

# Hype Cycle for User Experience, 2021

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Initiatives: [Software Engineering Technologies](#)

User experience is a core competency for digital product design and development for both customers and employees. Use this Hype Cycle to decide whether to adopt, explore or prioritize the leading innovations related to user experience.

## Analysis

### What You Need to Know

The innovations presented in this Hype Cycle reflect macro trends in user experience (UX) across industries. The discipline continues to shift from single practices, tooling and technology to be more about platforms, processes, methodologies, collaboration and the growing influence of artificial intelligence (AI) on design and development. This Hype Cycle embraces these overlapping, sometimes conflicting, topics. Any hyped topic associated with UX needs to be considered, and this Hype Cycle aims to guide teams on whether or not they should adopt, explore or prioritize the entries.

### The Hype Cycle

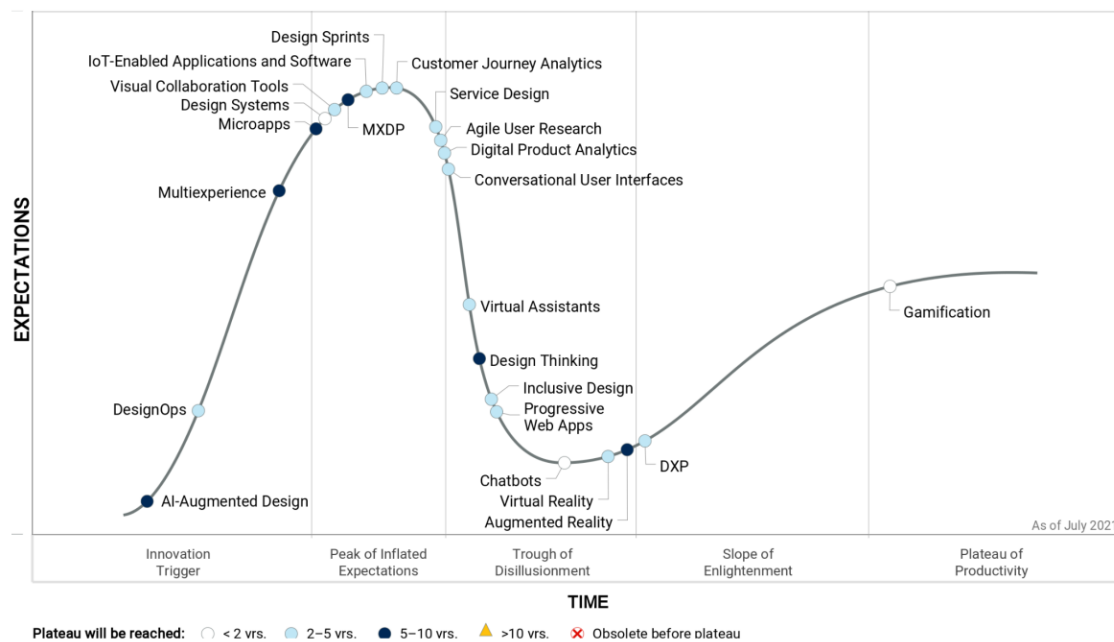
UX is necessary for exceptional and effortless experiences that drive measurable business results. At its core, it is a process — a process for creating high-quality digital products and services to deliver customer and business value. The technologies vary. Some affect how UX work is done, through defining or enhancing activities within the process, while others define or extend the range of possible digital solutions.

Several macro trends continue to accelerate the hype around UX:

1. Digital product design platforms. UX tools have evolved from purpose-built software apps, like screen design tools, into feature-rich platforms that enable design, collaboration, testing, handoff, design system and digital asset management.

2. Design systems. Traditional point-click-tap graphical user interfaces (GUIs) have been largely codified into repeatable user interface (UI) design patterns, libraries and open-source design systems. For the average website or app, it is no longer necessary to “start from scratch.”
3. Customer/user insights tools. Product offerings from the likes of UserZoom, User Testing and Qualtrics have increased in sophistication, further enabling agile research and ongoing monitoring of user segments, personas and individual users without slowing product delivery.
4. Contactless and touchless UIs. The next generation of human computer interaction will be contactless (using devices to communicate wirelessly with a system) or touchless (interacting with a system through sound and motion).
5. AI. Soon, AI will be able to produce sophisticated and near-production-ready designs and presentation layer code, shifting the role of the human designer from pixel-level creator to strategic curator of digital experiences.

**Figure 1: Hype Cycle for User Experience, 2021**



## The Priority Matrix

This Hype Cycle shows many technologies at or near the Peak of Inflated Expectations — reflecting the broader hype and more widespread maturity of UX. There is a shift from primarily technological solutions, working their way toward productivity with moderate and sometimes high impact, to new ways of working and paradigms that are climbing the peak with high or transformational impact. This composition tells a story of rapidly evolving maturity and a strategic shift in the importance of UX to the bottom line.

**Table 1: Priority Matrix for User Experience, 2021**

(Enlarged table in Appendix)

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Conversational User Interfaces IoT-Enabled Applications and Software Virtual Assistants	AI-Augmented Design Multiexperience	
High	Chatbots Design Systems	Customer Journey Analytics DesignOps DXP	Augmented Reality Design Thinking MXDP	
Moderate	Gamification	Agile User Research Design Sprints Digital Product Analytics Inclusive Design Progressive Web Apps Service Design Virtual Reality Visual Collaboration Tools	Microapps	
Low				

Source: Gartner (July 2021)

## On the Rise

### AI-Augmented Design

Analysis By: Brent Stewart

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Embryonic

#### Definition:

AI-augmented design, or generative design, is the use of artificial intelligence (AI), machine learning (ML) and natural language processing (NLP) technologies to automatically generate and develop user flows, screen designs, content and presentation-layer code for digital products.

#### Why This Is Important

AI-augmented design is in its infancy. Conceptually, the design community sees the bold, fascinating — and even frightening — future that AI-augmented design will enable. Gartner expects to see AI at work in the digital product design platform market soon, leading to major leaps in efficiency, quality and time to market. AI will appear first as feature-level support (e.g., intelligent design recommendations) and will rapidly transition to full digital product design capabilities.

#### Business Impact

In a future powered by AI-augmented design, 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 that ensure maximum usability and accessibility. In this future, user experience (UX) teams will shrink, and the remaining practitioners will be focused on research, strategy and design curation, rather than design production.

#### Drivers

To understand the drivers for AI-augmented design, consider this hypothetical scenario for creating an online store:

- Tell the AI that you want an online store; the AI will automatically generate the standard structural elements of an online store from the homepage to product detail templates to the shopping cart.

- Apply your style guide, giving the AI inputs on color, typography, iconography, photographic style, etc.
- Provide some inspiration to the AI by indicating a set of stores you'd like to emulate.
- Hit submit and, within minutes, the AI will produce three high-fidelity design directions on which you can evaluate and iterate.

Every design element will have an associated code component that is updated as you tweak or curate the final design.

The promise of operational efficiency and “democratization” of UX design contribute to the business case driving AI-augmented design. Key drivers in this category include:

- **Product delivery** — AI-augmented design promises to accelerate digital product delivery more than any technology in recent history.
- **Accessibility** — AI-augmented designs and code will account for assistive technologies and deliver the most accessible screen designs and code possible. This will drastically improve the digital lives of people with disabilities.
- **Democratization** — More and more nonprofessional (citizen) designers and researchers are engaging in UX tasks and must be able to produce high-quality experiences without deep design training or education.
- **UX/user interface (UI) design standardization** — The overwhelming majority of digital products are based on established product types and UI design patterns. In general, the standardization of common digital experiences continues to expand.

AI-augmented design will quickly apply three key technologies to common UX tasks, as they expand:

- Visual AI (computer vision)
- ML
- NLP

## Obstacles

The growth and velocity of AI-augmented design will be continually inhibited by three key factors:

- **Cost** — AI-augmented design is a heavy lift that requires deep talent, long timeframes and deep pockets.
- **Jobs** — AI-augmented design will drastically reduce low-level UX production tasks, reducing the need for production designers, presentation layer developers and UX writers. These team members will need to retool and “move left” to become UX design strategists/researchers who can guide and tweak the output of design bots.
- **Originality** — Since AI-augmented design pulls from established product types and design patterns, it will not be notable for its originality. Many UX practitioners are concerned that our UX will become too uniform and lack originality.

## User Recommendations

Software engineering leaders responsible for UX design should:

- Assess developments in AI-augmented design, specifically at Adobe, followed by Figma and InVision.
- Prepare digital product teams for the emergence of AI-augmented design, first through design-to-code technology, followed by bots that produce high-fidelity screen designs and written content.
- Transition the role of humans in the design process from production-level creators to strategic curators.

## Sample Vendors

Adobe XD; Figma; InVision

## Gartner Recommended Reading

[Emerging Technologies: Critical Insights Into AI-Augmented Software Development](#)

[Top Strategic Technology Trends for 2021: AI Engineering](#)

[Artificial Intelligence Maturity Model](#)

[Hype Cycle for Artificial Intelligence, 2020](#)

[Predicts 2020: Artificial Intelligence Core Technologies](#)

## DesignOps

Analysis By: Brent Stewart

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

### Definition:

DesignOps is a set of operational practices that enables design team management and product-level delivery of design assets. The team management side focuses on strategic alignment to the business, operations for the central design function and career development. The product delivery side combines UX, product management and technology operations to enable efficient and DevOps-compatible plans, estimates and processes that increase quality, enable collaboration and feed ongoing innovation.

### Why This Is Important

DesignOps introduces formalized approaches to governance, operations and people management. As a set of easy-to-use operational standards, DesignOps continues to gain in popularity as digital product companies (for example, Airbnb, Adobe and InVision) and agencies alike discover the tremendous value of a proven operational approach for UX team management and design delivery on product teams.

### Business Impact

The growth of DesignOps is due, primarily, to the value it creates during the delivery of design assets. Here, DesignOps does not alter the core skills and activities of a UX team; rather, it reorganizes them in a way that supports ongoing feature enhancement and idea generation without interrupting the continuous workflow of development teams. DesignOps represents the first widespread implementation of operational methods and techniques created not only for designers, but also for developers.

## Drivers

Modeled to be compatible with DevOps and agile practices, DesignOps structures and organizes design work to enable early and frequent feedback via collaboration between the user, the designer and the developer, as well as ongoing, iterative delivery of assets and design decisions to the development team. This allows product teams to run parallel tracks of work (dual-track agile) in which UX teams employ “continuous discovery” to understand the user, engage in research, explore various design directions, test possible solutions and document outcomes. It also allows them to progressively support early development activities such as tech design and story creation.

There are three key drivers behind DesignOps:

- **Innovation:** When coupled with DevOps, DesignOps leads to more innovative solutions. As a practice, DesignOps employs dual-track agile that sets aside ongoing tracks of work dedicated to new discovery, idea generation and design exploration. This work acts as a constant source of evidence-based, multidisciplinary innovation.
- **Speed:** DesignOps reduces the time to market for major updates and incremental feature enhancements alike. Due to the concepts of continuous discovery and continuous delivery, developers engage in tech design, architectural explorations and proofs of concept sooner than before, and with much deeper understanding of the overall vision.
- **Collaboration:** DesignOps increases communication and camaraderie between design and development teams. The design-development gap exists for many reasons, one of them being culture. DesignOps promotes multidisciplinary teams in workshop settings, design sprints or one-on-one “pairing and sharing” that promotes understanding, empathy and relationship building between these two crucially important groups.

## Obstacles

To a large extent, the growth of DesignOps is inhibited by key gaps in planning, estimation and tracking knowledge:

- Few UX practitioners are educated in detailed planning and estimation using a common work breakdown structure (WBS).
- Few product managers are trained in UX planning, estimating and tracking.



- Popular enterprise agile planning (EAP) tools are not designed with UX practitioners, activities and deliverables in mind (though this is changing).

## User Recommendations

Software engineering leaders should:

- Educate themselves about the practice of DesignOps
- Train their UX teams in the basics of agile
- Pilot the approach with a high-performing, multidisciplinary feature team

Following a successful pilot, application leaders and the pilot team members should

- Engage in a productwide rollout that involves training, updated product plans and the allocation of one or more persons to the role of design manager — essentially, a UX-focused product manager.

It should be noted that a successful rollout of DesignOps at the product level requires complete buy-in from product management, design and development teams, as well as robust logistical and administrative skills.

## Gartner Recommended Reading

[DesignOps: Organize, Collaborate and Innovate Product UX at Speed](#)

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

[3 Key Practices to Enable Your Multiexperience Development Strategy](#)

[Software Engineering Technologies Primer for 2021](#)

[Build Links Between Customer Experience, Multiexperience, User Experience and Employee Experience](#)

[Strategic Roadmap for Becoming a Digital Product Delivery Organization](#)

## Multiexperience

Analysis By: Jason Wong

**Benefit Rating:** Transformational

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Definition:**

Multiexperience describes interactions that take place across a variety of digital touchpoints (such as web, mobile apps, conversational apps, AR, VR, MR and wearables) using a combination of interaction modalities in support of a seamless and consistent digital user journey. Modalities include no-touch, voice, vision and gesture.

Multiexperience is part of a long-term shift from the individual computers we use today to a multidevice, multisensory and multilocation ambient computing experience.

**Why This Is Important**

Multiexperience (MX) is the new “omnichannel” for a digital-first world. Through 2030, the digital user experience (UX) will undergo a significant shift in terms of how customers, partners, citizens and employees experience their environments. MX is about the shift both in UX perception and in interaction models, which leads to a multisensory, multidevice, multilocation and multitouchpoint digital journey.

**Business Impact**

To achieve digital business transformation, it is essential to understand and exploit multiexperience. Applying multiexperience design to digital experiences removes friction and effort for the users — both customers and employees. Adopting MX will allow organizations to be more agile — delivering positive business outcomes by serving customers and employees in ways that best suit their needs and expectations.

## Drivers

- Organizations are shifting their delivery models from projects to products, but beyond products is the experience — the collection of feelings, emotions and memories. Web and mobile apps are already commonplace, but they are undergoing UX changes driven by new capabilities like progressive web apps, WebXR and artificial intelligence (AI) services. Conversational platforms allow people to interact more naturally and effortlessly with the digital world. Virtual reality (VR), augmented reality (AR) and mixed reality (MR) are changing the way people interact with and perceive the physical-digital world.
- As organizations continue to invest in customer experience (CX) and employee experience (EX), they will need to apply MX front-end architecture and technology strategies to be more agile at serving business needs and user expectations. When MX discipline is applied with great UX in support of CX and EX strategies, total experience (TX) transformation is achieved. TX requires MX to be executed with CX, EX and UX in harmony and synchronicity.
- The long-term manifestation of MX is a composable digital experience that is adaptive, seamless, collaborative, consistent, personalized and ambient. This will happen over the next five years — and has already been accelerated by the COVID-19 pandemic, which has increased reliance on digital touchpoints and no-touch modes of interaction. In this new decade, MX is needed to deliver transformative and memorable experiences for customers, employees and all users of your digital products and services.

## Obstacles

- Privacy concerns may dampen the enthusiasm and impact of MX adoption. Users will need to consent to sharing their location, accepting notifications and being tracked across their devices.
- On the technical front, the fragmentation of many consumer devices and the inconsistency of interoperability standards are enormous barriers to seamless MX integration of front-end technologies.
- The skills needed for MX development, such as immersive interaction design, are still lacking in most enterprise software engineering teams.
- Don't expect automatic plug-and-play of off-the-shelf devices, applications and services for MX. Instead, proprietary ecosystems of MX solutions will exist in the near term.

## User Recommendations

Application and software engineering leaders should:

- Identify three to five high-value, proof-of-concept projects in which MX design can lead to more effortless, compelling and transformative experiences.
- Use personas and journey mapping to address the requirements of diverse business use cases. Use external-facing and internal-facing scenarios to support a unified digital experience.
- Collaborate with UX design teams to create a design system that spans desired MX touchpoints and modes of interaction. This ensures that MX development teams can accurately and consistently apply visual, behavioral and written guidelines.
- Establish a multidisciplinary fusion team including (but not limited to) IT, product managers, UX designers and business stakeholders.
- Focus on understanding how unified digital experiences impact the business, and use evolving MX technologies to create targeted solutions for customers or internal constituencies.

## Gartner Recommended Reading

[How to Apply Design and Architecture to Multiexperience Application Development](#)

[Transcend Omnichannel Thinking and Embrace Multiexperience for Improved Customer Experience](#)

[Multiexperience Will Be the New Normal for Consuming Analytics Content in the Augmented Era](#)

## At the Peak

### Design Systems

Analysis By: Brent Stewart

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

#### Definition:

A design system is a repository of reusable assets — guided by clear visual, user interface and technical standards — that serve as the building blocks to quickly and consistently design and develop digital products. A typical design system is composed of four main sections: style assets, structural assets, code components and standards.

#### Why This Is Important

While design systems have been in use for years, they have only gained popularity recently. Market-leading digital product design platforms, such as Adobe, Figma and InVision, have robust features to quickly and easily transfer design assets into a web-based design system that can be accessed by the entire team. Popular SaaS platforms maintain their own design systems to facilitate application design and development on their platforms, including Salesforce, SAP and Pegasystems to mention a few.

#### Business Impact

A design system is one of the most important strategic assets for an organization that produces digital products. A robust design system drastically shortens design and development timelines, ensures the user interface (UI) design is consistent, predictable and usable, and guarantees brand compliance.

#### Drivers

The value proposition for design systems is strong:

- **Speed** — Design systems drastically reduce the time required to design and code the presentation layer by assembling and tweaking screen designs rather than designing them from a blank artboard.

- **Usability** — Design systems are typically composed of time-tested, proven UI design patterns that are familiar to most users. Foundational UI design heuristics, such as “visibility of system status” or “recognition rather than recall” are built into these patterns.
- **Consistency** — Design systems enable consistent user experiences across disparate teams, whether they are feature teams delivering into a single product or product teams sharing a design system across a larger product portfolio.
- **Scale** — Design systems make it easy for designers and developers to share common, approved design assets and code components across an entire portfolio of digital products.
- **Reduction of defects** — Over time, design system code components become “hardened,” leading to far fewer production defects in your presentation layer.
- **Brand compliance** — Design systems reinforce your brand identity and infuse key elements such as color and typography into every single design and code asset.
- **Accessibility** — Design system assets can be pretested for compliance with the latest Web Content Accessibility Guidelines (WCAG), eliminating unnecessary rework downstream.

## Obstacles

While valuable, the growth of design systems faces a number of challenges:

- **Level of effort** — Design systems require a fair amount of people, time, effort and cost to create.
- **Lack of governance** — Without a clear process to update and maintain a design system, it quickly becomes outdated and less impactful.
- **Originality** — Since design systems pull from established product types and design patterns, many user experience (UX) practitioners are concerned that their UXs will become too uniform and lack originality.
- **Executive buy-in** — Few executive leaders are aware of the strategic importance and tremendous business value of design systems.

## User Recommendations

Software engineering leaders responsible for UX should:

- Educate themselves about design systems by auditing leading examples such as Ant Design, Google Material Design, IBM Carbon and Salesforce Lightning.
- Assemble a cross-disciplinary team of UX, product development and product marketing to gather, organize, define and launch an enterprisewide design system.
- Evaluate and select a product or platform on which to build your design system.
- Update design and development processes to explicitly pull from the design system rather than starting from scratch for new initiatives.

## Sample Vendors

Google; IBM; InVision; Microsoft; Oracle; Pega; Salesforce; SAP; Storybook; zeroheight

## Gartner Recommended Reading

[Build Better Products Faster With Design Systems](#)

[DesignOps: Organize, Collaborate and Innovate Product UX at Speed](#)

[How to Build a User Experience Team](#)

[To Scale Digital Design, Add Just Enough Design Thinking Method to Agile Practices](#)

## Microapps

Analysis By: Jason Wong

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

### Definition:

A microapp is a discrete, yet reusable and portable, app function, process or workflow that operates within the context of a larger app or application — and possibly across multiple apps or applications. The microapp must be tightly scoped and is composed of user interface (UI), logic and data components typically bound to back-end microservices through a mediated API layer. Microapps can be used as part of a micro-frontend architecture to compose a fit-for-purpose user experience (UX).

## Why This Is Important

The term “microapp” is not new. But the architectural concepts of microapps as part of a mesh app and service architecture (MASA), and applied to multiexperience development (spanning web, mobile and conversational apps), are important to designing for composable business and achieving composable experiences. Microapps help scale front-end development because they are built and run as self-contained activities that may rely on common back-end services.

## Business Impact

- Microapps deliver composable experiences, enabling more dynamic and contextual user engagement.
- They improve agility and reuse, with an ability to develop functionality independently by different developers.
- They promote consistent UX, especially across a multiexperience user journey.



## Drivers

- Microapps have gained traction as part of mobile app development, but have yet to be more broadly embraced for multiexperience. However, there has been a steady increase in the use of micro-frontend application architecture that aligns with the use of microapps, such as creating a library of React-based modules or components. Microapps also support event-based scenarios to present interactions based on context, which aligns with event-driven architecture trends.
- In recent years, the total number of vendors using the term “microapp” to describe capabilities of their offerings has steadily increased. Enterprise software providers, such as SAP and Citrix, are also enabling and delivering microapps for greater configuration of a multiexperience UX.
- Some providers have started to create “super apps,” which are the runtime mechanism for distributing microapps from their ecosystem and developers. The WeChat and Alipay apps in China are examples of super apps that allow for third parties to create and deploy miniprograms within their apps. Enterprise collaboration and messaging platforms, such as Microsoft Teams and Slack, are taking cues from these consumer super apps to also enable third parties to create and distribute microapps within their main mobile or web apps.
- On the enterprise side, Tata Digital announced the creation of its own super app to bring all the Tata Group consumer businesses onto a single platform. This is an evolution of the apps economy, driven by digital business ecosystems. Microapps align with agile development practices and support the shift to smaller units of development work that can be delivered continuously. Organizations must align to agile and DevOps practices to effectively deliver microapps, and shift to cloud-centric development to streamline self-service development and DevOps processes. Security and governance is a concern when multiple microapps, from different providers, run in a larger application context.

## Obstacles

- One main challenge is in designing for microapps. This requires understanding the user journey and breaking down interactions into microjourneys. This mature UX design approach allows for microapps to be used across mobile apps, as well as in web apps and supporting conversational apps, such as a card UI within a chatbot interaction.
- The development effort requires a high level of skills and coordination. Some organizations rely on specific client-side frameworks or proprietary platforms, such as low-code application platforms (LCAPs) or multiexperience development platforms (MXDPs), to implement an architecture supporting microapps. Using platforms and frameworks could lead to vendor lock-in risks; therefore, development teams must use appropriate isolation techniques to separate their code.

## User Recommendations

Application and software engineering leaders should encourage their teams to:

- Address the need to support ever-increasing digital experiences by using microapps to facilitate multiexperience development running on the MASA.
- Identify suitable development frameworks or technologies for microapp enablement and orchestration across your target touchpoints (e.g., web, mobile app, chatbots).
- Avoid functional conflicts by managing governance of the microapp runtime container's capabilities (such as permissions, user consent and location service).
- Learn and strengthen modern application development skills that improve architecture, development and delivery.

## Gartner Recommended Reading

[3 Key Practices to Enable Your Multiexperience Development Strategy](#)

[Essential Skills for Modern Application Development](#)

[One Versus Many — When to Consolidate Your Enterprise's Apps](#)

## Visual Collaboration Tools

Analysis By: Brent Stewart

**Benefit Rating:** Moderate

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Definition:**

Visual collaboration tools offer a set of features designed to enable collaborative creativity in a real-time, cloud-based workspace. Visual collaboration tools go way beyond the virtual whiteboard with feature sets and templates that allow users to facilitate live sessions, run planning sessions, generate ideas, evaluate concepts, and co-design.

**Why This Is Important**

Prior to COVID-19, visual collaboration tools were already gaining traction. Since the remote work imperative, they have become a key toolset for creative teams, including UX. Top vendors in the market have successfully handled their new status and the associated business and functional demands, revealing a level of maturity that is remarkable. Gartner expects visual collaboration tools market to expand and solidify a foundational role in the continuing global shift to remote work.

**Business Impact**

Visual collaboration tools further legitimize and support the case for remote work. In fact, it is possible visual collaboration tools elevate creativity in general due to the frameworks they provide for ideation, evaluation and participation (by multiple team members and/or customers).

**Drivers**

- **Shift to remote work:** Global shift to remote work makes visual collaboration tools the “new whiteboard.”
- **Design thinking and collaborative creativity:** The rise of design thinking and collaborative creativity in the form of workshops, design sprints, strategy sessions and more requires a shared workspace that enables shared ideation, evaluation and decision making.
- **Tools and templates:** Visual collaboration tools include templates for brand, business, marketing and product strategy methods and techniques that accelerate discovery, exploration and validation

## Obstacles

- **Return to the office:** As the pandemic subsides, Gartner expects several companies will return to the office and/or implement hybrid working models. When teams can gather around a physical whiteboard, visual collaboration tools become less critical.
- **Digital product design platforms:** Collaboration and co-design features in digital product design platforms, specifically in Figma, are close to — or on par with — purpose-built visual collaboration tools.
- **Integrations:** Visual collaboration tools need to enable deeper integration with design, product management and development tools to become a permanent part of the digital product design toolset.

## User Recommendations

Software engineering leaders interested in collaborative creativity should:

- Engage in a platform evaluation and selection process.
- Employ a visual collaboration tool as the de facto meeting tool for research, strategy and creative teams (potentially replacing Zoom, Teams or Webex).
- Plan and execute workshops and design sprints on the selected platform.
- Plan and execute user research methods and techniques that require real-time one-on-one facilitation.

## Sample Vendors

Bluescape; Figma; Miro; MURAL

## MXDP

Analysis By: Arun Batchu, Jim Scheibmeir, Van Baker, Adrian Leow

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Emerging

**Definition:**

A multiexperience development platform (MXDP) offers development teams an opinionated and integrated set of front-end development tools and “backends for frontends” services. Its purpose is to enable distributed and scalable development (both in teams and architecture) of fit-for-purpose apps across digital touchpoints and interaction modalities.

**Why This Is Important**

A MXDP unifies front-end application development activities across heterogeneous types of apps so that the user experience (UX) across these apps is seamless, persistent and enjoyable. MXDPs ensure maximum reuse and accelerate development velocity.

**Business Impact**

- Delightful application user experiences that seamlessly and persistently span multiple devices and augment human senses (touch, vision, auditory).
- Simplified and composable construction of complex front-ends that speed-up application development and deployment.
- Smoother development experiences resulting in more engaged and loyal software engineers.
- Reduction of the number of development teams and personnel by allowing cross-platform development.

**Drivers**

- Need for consistent, seamless and distinctive application experiences that span an increasing number of end-user computing devices.
- Need for ambient (no-touch) experiences accelerated by the pandemic.
- Increased sophistication of multiexperience development platform technology.
- Increased demand for digitalization of industries using heavy machinery or operating in hazardous environments.

## Obstacles

- Lack of portability of applications across MXDPs and vendor lock-in.
- Immaturity of immersive technologies.
- Inconsistent implementation of browser models across multiple devices and operating systems.
- Platform licensing costs, especially for consumer facing use cases.
- Learning curve for proprietary stack.
- Lack of and retention of trained personnel.
- Preference for open-source software stacks.

## User Recommendations

- Guide teams to consider an MXDP as a supplement to open-source software stacks and low-code application platforms (LCAP).
- Drive innovation by having teams demonstrate the power of MXDPs to business and upper management stakeholders.
- Narrow down a consideration set by using Gartner's Critical Capabilities research for MXDPs.
- Use Gartner's Magic Quadrant research to pick a vendor that best matches the strategic vision and expectations of product execution.
- Evaluate licensing costs at scale, before increasing the impact of MXDPs.
- Develop plans for training and recruiting developers for the chosen MXDP.
- Mitigate lock-in risk by encouraging modularizing of applications and replacing them with open source stacks when appropriate.
- Utilize software engineering skills to extend the MXDP offerings with custom and reusable modules that citizen developers can utilize in no or low code development.

## Sample Vendors

Appian; Builder.ai; GeneXus; HCL Software; Mendix; Neptune; Neutrinos; OutSystems; Pegasystems; Salesforce; SAP; ServiceNow; XOne

## Gartner Recommended Reading

[Technology Insight for Multiexperience Development Platforms](#)

[Magic Quadrant for Multiexperience Development Platforms](#)

[Critical Capabilities for Multiexperience Development Platform](#)

## IoT-Enabled Applications and Software

Analysis By: Benoit Lheureux, Jim Robinson, Tim Faith

**Benefit Rating:** Transformational

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

### Definition:

IoT-enabled applications and software are designed or enhanced to directly leverage IoT. Such that they are integrated with IoT edge devices and technologies, often (not always) via IoT platforms. Secondly, so they can ingest and analyze IoT data to improve situational awareness, and optionally orchestrate a business response or device action. Thirdly, so they can interact bidirectionally with digital twins to accomplish the above.

### Why This Is Important

Integrating Internet of Things (IoT) connected products, assets, people and processes directly with enterprise applications and software is a key technology enabler for data-driven business decision-making and automation. However, to help enable this digital transformation, companies will need to make substantial technology and skills investments in order to design, develop, manage and support IoT-enabled applications and enterprise software.

## Business Impact

- Most forms of enterprise applications and software will eventually be IoT-enabled, simplifying the adoption of IoT via new applications and upgrades.
- Some forms of IoT-enabled applications (e.g., asset performance management [APM], enterprise asset management [EAM], field service management [FSM], and product life cycle management [PLM]) and software (e.g., analytics, modeling and simulation) are emerging more quickly.
- Native IoT-enabled applications and software will appeal to enterprises that prefer a buy-over-build approach to adopting IoT.



## Drivers

- When IoT is used to enhance traditional business applications (e.g., APM, CRM, EAM) and software (modeling, visualization, simulation), it delivers significant business benefits (e.g., design improvement, remote monitoring, asset and process optimization, condition- and predictive- based maintenance, improved customer service) — see [Why Machines Customers May Be Your Service Departments' Best Advocates](#).
- Some companies are finding it easier to acquire new, native IoT-enabled business applications (e.g., building information management [BIM], EAM, FSM) and software (production or system modeling and simulation) rather than integrating new IoT technologies with their legacy (i.e., pre-IoT) business applications and software, which requires strong IoT device integration skills and the skills to develop new, IoT-enhanced workflows (see [How Can Organizations Integrate IoT Digital Twins and Enterprise Applications?](#)).
- Business increasingly needs two-way engagement between “machines” and related applications and software, in order to close traditional situation awareness gaps and inefficiencies and thus improve asset and process monitoring, automation, optimization and maintenance.
- Enterprises driving cost optimization in industries — such as manufacturing, oil and gas, and utilities — are exploring ways to leverage IoT-enabled applications to improve outcomes.
- Technology providers are investing in IoT to further enable their business applications and software offerings.
- IoT data helps to enable ever faster planning cycles required by the business.
- Customer organizations will increasingly rely on “machine customers” to broker activities based on data received from the endpoints — sales and service providers will need to react.

## Obstacles

- Significant IT resources are needed to acquire or upgrade to new IoT-enabled applications and software. For many companies, such effort is comparable to CRM or ERP application upgrades.
- Organizational barriers between IT and operational technology (OT) will inhibit integration of traditional IT master data (e.g., customer, order master) with commercial and industrial OT data.
- IoT-enabled business applications and software are fairly complicated because they are implemented as part of an end-to-end IoT business solution architecture (see [Use the IoT Platform Solution Reference Model to Help Design Your End-to-End IoT Business Solutions](#)).
- Integrating IoT-enabled business applications and software with brownfield OT edge devices (for example, programmable logic controllers (PLCs), supervisory control and data acquisition [SCADA] and historians) requires significant investment in new technology.
- The heterogeneity of endpoint communications complicates organizational efforts to scale. It will likely take years for IoT-enabled business applications to mature.

## User Recommendations

- Acquire IoT-enabled business applications or software whenever IoT, data-driven insights can increase the overall value and impact of any new business capability or software investment.
- Identify any commercially viable, high-impact IoT-enabled business outcomes in your business and use these to help determine if you should consider IoT-enabled business applications or software.
- Determine if your best option is investing in new, IoT-enabled applications and software, or integrating IoT technology with legacy business applications and software.
- Ensure collaboration between IT and OT staff whenever implementing new, IoT-enabled business applications and software to help achieve a better ROI on your investment.
- Integrate new IoT technologies with legacy (pre-IoT) business applications and software when new IoT-enabled applications and software are neither available nor mature enough to meet your needs.

## Sample Vendors

Bentley Systems; GE Digital; Oracle; PTC; SAP; Uptake

## Gartner Recommended Reading

[Market Guide for Digital Twin Portfolios and Enabling Technologies](#)

[How Can Organizations Integrate IoT Digital Twins and Enterprise Applications?](#)

[Survey Analysis: Focus on Practical Outcomes for IoT Projects](#)

[Use the IoT Platform Solution Reference Model to Help Design Your End-to-End IoT Business Solutions](#)

[Why Machines Customers May Be Your Service Departments' Best Advocates](#)

## Design Sprints

Analysis By: Brent Stewart

Benefit Rating: Moderate

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Definition:**

A design sprint is a multiday, workshop-style process designed to solve business problems through strategic design exploration, prototyping and rapid user testing. Popularized by Jake Knapp's book *Sprint*, design sprint methods and techniques have been in use for years — mainly at leading agencies and product companies. A typical design sprint lasts five days and includes steps to define the business problem, generate ideas, prototype the solution and test the prototype with real users.

**Why This Is Important**

Design sprints are an important process in design and development, enabling the rapid generation and evaluation of big ideas without delaying agile development. They are also an excellent method to foster innovation, whether for new ideas, revolutionary ideas or to identify new ways to solve old problems. By employing design sprints, an organization taps its collective knowledge to gain deeper insight from cross-disciplinary subject matter experts, which leads to superior business results.

**Business Impact**

Many popular and impactful products — both digital and physical — were born during a design sprint, or a similar process. Design sprints give businesses a fast, proven and human-centered means to generate and/or evaluate new ideas, experiences, designs and products. Very few methodologies in business move at the speed of technology. Design sprints are an exception and have become a popular way to infuse experience research and experience strategy into rapid design-development cycles.

**Drivers**

Design sprints promote valuable business results:

- **Innovation:** The first and most important business impact of design sprints is innovation. True and meaningful innovation requires deep expertise, diversity of thought, empathy for users and validation of requirements. Design sprints empower organizations to innovate quickly and cheaply, while still maintaining their ability to incrementally evolve and maintain core products and services.

- **Accelerate product delivery:** At the core, a design sprint is simply a shortened version of the human-centered design process. While deeper HCD is often required, design sprints provide a “quick and dirty” evidence-based approach to design. As a result, teams that use design sprints drive deeper consensus and move faster than the average product team.
- **Collaboration and decision making:** Design sprints also have a significant cultural impact on an organization. During a design sprint, ideas rule the day, not people. This democratization of influence is empowering to individuals who may not always have a voice at the table of product strategy and innovation. Also, the experience of collaborative creativity builds bridges between people, teams and across disciplines. Most critically, design sprints open channels of communication and build relationships that close the gap between design and development, leading to better ideas, easier execution, superior design and higher quality releases.

## Obstacles

The only real obstacles to design sprints are operational:

- **Workshop skills:** In order to succeed, a design sprint must be planned meticulously and run with precision and finesse. Only experienced workshops planners and facilitators can do the low-level planning, preparation and ongoing production work.
- **Availability:** A design is worthless unless you have the right attendees — both from the UX team and the business. For the average product team, it is difficult to lose key team members from product delivery tracks of work for an entire week or more.

## User Recommendations

- Educate software engineering leaders and their teams in the practice of design sprints and periodically employ them for larger scale strategic initiatives, new product concepts and transformative feature enhancements.
- Know that design sprints are overkill for smaller, incremental improvements. Product teams with collaborative workshop experience can learn the design sprint process easily with the help of articles, books, and shared templates.
- Engage with in-person or online training in design sprints for UX and product management leaders for less experienced practitioners.
- Once these individuals develop proficiency in design sprint planning, execution and follow-up, train additional senior members on their respective teams.

## Gartner Recommended Reading

[DesignOps: Organize, Collaborate and Innovate Product UX at Speed](#)

[Use 3 Design Thinking Principles in Everyday Product Management to Drive Innovation](#)

[Executing on Innovation: Design the Process From Idea to Value Achieving Consensus in Solution Design \(Google\)](#)

## Customer Journey Analytics

Analysis By: Matthew Wakeman

Benefit Rating: High

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

### Definition:

Customer journey analytics (CJA) is the process of tracking and analyzing customers and prospects that interact with an organization via multiple channels. It covers all channels the customer has used, including those with human interaction (such as a call center) and that are fully automated (a website), provide assisted help to the customer (live chat and co-browsing), operate in physical locations (a retail store) and have a limited two-way interaction (advertising).

## Why This Is Important

Consumers expect personalized engagement and marketers need to deliver it — challenging marketing strategies that take an inside-out approach to the customer experience. Moreover, customers often hop between channels, so continued investment in understanding customer behavior within a single channel will fail to deliver more valuable insights than understanding the combination of channels they use.

## Business Impact

CJA is a strategic priority for a variety of internal roles in several different industries, as marketing leaders strive to gain a better understanding of the customer journey across all phases — acquisition, retention, satisfaction, advocacy and loyalty. CJA can also optimize and deliver these experiences in real-time and at scale. In some cases marketers will be able to leverage CJA features in their existing martech stack rather than add a stand-alone vendor.

## Drivers

- CJA is a strategic priority for a variety of internal roles in several different industries, as marketing leaders strive to gain a better understanding of customer acquisition, retention, satisfaction, advocacy and loyalty.
- Complex challenges of delivering personalized experiences (in real-time and at scale) require marketers to measure each phase of a journey to optimize the journey based on the customer (or customer segment) context and intent.
- CJA is accelerating in adoption as more applications begin to add elements of journey analysis into existing tools, such as customer data platforms, personalization engines, customer analytics applications and multichannel marketing hubs.

## Obstacles

- Marketers are challenged by being able to access, analyze and activate all the customer data of their companies — from website activity to call-center engagement. Gartner surveys conducted in late 2020 show leveraging integrated customer data for insight and generation and enabling personalized customer data are among top challenges.
- Privacy regulations, consumer concerns about the privacy and security of their personal information require marketers to be transparent about customer data collection — a requirement that will impinge on their ability to power their CJA toolsets.
- Without developing a clear strategy for capturing and linking the right data in each channel, organizations will lack a true understanding of the customer journey beyond interactions where customers are forced to reveal their identity.

## User Recommendations

- Acknowledge that valuable insights come from understanding the combination of channels used by customers, not by understanding customer behavior within a single (KPI) channel.
- Avoid key performance indicators (KPIs) that fail to consider the implications of customer activities in other channels, such as single-channel conversion rates or ROAS.
- Start with customer identification and journey mapping across only two to three channels, where the journey benefits the customer and organization (high impact) and the data are both available and valuable (high feasibility).
- Evaluate your existing technology stack to see if you're already paying for an application with journey analysis capabilities because journey analysis functionality is often embedded into other systems now.

## Sample Vendors

Adobe; Cerebri AI; Splunk; Teradata

## Gartner Recommended Reading

[Market Guide for Customer Journey Analytics](#)

[The Gartner Marketing Technology Vendor Guide](#)



## Service Design

Analysis By: Brent Stewart

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Early mainstream

### Definition:

Service design is a subset of user experience design and involves the planning, organization and design of a business' internal tools and processes to directly improve the product user experience for the employee and, indirectly, the overall customer experience (CX). As employees become more efficient, better informed and more capable through high-quality service design, they transfer those benefits to the user in the form of improved service and support.

### Why This Is Important

Coined as a term in 1984 by Lynn Shostack in Harvard Business Review, "service design" has experienced a renaissance as user experience (UX) practitioners apply these time-tested principles to digital businesses. In the process, they have extended and enhanced the methods and techniques of the discipline by employing common UX practices such as journey mapping and persona development.

### Business Impact

For most brands, customer service is a key business capability and potential differentiator that can make or break a company. While service design can be focused only on the internal user, its greatest impact is on the customer that benefits from more informed and efficient service personnel. This fact is even more apparent for digital businesses that rely on exceptional service and support to compensate for the lack of face-to-face interactions, especially in the time of COVID-19.

### Drivers

The business results of high-quality service design drive this design discipline forward:

- **Operational efficiency:** According to the Gartner Digital Friction Survey conducted in 2020, employee work effectiveness, productivity, intent to stay and discretionary effort all benefit significantly from a high-quality employee user experience.

- **Relationship building:** Service design helps employees understand task and role dependencies, which leads to better communication, collaboration and comprehension with co-workers.
- **Employee morale:** A more efficient and well-organized workplace is naturally more enjoyable. When employees feel productive and empowered by the people, systems and processes around them, they thrive.
- **Customer service and support:** Consumers consistently rate customer service as a key decision-making and purchasing factor. As such, the quality of service design is a way to either build customer loyalty and satisfaction or erode customer relationships and stoke attrition.

## Obstacles

Only a few key factors inhibit the growth of service design:

- **Customer-only focus:** This is the primary obstacle to service design. Most organizations put 100% of their focus and effort into customer-facing experiences and never make time for internal tools, systems and processes.
- **Lack of resources:** Most organizations lack the time and budget for internal initiatives.
- **Culture:** Corporate cultures are often resistant to change — especially if it affects the tools, systems and processes that are used regularly.

## User Recommendations

- If your organization interacts with customers in any communication channel — real-time, asynchronously or via bots — service design can provide tremendous benefit. Application leaders should study the recent history of service design to build a foundational understanding and to gauge its potential benefits.
- Service design requires a deep understanding of business process, workflow, UX design and operations. While service designers exist, they are rare and difficult to source. Instead, consider repurposing a UX designer, researcher or strategist with strong analytical skills and the ability to promote cross-discipline collaboration.

## Gartner Recommended Reading

[3 Strategies to Make the Case for Investing in Employee UX](#)

[Proven Design Principles to Deliver a High-Value Employee User Experience](#)

[Success in the Digital Experience Economy Requires Connecting MX, UX, CX and EX](#)

[Magic Quadrant for Intelligent Business Process Management Suites](#)

## **Agile User Research**

**Analysis By:** Brent Stewart

**Benefit Rating:** Moderate

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

### **Definition:**

Agile user research is a type of discovery designed for rapid planning, execution and analysis, that prioritizes speed and decision support over in-depth and time-consuming analysis. Using agile user research as a “snapshot” assessment, practitioners conduct small, cross-sectional studies over the course of one to three days that enable near-real-time feedback of features, flows, content and ideas.

### **Why This Is Important**

Agile user research represents the triumph of evidence-based design and decision making over opinion and anecdote — that are often flawed — in agile environments. Using rapid prototyping as well as the speed of online user research and testing platforms, agile user research gives voice to the customer, and valuable guidance to design and development teams, without slowing delivery.

### **Business Impact**

Agile user research is valuable to any organization that seeks to deliver user-centered products, services and experiences, and wishes to validate decisions made at the speed of agile development. Agile user research is most effectively used to evaluate experiences and provide evidence to support decision-making during a given build, such as: “Are we on the right track?” or “Is the new workflow usable?” or “Which features should we cut if we need to descope?”

## Drivers

Agile user research continues to expand, particularly among organizations with mature UX functions. Three drivers of growth, in particular, stand out:

- **Risk mitigation:** Agile methodology is defined by change in response to contextual shifts, opportunities and constraints. Agile user research provides the means to mitigate the risk of an untested feature or scope change.
- **Decision support:** Without agile user research, response to change is just a guess (and often, an uneducated one). When descopeing, for instance, how do you know which features to push to the next build? Agile user research is the means to an informed decision.
- **Scope management:** Agile user research enables teams to validate features, functions and content for a given build. This often results in adjustments to scope — either to add or remove — based on direct user input.

## Obstacles

As with many UX practices, the only obstacles of note are operational:

- **Expertise:** Agile user research requires a moderate amount of expertise with research design and tools. However, experienced researchers are in high demand and difficult to acquire. While many UX designers have the ability to set up simple usability tests using templates and tools on popular user research and testing platforms, their abilities are limited.
- **Impact on delivery:** Even though agile user research is designed to be fast, there are objections about the impact of research on the schedule. While effective agile research may add a small amount of time, it is intended to reduce the risk to the schedule — and the business — by designing and building the *right* product, not just *a* product.
- **Cost:** Agile user research requires resources and money. All in, quick cross-sectional agile user research work only costs a few hundred to a few thousand dollars per study. For some organizations, the cost of agile user research is not justified by its expected results.

## User Recommendations

Agile user research is an imperative for software engineering leaders who want to build successful products and experiences.

- Create project plans, estimates and roadmaps that include agile research during design exploration, design production, technical development and post launch, to ensure products meet user needs and business objectives. This works for organizations with an existing user research capability.
- Entrust UX designers to fill the agile user research gap, if your organization is without a user research function. Most UX designers are well-versed in the basics of agile user research and can effectively design and execute simple usability tests.

## Gartner Recommended Reading

[Improve Customer Acquisition, Satisfaction and Loyalty via User Research and Testing](#)

[Tool: User Research Methodology Guide](#)

[Survey Analysis: Customer Experience Leaders Rely on User Research for Successful Programs](#)

[Maturity Model for User Research](#)

[DesignOps: Organize, Collaborate and Innovate Product UX at Speed](#)

## Digital Product Analytics

Analysis By: Melissa Davis, Jason Wong, Aapo Markkanen

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

### Definition:

Digital product analytics are tools to analyze digital product usage and performance to better understand and improve end-user outcomes. These tools typically apply web and mobile app analytics, along with other feedback mechanisms, to generate specific insights on usage and performance KPIs for product enhancements.

## Why This Is Important

Digital product analytics have been around for years and used by digital-native product companies. Tools are used to analyze data from mobile and web apps, but are also increasingly applied to IoT devices and enterprise software. Consumer brands use product analytics to refine the user experience and optimize engagement. As enterprises shift from project delivery to product delivery, mainstream companies such as Capital One, and Adidas are adopting digital product analytics.

## Business Impact

End users responsible for digital products can improve adoption, CX, retention and revenue by:

- Tracking app usage to find upsell or cross-sell opportunities and licensing compliance gaps.
- Providing personalized intervention to guide users through real-time in-app messaging, driven by the user's interactions.
- Improving the UX by finding trouble spots in workflows/customer journeys
- Prioritizing enhancements most relevant to users.
- Exposing detailed usage metrics.
- Refining app packaging and pricing.

## Drivers

- A high priority has been placed on improving customer experience based on the digital experience.
- There is a trend toward data-driven decision making for product investment prioritization.
- Purpose-built tools for product managers and product teams are increasingly available.
- The COVID-19 crisis has elevated the need for optimized digital user experience as organizations respond to changing priorities from physical to digital experiences.

## Obstacles

End users responsible for digital products should take actions to minimize obstacles such as:

- Usability and technical depth of digital product analytics tools require careful balancing as the addressable user base continues to expand from data scientists and analysts to less-technical users. Many of the available tools still require a relatively steep learning curve from business users.
- Data privacy considerations restrict real-life application of product analytics, despite anonymization and other privacy-enhancing features. In particular, products with small user bases, which are common in B2B applications, can be complicated to analyze in that regard.

## User Recommendations

End users responsible for digital products should:

- Architect any new digital products for use of digital product analytics and study the options for optimizing existing products for the same.
- Think about employee-facing applications (particularly the custom-developed ones), not just digital product analytics, as digital products with a life cycle to be maintained and optimized.
- Build a data management and governance framework that helps control analytics orchestration and processes as use of the tools expands beyond analytics experts.
- Leverage the quantitative data from product analytics to support data-driven, data-informed and data-inspired decision making in product management, thus complementing the insights available from qualitative techniques such as interviews and surveys.
- Explore the potential to improve go-to-market elements of the product strategy — for example by refining pricing models and tiers through analysis of customer segments and conversion drivers

## Sample Vendors

Amplitude; Countly; FullStory; Gainsight; Heap; Mixpanel; Pendo; Pyze; Quantum Metric

## Gartner Recommended Reading

[Market Guide for Web, Product and Digital Experience Analytics](#)

[Competitive Landscape: Product Management Tools](#)

[Worlds Collide as Augmented Analytics Draws Analytics, BI and Data Science Together](#)

[Product Manager Insight: Changes in Product Data and Insights Through 2025](#)



## Sliding into the Trough

### Conversational User Interfaces

Analysis By: Magnus Revang, Van Baker

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

#### Definition:

Conversational user interface (CUI) is a high-level design model in which user and machine interactions primarily occur in the user's spoken or written natural language. The sophistication of a CUI can vary from understanding just simple verbal utterances to handling complex multiturn interactions.

#### Why This Is Important

CUIs promise a shift in responsibility between the user and the interface. In traditional UIs, the user operates the technology and is largely responsible for the effects of using it. In a CUI, this responsibility shifts. The CUI is responsible for determining the user's intention and executing it, meaning the CUI has taken over some of the responsibility from the user. This makes CUIs the first widespread adoption of agent user interfaces for software, devices and the IoT.

#### Business Impact

The conceptual shift away from the user as the operator, toward the user conversing with an agent that will execute on a determined intention, has a greater impact on the enterprise than most realize. Training, onboarding, escalations, productivity, empowerment and responsibility all change with this new model and need to be embraced as part of CUI projects. Treat CUIs as transformative, and plan on CUIs becoming the dominant interaction model in the future.

#### Drivers

- The underlying technology supporting CUIs, either front ends delivered as part of software or custom-developed CUIs (like chatbots and virtual agents) built on top of conversational platforms, still needs to evolve until it reaches its potential. Vendor and technology choice are tactical for the foreseeable future. Voice will also arrive as a strong modality.

- Users increasingly expect to be able to hold conversations and ask natural language questions of applications they use.

## Obstacles

- Developing a good CUI requires much more effort than similar instructional GUIs. More intelligence has to be built into the conversation to deal with different kinds of users, different modalities and different edge cases.
- A conversational UI will make predictions about the user's intent. These predictions will sometimes be wrong, so the designer of a CUI has to have deeper knowledge about potential consequences, and design defensively with nonreversible actions and keeping ambiguity in mind.
- CUIs will need to employ anthropomorphism for the foreseeable future, lending elements of human communication to make it easier for users. A lack of personality, fragmented tone of voice, poorly written dialogue and flows that do not align with the user's behavior are affecting user sentiment toward CUIs, labelling them simple and, in many cases, useless.

## User Recommendations

- Prepare for CUIs to communicate with each other. Larger architectures connecting different use cases for CUIs, like virtual agents for customer service, HR, IT to front ends for enterprise software, business intelligence tools, etc., will be a central challenge for organizations in the next three to five years. This will lead to a variety of architectural models entering the market, such as CUI-to-CUI communication and specialist tooling.
- Prepare for new roles in the enterprise. Dialogue designer, AI trainer, digital coach, humanizer and AI interaction designer are all titles Gartner is seeing in the market to support the creation of conversational experiences.

## Virtual Assistants

**Analysis By:** Van Baker

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Definition:**

Virtual assistants (VAs) help users with tasks previously handled by humans. VAs use semantic and deep learning models, natural language processing, prediction models, recommendations and personalization to interact with people via voice or text conversations. Increasingly, they also automate processes and workflows. VAs learn from user behaviors, build data models, and recommend and complete actions to support VA users. VAs can be deployed in simple as well as complex use cases.

**Why This Is Important**

Conversational interactions are inherently appealing to both customers and members of the workforce. The ability to converse with applications to retrieve information or accomplish transactions is a natural extension of human-to-human interactions to human-to-machine interactions. A well implemented virtual assistant is always available, cannot be distracted, and can be very efficient in assisting humans in accomplishing tasks and retrieving necessary information.

**Business Impact**

VAs, RPA, event brokers and other technologies are automating the enterprise. VAs use contextual multiturn conversations to drive business workflows. Integration with enterprise applications enhances the handling of complex tasks by VAs. Consumer VAs led to enterprise VAs embedded in SaaS platforms. Business channels such as websites, mobile apps and messaging are commonplace. Voice-based VAs are becoming the focus of conversational AI providers. Additionally, use of VAs can expand hours of operation and improve customer response time.

## Drivers

- Customer expectation for access to customer service anytime, anywhere. This is especially true for online e-commerce businesses that have seen extreme growth in response to the pandemic.
- Consumer expectation for access to product information anytime, anywhere. E-commerce is a 24/7 business and consumers expect to get their answers whenever they engage.
- Employee access to information on a real-time basis via conversational queries, resulting in enhanced productivity because of increased use of business-critical information.
- Increasing demand for technology that is easy to understand and interact with. While this is true for all workers, it is especially needed by remote workers in the enterprise.
- A strong desire by businesses to automate business workflows and processes wherever automation can deliver value to the business.
- The ability to initiate communication with your workforce in response to event triggered conditions or transactions. This facilitates more timely response to changing business conditions by removing the need for workers to initiate transactions.
- The ability of conversational AI platforms to deliver more complex transaction capabilities spanning multiple users and business processes.
- Improved access to the business across multiple channels addressing the preferences of particular customer segments, allowing them to select their channel and modality of choice.
- Improving capability for conversational AI platforms to use natural language generation. This allows the virtual assistants to initiate interaction with customers and employees rather than just reacting to user requests.
- VA tools are becoming available that enable the automatic ingestion of unstructured and structured data to enhance and improve the language models.
- Enabling technologies are making creation of VAs easier such as low-code tools, automated identification of intents and entities, and the use of APIs for complex integrations.

## Obstacles

- Poor or inadequate language models for the use case that is deployed. The virtual assistants need to be able to respond to an extraordinary variety of users' questions. They should also be able to handle off-topic questions to some degree.
- Inadequate conversational AI platforms that do not have the capabilities needed to deliver virtual assistants. Many platforms lack the ability to handle complex transactions, context switching, multi-intent utterances, strong integration, process automation and other functionality needed for virtual assistance level capabilities.
- A design approach that oversimplifies use cases for virtual assistants. Many dialogue designs assume consistency in the way that people ask questions or do transactions that do not exist. This often leads to successful pilot development efforts that fail upon deployment.
- The need for ongoing continual retraining of the language models is often overlooked or ignored leading to poor performance over time.

## User Recommendations

- Assess the continual rapid evolution of the technologies that support the creation and deployment of virtual assistants. These technologies are evolving at a very rapid pace that is not expected to slow in the near term.
- Deliver significant levels of integration and business process automation in conjunction with virtual assistant conversational capability as the platforms in the market are becoming increasingly sophisticated. Many conversation AI platforms include workflow automation capabilities as part of their offering.
- Evaluate that VAs will have voice and text capabilities with voice becoming the dominant modality.
- Define a chatbot strategy at the enterprise level and decouple the technical decisions from it.
- Pick your core services by favoring modular technical solutions that allow the same.

## Gartner Recommended Reading

[When Should I Use Embedded Conversational Assistants?](#)

[Making Sense of the Chatbot and Conversational AI Platform Market](#)

Craft a Chatbot Initiative Based on Your Business Requirements and Solution Complexity

Roles and Responsibilities for Scaling Chatbot Initiatives

Solution Criteria for Enterprise Conversational AI Platforms

## Design Thinking

Analysis By: Gene Phifer

Benefit Rating: High

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

### Definition:

Design thinking is a multidisciplinary process used to improve the design of digital and analog products and services. It starts with empathy for users and the gathering of insight about their needs and motivations. These are then developed using an iterative, experimental approach. Deep customer insight, combined with a creative process, is ideal for digital innovation and digital product development. Design thinking helps to design high-value solutions and improve their usability.

### Why This Is Important

Design thinking is a proven methodology applied to a broad range of business problems, but typically used to enhance usability and user experience (UX) of analog and digital products/services. UX is a key element of total experience, impacting both employee experience and customer experience. Leading organizations regularly practice design thinking on new, digital projects/products. Design thinking can also link to lean startup and agile methodologies, further enhancing application development.

### Business Impact

Design thinking can be a crucial element for UX, which is critical for both employee experience (EX) and customer experience (CX). Higher levels of usability ensure that digital solutions are accessed and used by the end-user community. Usability also impacts CX key performance indicators (KPIs) like customer satisfaction, Net Promoter Score and customer effort score, and financial KPIs like customer retention, conversion, revenue and market share.

## Drivers

- The growing importance of digital engagement with customers and employees has forced enterprises to take design seriously. Design teams, centers of excellence (COEs), user-centered design, usability testing, usability labs and skilled designers are but a few of the efforts made by enterprise IT to improve design. While these generally work well, a methodology for improving design as part of the development effort is needed. This is where design thinking comes in.
- Design thinking impacts UX, and UX impacts CX and EX (the two significant investment areas for enterprises). The relationship between UX, CX and EX is encapsulated in the concept of total experience, which is an emerging focus area for enterprises.

## Obstacles

- Design thinking is a structured methodology, and as such, follows a specific set of steps. However, some developers may be unwilling to spend the necessary time at the design stage.
- Some experience in design and training in design thinking will ensure smooth application of design thinking. Fortunately, a high-end developer with years of design thinking experience isn't required; some basic training in design and design thinking is adequate. However, the relationship between the designer and the developer is important. The designer-developer pairing is a best-practice model for implementing design in projects and products, and for making design thinking work effectively.
- Design thinking has historically been accomplished by a group of people in the same location, frequently a dedicated space. With COVID-19, these gatherings are not possible and design thinking is forced into a remote-only model. This can be challenging, especially for steps like ideation and prototyping.

## User Recommendations

- Identify opportunities for the application of design thinking to improve usability, especially in new digital projects and product development.
- Build cross-functional teams, drawing from business units and the IT department. Train them in the process of design thinking and give them time to practice it.
- Start simply and on a small scale in most cases. Take on more complex projects progressively as your experience grows. Eventually, consider building design COEs.
- Evolve your design thinking approaches to support the contactless world of COVID-19 and the post-COVID-19 era by supporting remote design thinking workshops. The key elements are: (1) a collection of digital collaboration tools; (2) electronic conference rooms; (3) multiscreen capabilities for individual WFH workers; and (4) application of DesignOps.
- Evaluate new tools for remote design thinking workshops to facilitate remote workers.

## Sample Vendors

Accenture; frog; IBM; IDEO; Oracle; Pegasystems; Salesforce; SAP

## Inclusive Design

Analysis By: Brent Stewart, Van Baker

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

### Definition:

Inclusive design is a design methodology created with the purpose of drawing upon the full range of human diversity and ability to inform and create digital products that are accessible by the greatest number of people. Due to various barriers, many people are unable to participate in all aspects of society. This is most prominent in the lives of people with disabilities but also extends to other attributes that are not often considered by designers such as age, culture, gender or religion.



## Why This Is Important

Inclusive design is a movement in the design community to use its skills and influence to create a more just, open and accepting world in which digital spaces and communities are open to the full range of people in society. The intent is to design with diversity in mind to improve the user experience for all constituencies. One aspect is to address the needs of people with disabilities, but it extends beyond that to the areas of bias and cultural considerations as well.

## Business Impact

From a business perspective, inclusive design is a means to expand one's offering by including the broadest set of users, representing the diversity that is inherent in today's society. This can avoid controversy and increase revenue, considerably. Following the practice of inclusive design has led to breakthrough products for many digital products companies, as features designed to address inclusiveness are often appealing to a wide range of users, thereby expanding the market.

## Drivers

Several drivers — both tangible and perceptual — fuel the growth of inclusive design:

- **Digital accessibility** — Products designed and built using inclusive design are, by definition, accessible products. These products are more likely to meet Web Content Accessibility Guidelines (WCAG) Level AA compliance without extensive testing and remediation, saving time, money and effort involved in post launch accessibility initiatives.
- **Brand image** — Companies that engage in inclusive design experience a halo effect that enhances their brand image among customers, employees, new hire candidates and the market at large.
- **Customer base** — People with disabilities are well aware of which brands and organizations create accessible products. Once a product achieves WCAG compliance and disabled users can search, shop, sell and socialize without boundaries, the customer will expand, loyalty will increase and critical KPIs will see marked improvement.
- **SEO** — Organic search rankings for accessible products tend to be higher than non-accessible ones. Digital accessibility best practices lead to cleaner, more structured presentation layer code and robust content. This content uses assistive technology to provide a more accessible experience and gives search engine spiders higher quality content (more keywords, phrases, etc.).

- **Bias** — Companies that focus on diversity, both in the data that they use and the people they address, will avoid inherent bias in limited datasets and user testing groups that fail to represent the full gamut of society.
- **Increased ROI** — Companies that design and deliver products and services based on an inclusive design approach often see these features enjoy broader appeal among the target audience, increasing overall revenue and returns.

## Obstacles

Due to a lack of knowledge and will, inclusive design has yet to catch on widely. Specific obstacles include:

- **Lack of expertise** — Inclusive design requires sophisticated user research methods and techniques to identify and apply evidence-based findings. Few organizations have researchers capable of this level of discovery.
- **Resource constraints** — Most organizations lack the time and budget for work that does not guarantee a valuable enough return on investment (ROI)
- **Edge-case thinking** — Most product teams are encouraged to focus on core use cases and de-prioritize edge cases. Often, inclusive design falls into the edge case bucket for consideration at a later date.

## User Recommendations

Application leaders should:

- Educate themselves and their teams in the principles of inclusive design
- Integrate the methodology into their design and development processes
- Ensure that their design and development efforts do not focus exclusively on the “target customer” as this consciously excludes potential customers

## Gartner Recommended Reading

[Compliance and Beyond: 4 Ways Digital Accessibility Gives You a Competitive Advantage](#)

[3 Ways to Build Inclusive Leaders](#)

[The Leading Trends in Digital Experience — 2020](#)

## Inclusive Design for Disability Will Lead to Augmented Human Innovation Breakthroughs

### Predicts 2020: AI and the Future of Work

#### Progressive Web Apps

Analysis By: Jason Wong

Benefit Rating: Moderate

Market Penetration: 5% to 20% of target audience

Maturity: Adolescent

#### Definition:

Progressive web apps (PWAs) are designed to deliver a native app experience without the need to install app binaries on devices. They combine an app shell with service workers installed on desktops or mobile devices, which enable HTML, JavaScript, Cascading Style Sheets and web content to be cached and synchronized for optimal performance. When users opt to enable them, PWAs deliver app-like features such as offline data access, push notifications and a home screen icon.

#### Why This Is Important

PWA-enabled web applications and sites deliver better performance and improve user engagement. Developers simply embed service workers, supported within the browser, to surface PWA functions. PWAs can be installed directly from a PWA-enabled website and can be shared through links and QR codes. Google and Microsoft allow PWAs to be listed on and deployed through Google Play and the Microsoft Store respectively; however, Apple does not allow this for its App Store.

#### Business Impact

The main benefits of PWAs include:

1. Users do not need to visit an app store and install an app in order to get the capabilities of PWAs.
2. PWAs can be changed and updated without the requirements to push revisions to an app store and force updates on users' devices.

3. PWAs offer fewer capabilities than native apps, but they can be achieved at a fraction of the cost. Plus, they can be delivered by existing web development skills and teams.

#### Drivers

- Most leading desktop and mobile browsers have embraced PWAs. Browsers such as Apple Safari, Google Chrome, Microsoft Edge and Mozilla Firefox enable developers to implement service workers (albeit not consistently across desktop versus mobile browsers and operating systems), so that websites can behave like apps.
- PWAs are also being utilized by Huawei, one of the world's largest smartphone makers. In 2020, the Huawei Browser, a Chromium-based browser, supported the installation of PWAs for Huawei Mobile Services-based devices, without Google Services. Additionally, Huawei launched the Quick Apps project with 11 other Chinese mobile phone manufacturers to drive installation-free apps developed on JavaScript, CSS and HTML.
- Since PWAs are based on web standards, development tools and frameworks are also starting to support the creation and enablement of websites as PWAs. These tools include web frameworks like Ionic to low-code development tools that generate responsive web and single page applications that are PWA-enabled.
- PWAs are slowly being adopted for consumer facing websites as the next step beyond responsive web design. Also, Gartner observes that PWA support for specific employee-facing web apps, in lieu of native desktop or mobile apps, is also becoming an option for certain app use cases.

## Obstacles

- PWAs are in the Trough of Disillusionment due to the still fragmented user experience (UX) across browsers, fairly basic app capabilities being utilized, and a general lack of consumer awareness of PWAs. Also, Apple continues to take an “arm’s-length” approach to supporting PWAs, instead using the term “HTML5 apps” to describe them.
- Penetration rates are still very low overall. At the end of 2020, approximately only 1% of websites included a service worker, and 2.2% had an installable Web App Manifest file (Evidence: [Progressive Web Apps in 2021](#)). In December 2020, Mozilla abandoned support of PWAs for the Firefox desktop browser, although it still plans to support it on Android.
- Moving to PWAs in place of native apps is becoming less likely the longer the fragmented nature of service-worker support across operating systems and web browsers persists. Some of the technical limitations have forced application leaders to recognize that PWAs are inadequate for advanced mobile app use cases.

## User Recommendations

Application and software engineering leaders should:

- Apply PWA service workers now to improve performance and UX in browsers that support PWA. Don’t disregard PWAs’ value because the capabilities are not available to all users, but factor in the variance in UX across devices.
- Evaluate PWAs for employee-facing app use cases, such as extending employee portal functionality to a mobile-optimized interface.
- Utilize PWAs in digital commerce as a means of turning web users into mobile-first users by increasing engagement and conversion rates with high-value, frequent interactions and supporting offline browsing of product catalogs.
- Investigate the potential security limitations of PWAs in terms of securing data cached locally on devices that use default web security and encryption technologies, such as HTTPS.
- Utilize JavaScript tools, frameworks and platforms that provide support for PWA capabilities to speed up the process of implementing PWA capabilities in your web apps.

## Gartner Recommended Reading

[Assessing Progressive Web Apps to Provide Multiexperience Performance and Capabilities](#)

[Balance Web and App for a Winning Mobile Marketing Strategy](#)

[Key Considerations When Building Web, Native or Hybrid Mobile Apps](#)

## Chatbots

Analysis By: Magnus Revang

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

### Definition:

Chatbots are domain-specific or task-specific conversational interfaces that use an app, messaging platform, social network or chat solution for conversations. Chatbots range in use-case sophistication from simple, decision-tree-based, to implementations built on feature-rich platforms. They are always narrow in scope. A chatbot can be text-based or voice-based, or a combination of both.

### Why This Is Important

Chatbots represent the No. 1 use of artificial intelligence (AI) in enterprises. Primary use cases are in customer service, human resources, IT help desk, self-service, scheduling, enterprise software front ends, employee productivity and advisory. Offerings in the market include developer self-service platforms, managed products, middleware offerings, integrated offerings and best-of-breed approaches.

### Business Impact

Chatbots are the face of AI and will impact all areas with communication between machines and humans. Customer service is an area where chatbots are already very influential and will have a great impact on the number of service agents employed by an enterprise and how customer service is conducted. The change from “the user learns the interface” to “the chatbot learns what the user wants” has implications for onboarding, training, productivity and efficiency inside the workplace.

## Drivers

- Chatbots in social media, service desk, HR or commerce, as enterprise software front ends and for self-service, are all growing rapidly.
- For enterprises, the main challenge with chatbots has been scaling and operationalizing them out of the proof-of-concept phase. As COVID-19 has accelerated adoption of chatbots, vendors seem to have “cracked the code” on operationalization. Vendors are now able to deliver multiple bots for multiple use cases, with no-code environments allowing multiple roles to participate in operationalization. This is creating a market for enterprise conversational AI platforms fueling the next generation of chatbots.

## Obstacles

- Scaling and operationalizing still remain a challenge in some cases, due to lack of dedicated internal teams to work on continuous improvements.
- Figuring out the composition of teams, and the methodologies to iterate effectively, are still emerging practices with strong vendor dependency.
- Technology is improving at an astounding pace, but best practices on adoption and use of these technological advancements are still trailing, resulting in a lot of trial and error for enterprises.
- Selected vendors are sometimes unable to keep pace with the technology and the market dynamics.
- The vendor landscape comprises over 2,000 vendors, despite some consolidation during 2020. However, this is composed of many subcategories, majority of which are tactical. With this many vendors, the majority of chatbots will have to switch their underlying technology in the near to midterm future. Still a category of enterprise-grade platforms has emerged, with an estimated 120 vendors. These enterprise-grade platforms are becoming suitable as a more tactical choice.

## User Recommendations

- Select an enterprise-grade platform to develop multiple use cases with orchestration of the assets needed.
- Focus on operationalization of chatbots as a product, with the necessary organization and roles in place, to evolve and maintain chatbots over time.

## Sample Vendors

Amazon; Amelia; Cognigy; Google; IBM; Kore.ai; Microsoft; Pypestream; ServisBOT; Uniphore

## Gartner Recommended Reading

[The 3 Decisions You Must Make Before You Begin a Chatbot Project](#)

[Consolidate Your Chatbot Initiatives Into a Single Enterprise Strategy](#)

[When Should I Use Embedded Conversational Assistants?](#)

## Virtual Reality

Analysis By: Tuong Nguyen, Auria Asadsangabi

Benefit Rating: Moderate

Market Penetration: 1% to 5% of target audience

Maturity: Adolescent

### Definition:

Virtual reality (VR) provides a computer-generated 3D environment (including both computer graphics and 360-degree video) that surrounds a user and responds to an individual's actions in a natural way, either through immersive head-mounted displays (HMDs) or room-based systems.

### Why This Is Important

VR is extremely useful for simulating high-cost, high-risk, high-insurance or otherwise high-consequence situations. Examples include space exploration, industrial settings such as energy and utilities, combat training, empathy-based decision training, and situations where advanced visualization and HMDs can benefit the task or customer interaction. VR offers higher degrees of visual fidelity and personalization over what flat-screen-based (2D) systems can provide.

### Business Impact

3D simulations can benefit organizations in a number of ways. VR can:



- Reduce training costs compared to building expensive, centralized training facilities or planned equipment downtime to train employees.
- Reduce risk by providing task simulation.
- Improve design cycle time. For example, building physical products requires adapting 3D concepts into 2D for planning and then adapting back to 3D for implementation. These translations have high potential to introduce errors between steps and iterations.

## Drivers

- The global COVID-19 pandemic increased demand for VR.
- Much of this was due to consumer demand and reflected in the growth of VR HMD sales.
- Enterprise interest also increased as pandemic-related restrictions prompted organizations to actively seek alternative solutions for customer engagement, remote training and collaboration. Gartner client inquiries for VR increased by 36% in 2020 (compared to 2019). Among Gartner technology buyers (end users) it was a 51% increase.
- While interest was overwhelmingly consumer, it doesn't imply that VR is ready for the enterprise, but some areas are showing early value: 3D content development industries such as gaming and architecture, engineering, and design; 360-degree video such as live events, tours and documentation; training simulations for empathy and decision-making skills — e.g., high-consequence situations such as soft skill training and training in expensive or inaccessible locations such as space or deep sea exploration, surgical training, and onboarding for dangerous or remote locations such as an oil rig.

## Obstacles

Potential customization requirements and limited scalability means VR experiences tend to be much more expensive than AR ones — outweighing potential benefits in many situations.

We have kept the VR profile in the same position and believe it's closer to five years until the Plateau of Productivity due to the following reasons:

- The supplier ecosystem has been slow to advance products.

- Breadth and quality of content remain limited.
- Solutions lack scalability.
- There is a lack of enterprise-ready solutions.

## User Recommendations

- Use VR to support your organization's efforts for training, visualization and collaboration tasks requiring 3D content (such as BIM and CAD).
- Identify procedures and experiences that may benefit from virtualized visual interactions (such as tours and training procedures).
- Discover potential benefits of VR by benchmarking traditional practices against VR experiences.
- Focus on a small number of pilots based on platforms designed to meet enterprise requirements.
- Avoid point solutions.

## Sample Vendors

EON Reality; Facebook; Google; HTC; Insta360; Matterport; Motive; Ricoh; Sony; Strivr

## Gartner Recommended Reading

[Augmented Reality and Virtual Reality Will Transform Selling](#)

[Virtual Reality and Augmented Reality for Remote Workers](#)

## Augmented Reality

Analysis By: Tuong Nguyen, Auria Asadsangabi

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Definition:**

Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects and presented using a mobile, head-mounted display (HMD) or projected graphics overlays. It is this “real world” element that differentiates AR from virtual reality. AR aims to enhance users’ interaction with the environment, rather than separating them from it.

**Why This Is Important**

AR is the next era of experience or interface (via the form of a digital filter) that enhances the user’s surroundings with real-time, relevant, interesting, actionable information. This has an impact on both enterprises and consumers. As such, AR is broadly applicable across many markets, including entertainment, industrial design, digital commerce, marketing, mining, engineering, construction, energy and utilities, logistics, manufacturing, healthcare, and education.

**Business Impact**

- Current technology is best suited for purpose-built, specialized solutions. As such, position and adoption speed will vary by vertical and industry.
- Current horizontal tasks seeing the most traction are procedural tasks, situational video, visual design and customer engagement.

## Drivers

- We have moved the AR profile forward by one position to represent the continued momentum of this Innovation Profile; it will take five to 10 years for the ecosystem, marketplace and technologies dependencies to sufficiently evolve to significantly increase the use of AR.
- Market interest is growing steadily, but current solutions are better described as AR-inspired solutions — experiences that contain elements of AR and offer limited, purpose-built capabilities. AR adoption continues mainly in enterprise applications. Based on Gartner inquiry (22% increase in inquiries in 2020 over 2019, 35% among end users/technology buyers) and industry news, B2B AR continues to gain traction as more enterprises are seeing the value of using AR in their workflow.
- For enterprises, AR can provide value by furnishing checklists for training and maintenance or for remote telestration in see-what-I-see video collaborations. HMD sales reflect the burgeoning pilot deployments using hands-free AR devices. Advancements in HMD hardware (lighter, more durable, safer, etc.) will provide more compelling hands-free use cases for AR as well. For the benefit of consumers, AR offers brands, retailers and marketers the ability to seamlessly combine physical campaigns with their digital assets.

## Obstacles

- Content: The amount of digital content and associated AR experiences will need to be increased by orders of magnitude to make AR useful for the mass market. For example, consumer-facing implementations are still struggling to show consumers consistent value beyond narrow use cases like virtual try-on and social/messaging filters. The experiences that do show value are siloed from other experiences and interactions.
- Control: Interacting with both physical and digital elements in 3D space requires a mix of “vocabularies” of different interface modalities (speech, motion, touch, gesture, etc.) that need to be defined and standardized to make AR interactions intuitive.
- Convenience: Ease of access to form factors that make AR experiences seamless and valuable needs improvement. For example, handheld devices deliver a poor user experience for extended AR usage.

## User Recommendations

- Decide on the audience for your AR experience. Internal- and external-facing solutions are not currently transposable.
- Restrict initial trials to a specific task or goal. Set benchmarks against unaugmented solutions to understand risks and benefits.
- Set the business goals, requirements and measurements for your AR implementation before choosing a provider.
- Determine a clear intention for your deployment to ensure value. For external-facing implementations, use AR as an extension of your brand and experience. For internal-facing implementations, use AR as a tool that will enhance employee job function. This could include, for example, delivering context-specific information at the point of need for mobile workers, better leveraging experts (using one-to-many video support) in plant and maintenance operations, or enhancing business processes via AR-based training and instruction.

## Sample Vendors

8th Wall; Apple; Atheer; Google; Librestream; Microsoft; PTC; Scope AR; TeamViewer Frontline; Wikitude

## Gartner Recommended Reading

[Emerging Technologies: Kick-Start Adoption With Essential Enterprise Augmented Reality Business Practices](#)

[Emerging Technologies: Top Use Cases for Enterprise Augmented Reality](#)

[Virtual Reality and Augmented Reality for Remote Workers](#)

[Emerging Technology Analysis: Augmented and Mixed Reality Opportunity for 3D Design Software and Vertical ISVs](#)

[Emerging Technologies: AR Cloud Will Create a Multilayered Crowdsourced Canvas of the World](#)

[Cool Vendors in Augmenting Human Experiences](#)

[Emerging Technologies: Head-Mounted Displays for Augmented, Mixed and Virtual Reality](#)



## Climbing the Slope

### DXP

Analysis By: Irina Guseva, Gene Phifer

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

#### Definition:

A digital experience platform (DXP) is an integrated and cohesive set of capabilities designed to enable the composition, management, delivery and optimization of contextualized digital experiences across multiexperience customer journeys.

#### Why This Is Important

Organizations need a solution to enable the composition, management, delivery and optimization of contextualized digital experiences across multiexperience customer journeys. A DXP addresses these needs, creating digital experiences across a wide range of engagement scenarios, audiences, channels, devices and modes. The integrated nature of a DXP means faster time to market and lower deployment costs, as well as higher levels of customer and employee engagement and satisfaction.

#### Business Impact

Poor digital experiences, often delivered in silos, lead to customer and employee frustration. DXPs help enterprises deliver compelling digital experiences for both internal customers (employees) and external customers (consumers, citizens and partners). They also provide significant efficiencies in composition, management, delivery, contextualization and optimization of digital experiences across multiple touchpoints.

#### Drivers

- Growing need to improve customer and employee experiences, and establish stronger competitive position
- Multiexperience strategy adoption, leading to a total experience model
- Ability to bring multiple silos of engagement into a single seamless experience
- Ability to scale and pivot as business needs/environments change

- Business agility, elasticity, flexibility, extensibility and faster time to market enabled by DXPs
- Composable UX, supporting a composable business model
- Need for an integration layer, supporting API, integration platform as a service (iPaaS) and other models
- Desire to manage content and digital experiences with minimal IT support

## Obstacles

- Lack of digital maturity
- Cost
- Conservative verticals or use cases with low DX aspirations
- Limited agility and complexity of deployment

## User Recommendations

- Ensure a business-aligned and streamlined DXP strategy by focusing on business outcomes, along with governance including key business and IT stakeholders.
- Create an architecture for DXP that best meets your vision by examining the current state, determining gaps in current functionality and assessing opportunities to employ innovations required to achieve the future vision.
- Create an internal roadmap based on desired outcomes, technology maturity, potential disruptors and risks for the next three to five years, keeping composable DXP and the ideal user experience in mind.

## Sample Vendors

Acquia; Adobe; Bloomreach; Liferay; Optimizely; Salesforce; Sitecore

## Gartner Recommended Reading

[Magic Quadrant for Digital Experience Platforms](#)

[Critical Capabilities for Digital Experience Platforms](#)

[Defining the Digital Experience Platform](#)





## Entering the Plateau

### Gamification

Analysis By: Brian Burke

Benefit Rating: Moderate

Market Penetration: 20% to 50% of target audience

Maturity: Early mainstream

#### Definition:

Gamification is the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals. It is important to distinguish gamification from video games and loyalty programs as gamification uses techniques from behavioral science to “nudge” people into achieving their goals.

#### Why This Is Important

Gamification builds motivation into a digital engagement model and can be used to add value to products and to deepen relationships by changing behaviors, developing skills or driving innovation. According to Google Trends, interest in gamification peaked in 2014 and has declined moderately over the years; it continued to decline 7% in the past year. However, Gartner inquiry on gamification has increased 62% over the past year.

#### Business Impact

Gamification can increase the effectiveness of an organization’s digital business strategy. It:

- Provides a means of packaging motivation and delivering it digitally to add value to products and relationships.
- Has a digital engagement model that can scale to any number of users with very low incremental costs.
- Is relevant to human resources, product management, sales, marketing and customer service, whose aim is to meaningfully engage customers, employees or the public.

#### Drivers

- User engagement is at the heart of today's "always connected" culture. Incorporating game mechanics encourages desirable behaviors, which, with the help of carefully planned scenarios and product strategies, can increase user participation, improve product and brand loyalty, advance learning and understanding of a complex process, accelerate change adoption, and build lasting and valuable relationships with target audiences.
- Broad interest in gamification is coalescing around a much narrower set of use cases. These include online learning and employee training (particularly security awareness), employee performance (mainly in sales and customer service organizations) and engaging employees in innovation.
- This narrower set of use cases is due to repeatable paths to success and move gamification toward the Plateau of Productivity.
- Other use cases for gamification include customer engagement, collaboration, change management and wellness.
- Given the impact of COVID-19, there have been several inquiries on leveraging gamification to engage employees working remotely to ramp up adoption of collaboration and social tools.

## Obstacles

- Organizations must recognize that simply including game mechanics is not enough to realize the core benefits of gamification. Making gamified solutions sufficiently rewarding requires careful planning, design and implementation, with ongoing adjustments to keep users engaged.
- Designing gamified solutions is unlike designing any other IT solution, and it requires a different design approach. Few people have gamification design skills, which remains a huge barrier to success in gamified solutions.
- Organizations often benefit from working with digital agencies that employ behavioral scientists and have experience designing solutions focused on digital engagement.

## User Recommendations

- Focus gamification design on leveraging behavioral science to engage and motivate people, rather than on slapping badges onto activities.

- Determine the goals and motivations of the target audience you intend to engage, how those goals align with organizational goals and how success will be measured.
- Focus gamification efforts on providing feedback to help people achieve their own goals to engage people on an emotional level, rather than on a transactional level.

## Sample Vendors

Betterworks; BI WORLDWIDE; Capita (G2G3); Central; Checkmarx; CloudApps; Pluralsight; SAP

## Gartner Recommended Reading

[Boost Customer Community Participation With a Rewards and Gamification Program](#)

[Motivate and Engage Learners With Gamification](#)

[Use Gamification to Flatten the Curve of COVID-19 Infections](#)

[Gamifying Your Compliance Training: Examples From 3 Companies](#)

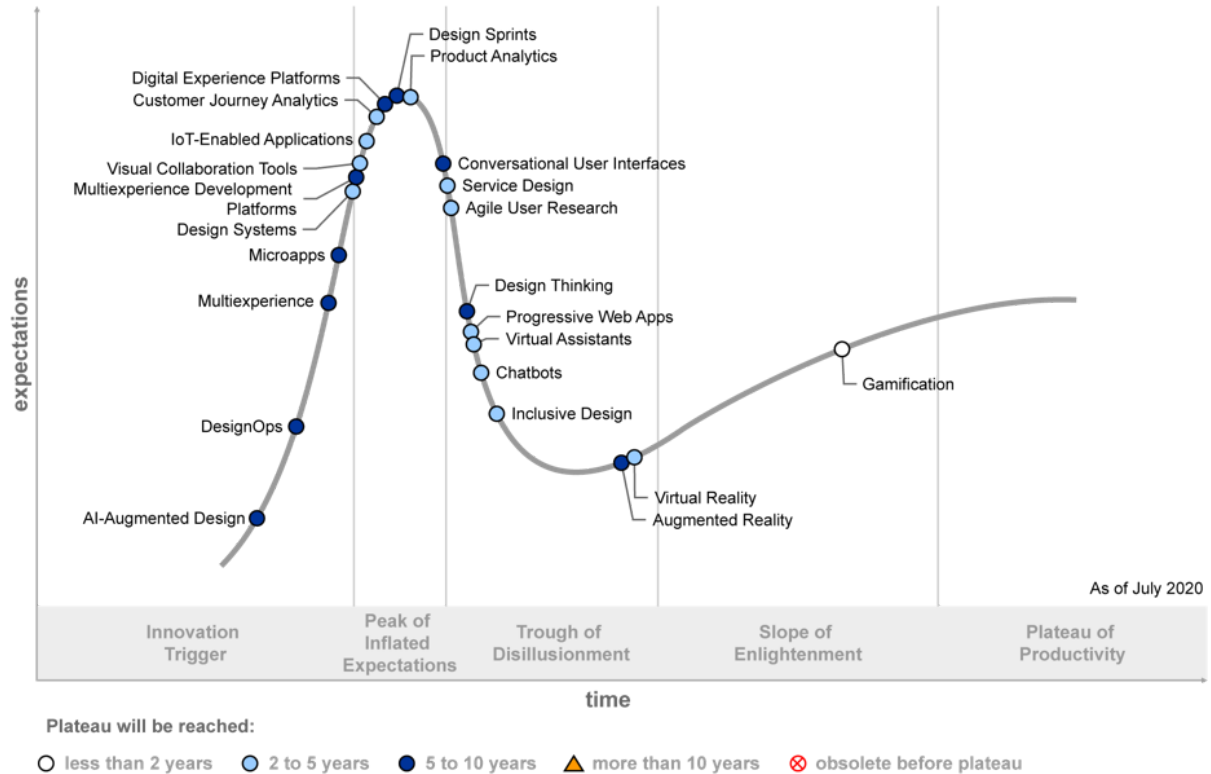
[Toolkit: Use 'Red Team, Blue Team' Gamification to Make Smarter Decisions](#)

[Assessing Online Learning Platforms for Technical Skills Development](#)

## Appendixes

Figure 2: Hype Cycle for User Experience, 2020

### Hype Cycle for User Experience, 2020



Source: Gartner  
ID: 450431

Gartner

Source: Gartner (July 2020)

## Hype Cycle Phases, Benefit Ratings and Maturity Levels

**Table 2: Hype Cycle Phases**

(Enlarged table in Appendix)

Phase ↓	Definition ↓
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
<i>Peak of Inflated Expectations</i>	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.
<i>Trough of Disillusionment</i>	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
<i>Slope of Enlightenment</i>	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
<i>Plateau of Productivity</i>	The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
<i>Years to Mainstream Adoption</i>	The time required for the innovation to reach the Plateau of Productivity.

Source: Gartner (July 2021)

Table 3: Benefit Ratings

<i>Benefit Rating</i> ↓	<i>Definition</i> ↓
<i>Transformational</i>	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
<i>High</i>	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
<i>Moderate</i>	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
<i>Low</i>	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2021)

**Table 4: Maturity Levels**

(Enlarged table in Appendix)

<i>Maturity Levels</i> ↓	<i>Status</i> ↓	<i>Products/Vendors</i> ↓
<i>Embryonic</i>	In labs	None
<i>Emerging</i>	Commercialization by vendors Pilots and deployments by industry leaders	First generation High price Much customization
<i>Adolescent</i>	Maturing technology capabilities and process understanding Uptake beyond early adopters	Second generation Less customization
<i>Early mainstream</i>	Proven technology Vendors, technology and adoption rapidly evolving	Third generation More out-of-box methodologies
<i>Mature mainstream</i>	Robust technology Not much evolution in vendors or technology	Several dominant vendors
<i>Legacy</i>	Not appropriate for new developments Cost of migration constrains replacement	Maintenance revenue focus
<i>Obsolete</i>	Rarely used	Used/resale market only

Source: Gartner (July 2021)

**Document Revision History**[Hype Cycle for User Experience, 2020 - 24 July 2020](#)[Hype Cycle for User Experience, 2019 - 7 August 2019](#)[Hype Cycle for Digital Design, 2017 - 3 August 2017](#)**Recommended by the Author**

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

[Understanding Gartner's Hype Cycles](#)[Create Your Own Hype Cycle With Gartner's Hype Cycle Builder](#)[Build Better Products Faster With Design Systems](#)[DesignOps: Organize, Collaborate and Innovate Product UX at Speed](#)[How to Build a User Experience Team](#)[Guidance Framework for Adopting Lean UX](#)



## Improve Programs, Products and Customer Experience by Incorporating Research and Testing Into Agile Frameworks

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Table 1: Priority Matrix for User Experience, 2021

Benefit ↓	Years to Mainstream Adoption			
	Less Than 2 Years ↓	2 - 5 Years ↓	5 - 10 Years ↓	More Than 10 Years ↓
Transformational		Conversational User Interfaces IoT-Enabled Applications and Software Virtual Assistants	AI-Augmented Design Multiexperience	
High	Chatbots Design Systems	Customer Journey Analytics DesignOps DXP	Augmented Reality Design Thinking MXDP	
Moderate	Gamification	Agile User Research Design Sprints Digital Product Analytics Inclusive Design Progressive Web Apps Service Design Virtual Reality Visual Collaboration Tools	Microapps	
Low				

Source: Gartner (July 2021)

Table 2: Hype Cycle Phases

Phase ↓	Definition ↓
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant media and industry interest.
<i>Peak of Inflated Expectations</i>	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the innovation is pushed to its limits. The only enterprises making money are conference organizers and content publishers.
<i>Trough of Disillusionment</i>	Because the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
<i>Slope of Enlightenment</i>	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the innovation's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
<i>Plateau of Productivity</i>	The real-world benefits of the innovation are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
<i>Years to Mainstream Adoption</i>	The time required for the innovation to reach the Plateau of Productivity.

Phase ↓

Definition ↓

Source: Gartner (July 2021)

Table 3: Benefit Ratings

Benefit Rating ↓

Definition ↓

Transformational

Enables new ways of doing business across industries that will result in major shifts in industry dynamics

High

Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise

Moderate

Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise

Low

Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (July 2021)

**Table 4: Maturity Levels**

<i>Maturity Levels</i> ↓	<i>Status</i> ↓	<i>Products/Vendors</i> ↓
<i>Embryonic</i>	In labs	None
<i>Emerging</i>	Commercialization by vendors Pilots and deployments by industry leaders	First generation High price Much customization
<i>Adolescent</i>	Maturing technology capabilities and process understanding Uptake beyond early adopters	Second generation Less customization
<i>Early mainstream</i>	Proven technology Vendors, technology and adoption rapidly evolving	Third generation More out-of-box methodologies
<i>Mature mainstream</i>	Robust technology Not much evolution in vendors or technology	Several dominant vendors
<i>Legacy</i>	Not appropriate for new developments Cost of migration constrains replacement	Maintenance revenue focus
<i>Obsolete</i>	Rarely used	Used/resale market only

Source: Gartner (July 2021)