Top 10 Strategic Technology Trends for 2018: Immersive Experience

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The way we use technology will shift from static, 2D windows on the world to dynamic, immersive 3D experiences. Enterprise architecture and technology innovation leaders must analyze the use cases for immersive technologies and identify opportunities for their organizations to exploit.

Key Findings

- In the future, immersive technology will integrate with endpoint devices and conversational platforms to provide a seamless interface to the physical and virtual worlds.

- Smartphone-based virtual reality (VR) and augmented reality (AR) will be broadly used for short-duration interactions, particularly B2C interactions.

- By 2022, mixed reality (MR) applications will lead business uses for immersive experiences, improving user efficiency and productivity, and employee training.

Recommendations

Enterprise architecture (EA) and technology innovation leaders using EA to master emerging and strategic trends:

- Gain a good knowledge of the different technologies by analyzing them and mapping them to their relevant use cases, including training, simulation, design, remote collaboration and hands-free information.

- Identify which of your organization's business capabilities could benefit from immersive technologies by analyzing their components and noting problem areas. Examples of capabilities that could benefit include field service, logistics and warehousing, maintenance, training, design, and medicine.

- Determine the business benefits, risks and costs of immersive experiences by evaluating innovation opportunities and starting proofs of concept within the next 12 months.

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Strategic Planning Assumptions

By 2021, 25% of large businesses in mature markets will pilot and deploy MR solutions, up from 1% in 2017.[1]

By 2022, 20% of early adopters will use 3D input/output interfaces to replace traditional 2D/flat interactions.[1]

By 2022, AR/MR will surpass VR as the key driver of head-mounted display (HMD) use. AR/MR will account for 55% of unit sales, up from less than 5% in 2017.[1]

Analysis

Why Immersive Experience Is a Top 10 Trend

Immersive technologies change the way people perceive the world by taking users beyond viewing a 2D scene. They do this by either augmenting the real world with virtual objects or by immersing users in a 3D virtual environment. The most advanced systems enable full freedom of movement. Users can walk around virtual objects in the real world, or walk through a virtual world that they can see, hear, touch and feel.

An immersive experience transports people into a new or enhanced world with a 360-degree, 3D experience. It's fundamentally different from the 2D windows on the world that we experience every day. For example, watching television gives viewers a 2D window into a car chase or sporting event, whereas an immersive experience puts the user into the speeding car or onto the sports field.

VR enables deeply immersive experiences in which users can be transported anywhere in (or out of) the world. For example, Everest VR on HTC VIVE enables viewers to enjoy the view as they climb Mount Everest virtually.[2] AR enables immersive experiences by revealing virtual objects in the real world. For example, Pokémon GO reveals the Pokémon lurking all around.[3]

MR takes AR and VR to the next level by sensing objects in the real world. It transforms those objects with virtual augmentations or by placing virtual objects in space that users can walk around and see in three dimensions. Immersive experiences are much more than clever display technologies; they actually change the way users view and interact with both the real and virtual worlds. Figure 1 shows the differences between the three technologies in helping users perform car brake maintenance.

Figure 1. The Distinguishing Characteristics of Augmented Reality, Mixed Reality and Virtual Reality
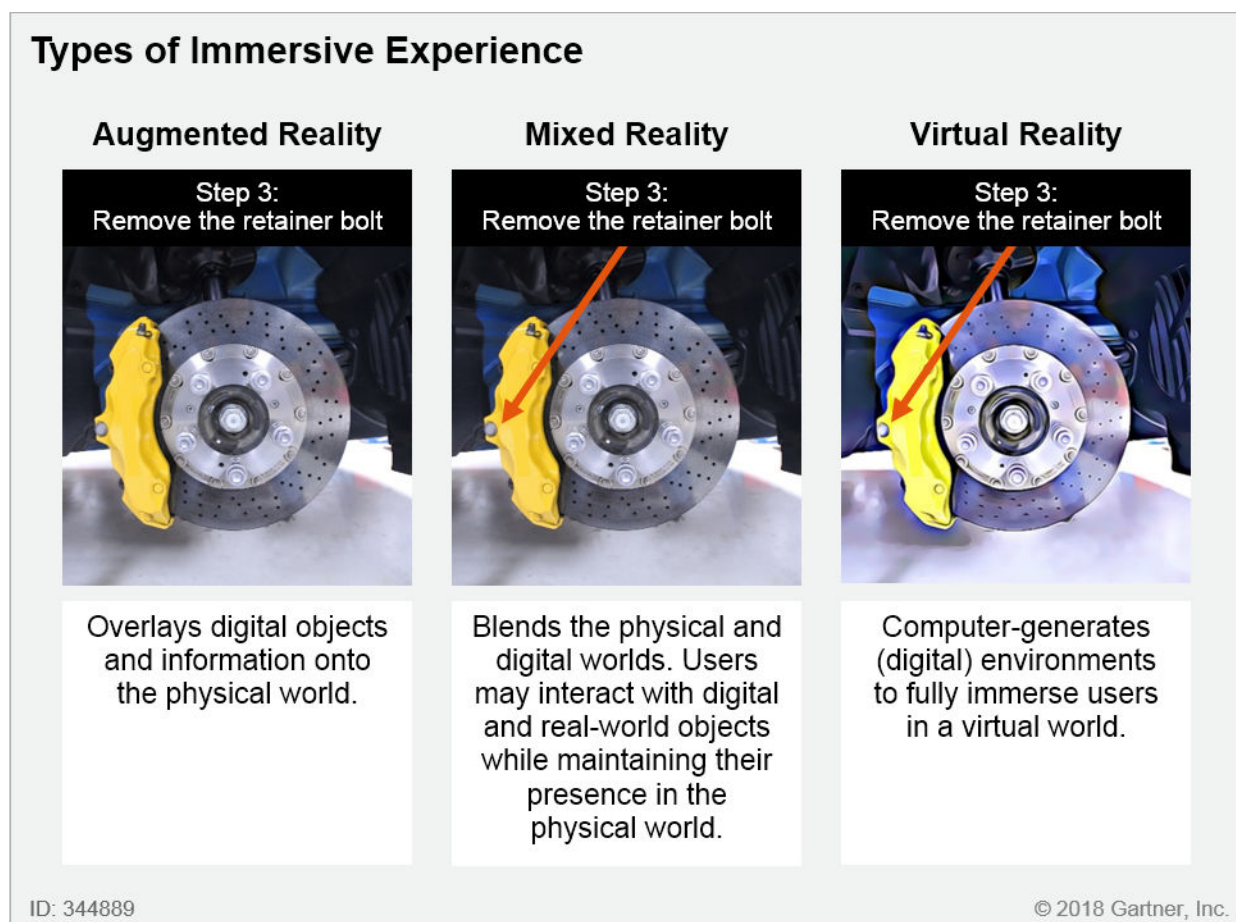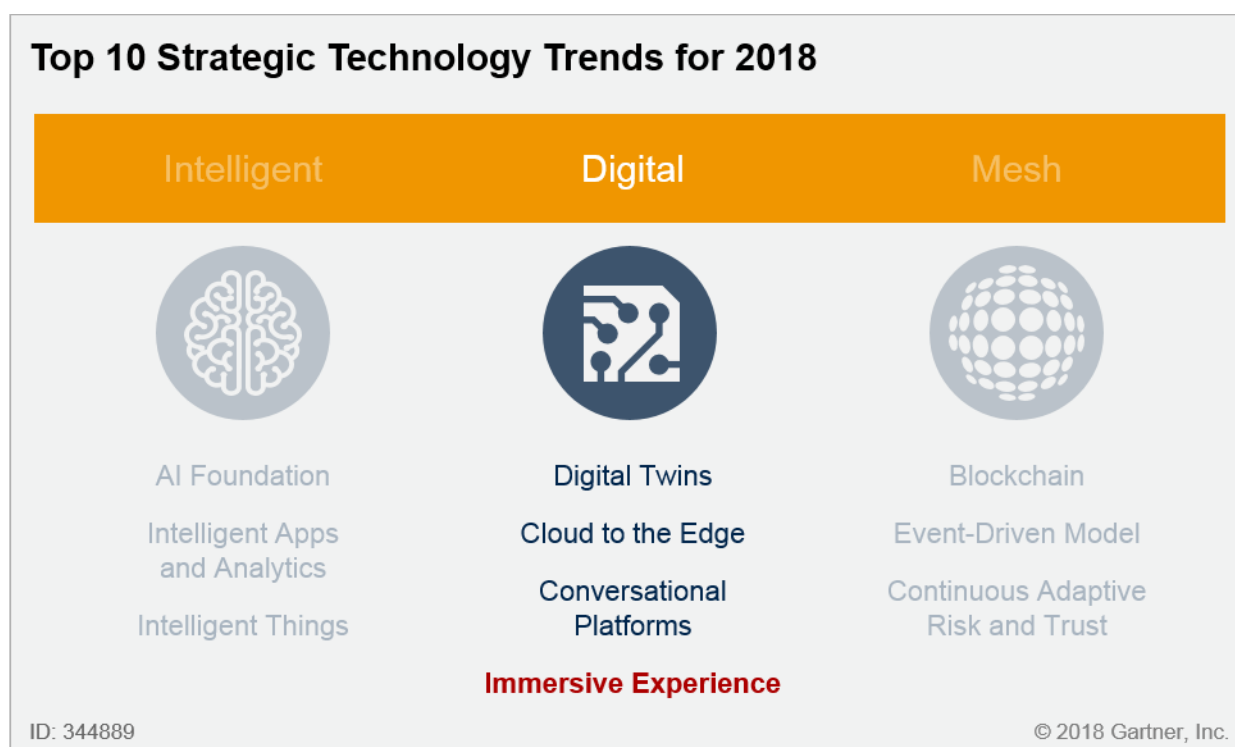

Source: Gartner (March 2018)

Shifting to immersive experiences will change the way everyone engages with the world. Instead of going to Rome to visit the Colosseum, users will experience it in their own homes. A service technician will be able to point a smartphone camera at a piece of equipment, and the defective part will be highlighted in the display. Businesspeople will be able to attend meetings with virtual representations of the other participants in the same room as them.[4] It could be the end of reality as we know it.

Where Immersive Experience Fits in the Top 10

This trend is part of the digital theme (see Figure 2), along with digital twins, cloud to the edge and conversational platforms. The digital theme focuses on blending the digital and physical worlds to create a natural and immersive, digitally enhanced experience. As the amount of data that things produce increases exponentially, compute power shifts to the edge to process stream data and send summary data to central systems. Digital trends, along with opportunities enabled by artificial intelligence, are driving the next generation of digital business and the creation of digital business ecosystems.

Figure 2. Where Immersive Experience Fits in the Top 10 List of Strategic Technology Trends

Source: Gartner (March 2018)

Immersive Experiences Transport Users to New or Enhanced Worlds

Immersive experiences combine many technologies, but the core ones are:

- **AR:** Overlays digital objects and information on the physical world.

- **VR:** Computer-generates (digital) environments to fully immerse users in a virtual world.

- **MR:** Blends the physical and digital worlds. Users may interact with digital and real-world objects while maintaining their presence in the physical world.

Additional technologies may be incorporated to create a deeper immersive experience. These include:

- Depth sensing

- Positional tracking

- Spatial audio

- Haptic feedback

- Computer vision

VR provides a computer-generated 3D environment that surrounds users and responds to their actions in a natural way. This is usually through immersive HMDs that block a user's entire field of vision. Gesture recognition or handheld controllers provide hand and body tracking, and touch-sensitive feedback may be incorporated. Room-based systems that provide a deeper sense of immersion deliver a 3D experience for multiple participants or one in which a user can walk in a room untethered, removing a significant adoption barrier.

AR is the real-time use of information in the form of text, graphics, video and other virtual enhancements integrated with real-world objects. It's presented using HMDs or mobile devices. This overlaying of virtual-world elements on a real-world background differentiates AR from VR. AR aims to enhance users' interactions with the real physical environment, rather than separating them from it.

Like AR, MR enables virtual objects in the physical world, but takes AR to the next level. MR uses inside-out tracking to sense the space and objects around the user to enable holograms to have realistic interactions using the surfaces in the room. For example, a hologram of a dog can run across the furniture. Holograms are 3D representations of objects, so users can walk around them, or holograms can move around users with the perspective changing with movement. This gives users six degrees of freedom (see Note 1) beyond a defined "play space." MR also enables users to manipulate holograms with their hands using gesture control.

The tipping point for broad adoption of VR and AR has arrived now that acceptable experiences can be delivered on affordable devices using smartphones. In 2017, Apple introduced ARKit[5] and Google introduced ARCore[6] to enable the development of AR content on mobile devices. We expect that many organizations will develop apps that use AR capabilities on mobile devices for a wide range of consumer use cases. For entry-level VR, smartphones used with HMDs (such as Google Daydream and Samsung Gear VR) provide a good-quality VR experience at a low cost.

Dedicated HMDs deliver the best immersive experiences. Tremendous advances in quality and falling prices are driving adoption of consumer VR HMDs, mainly for entertainment (games and videos). A 2017 Gartner survey indicates that 12% of households have a VR HMD.[7]

Advances in 360-degree video cameras make VR content easy and affordable to create. Companies such as Intel are taking VR content creation to the next level with volumetric video technology (see Note 2). This, for example, enables sports fans to watch an event from any point on the field, providing six degrees of freedom. In the future, television and films will be transformed into an immersive experience with the viewer part of the scene. The viewer will be able to keep up with the Kardashians by sitting in the room with them, adding a realistic immersive experience to reality television.

MR is still in the early stages of development. Microsoft HoloLens is the most prominent MR HMD on the market, but it's a device for early adopters because this technology is emerging.

Through 2021, immersive consumer and business content and applications will evolve quickly. In 2018, the market for HMDs will grow significantly. It will reach 67.2 million shipped units and $18.8 million in revenue by 2021.[8] In the near term, consumers will be more likely than businesses to adopt HMDs. Video games will be the first popular HMD app type, assuming that game providers can deliver compelling content. More specialized HMDs, and VR and AR content solutions, will become available for businesses. Through 2021, HMD technology will improve dramatically, but mobile AR will be the most widely adopted.

The Use Cases for Immersive Experience Are Diverse

The use cases for immersive experience are extremely diverse. Although entertainment is driving the improvements in immersive technologies, many commercial use cases exist. These include:

- **Training:** Immersive experiences are particularly useful when the real-world environment is dangerous, remote or expensive for on-site training.
  - *Example use:* Training firefighters to use equipment properly in an immersive simulation of a fire in which they can actually feel the heat.[9]
- **Simulation:** Providing a simulation of any experience reduces the costs, risks and time of experiencing it in person.
  - *Example use:* Taking a potential buyer on a virtual tour of a property without leaving the real estate office.[10]
- **Design:** Although 3D design has existed for a long time, the ability to immerse users in the finished product adds to the experience.
  - *Example use:* Homeowners can take a virtual tour of their renovated kitchen before the renovation work even begins.[11]
- **Remote collaboration:** This is particularly valuable when the expert is far away from the person performing the task.

- *Example use:* Connecting a junior field service technician with a remotely based service expert with real-time audio/video to give the junior technician guidance on more difficult technical issues.

- **Hands-free information:** This is helpful when users need to use their hands and refer to information simultaneously.

  - *Example use:* Providing hands-free order details to warehouse pick and pack workers to improve productivity.[12]

Immersive experiences will affect most industries and sectors. Examples include:

- **Marketing:** Providing additional product information when users point their smartphones at products

- **Education:** Conducting virtual field trips to museums and planetariums, and even to aquariums from inside the tanks

- **Interior design:** Enabling shoppers to visualize furnishings in their own homes before purchase[13]

- **Retail:** Enabling shoppers to try on clothes and shoes virtually

- **Product design:** Visualizing designs in 3D without the need to prototype them

- **Architecture:** Visualizing a new home before it is built

- **Manufacturing:** Providing critical assembly information hands free to increase productivity[14]

- **Equipment maintenance:** Color shading parts to be replaced and providing hands-free instructions

- **Automotive:** Enabling head-up displays for navigation and other information on windshields[15]

- **Travel:** Providing augmented information for travelers when they point their smartphones at different objects

- **Pharmaceutical:** Enabling molecular visualizations

- **Healthcare:** Treating patients for phobias[16]

VR and AR will integrate with multiple endpoints in the intelligent digital mesh, including mobile and wearable devices, Internet of Things endpoints, sensor-rich environments and conversational platforms. This integration will extend immersive applications beyond isolated and single-person experiences. Rooms and spaces will become active with things, and their connection through the mesh will appear and work in conjunction with immersive virtual worlds. Imagine a warehouse that can not only recognize the presence of workers, but also help them understand the state of its equipment, and can visually point out parts requiring replacement. Although the potential of VR and AR is impressive, there will be many challenges.

Actions

EA and technology innovation leaders:

- Learn about the different technologies and their use cases, including training, simulation, design, remote collaboration and hands-free information.

- Identify key target roles and use cases that can benefit from immersive technologies. Such capabilities include field service, logistics and warehousing, maintenance, training, design and medicine.

- Evaluate innovation opportunities for immersive experiences to determine the business benefits, risks and costs.

- Initiate proofs of concept of immersive technologies to demonstrate their value.

Appendix: The Other Top Strategic Technology Trends for 2018

For information on the other top strategic technology trends for 2018, see:

"Top 10 Strategic Technology Trends for 2018: AI Foundation"

"Top 10 Strategic Technology Trends for 2018: Intelligent Apps and Analytics"

"Top 10 Strategic Technology Trends for 2018: Intelligent Things"

"Top 10 Strategic Technology Trends for 2018: Digital Twins"

"Top 10 Strategic Technology Trends for 2018: Cloud to the Edge"

"Top 10 Strategic Technology Trends for 2018: Conversational Platforms"

"Top 10 Strategic Technology Trends for 2018: Blockchain"

"Top 10 Strategic Technology Trends for 2018: Event-Driven Model"

"Top 10 Strategic Technology Trends for 2018: Continuous Adaptive Risk and Trust"

Gartner Recommended Reading

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

"Market Insight: Mixed-Reality Immersive Solutions Are the Ultimate User Experience for Everyone"

"Predicts 2018: Immersive Technologies and Devices Will Transform Personal and Business Interactions"

"Cool Vendors in Enterprise Wearable and Immersive Technologies, 2017"

"Immersive Technologies Offer Infinite Possibilities"

"Getting Started Developing Virtual Reality Experiences"

Evidence

[1] "Predicts 2018: Immersive Technologies and Devices Will Transform Personal and Business Interactions"

[2] "Everest VR Is Not Like Climbing a Mountain, and It Shouldn't Have to Be," The Verge.

[3] "Pokémon GO iOS Update Will Deliver More Advanced Augmented Reality Thanks to ARKit," The Verge.

[4] "Virtual Reality Takes On the Videoconference," The Wall Street Journal.

[5] "Nine Cool AR Apps You Should Download to Try Out iOS 11's ARKit," The Verge.

[6] "Google's ARCore Brings Augmented Reality to Millions of Android Devices," Ars Technica.

[7] 2017 Gartner Personal Technologies Survey: "Which of the following do you have in your household?" — virtual-reality headset = 12%, n = 16,537. We conducted this online survey in June and July 2017. The respondents ranged in age from 18 to 74 years. We applied quotas and weighting for age, gender, region and income ($10,000 and above in the U.S., €10,000 and above in Germany, and £6,000 and above in the U.K.). Results are representative of each country's online population. Gartner analysts, familiar with the topics covered, developed the survey. Gartner's Research Data Analytics team reviewed, tested and administered it. We drew the respondents randomly from external consumer panels.

[8] "Forecast: Wearable Electronic Devices, Worldwide, 2017"

[9] "'FLAIM Trainer' Uses VIVE's Tracker for a Realistic Firefighting Experience," UploadVR.

[10] "The Rise of Virtual Reality in Real Estate," Forbes.

[11] "Virtual Reality Is Coming to a Project Near You," Woodworking.

[12] "DHL Supply Chain Makes Smart Glasses New Standard in Logistics," DHL.

[13] "HoloLens Will Now Let You Test Virtual Furniture in Your Real Home," Popular Science.

[14] "Renault Trucks Takes 'Mixed Reality' Test," Automotive Manufacturing Solutions.

[15] "Drive a Car Like You'd Fly an F-35 With Augmented Reality," WIRED.

[16] "Virtual Reality and Claustrophobia (Fear of Enclosed Spaces)," Virtual Reality Society.

Note 1 Degrees of Freedom

Virtual Reality and Augmented Reality Wiki describes degrees of freedom as "the ways an object can move within a space. There are a total of six degrees of freedom in a 3D space. The six degrees of freedom can be divided into two categories, rotational movements and translational movements. Each category has three degrees of freedom … Both orientation tracking (rotation) and positional tracking (translation) are required to have a truly immersive VR experience."

Note 2 Volumetric Video

In "The Brief History of Volumetric Filmmaking," J. George, writing for Medium, describes volumetric video as "an emerging format of video featuring moving images of real people that exist truly in 3D — like holograms — allowing them to be viewed from any angle at any moment in time."

More on This Topic

This is part of two in-depth collections of research. See the collections:

- Research Roundup: Augmented Reality and Virtual Reality
- Top 10 Strategic Technology Trends for 2018: A Gartner Trend Insight Report

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