

VIRTUAL AND AUGMENTED REALITY USERS 2019

VR Slows as AR Grows

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Victoria Petrock

Contributors: Jaimie Chung, Chris Keating



VIRTUAL AND AUGMENTED REALITY 2019: VR SLOWS AS AR GROWS

As virtual and augmented reality mature, both technologies are gaining traction among consumers and businesses. However, they are growing at different rates. This report provides our latest forecasts for virtual reality (VR) and augmented reality (AR) users in the US, and examines some of the market dynamics that are shaping the evolutions of both immersive technologies.

What's the difference between VR and AR? Though we release our forecasts for VR and AR at the same time, they are distinct technologies with different use cases. VR places users in virtual worlds and often requires the use of specialized headsets, while AR involves overlaying computer-generated information onto existing real-world views and is largely accessible via everyday mobile devices. VR is the more mature of the two technologies, but has fewer users.

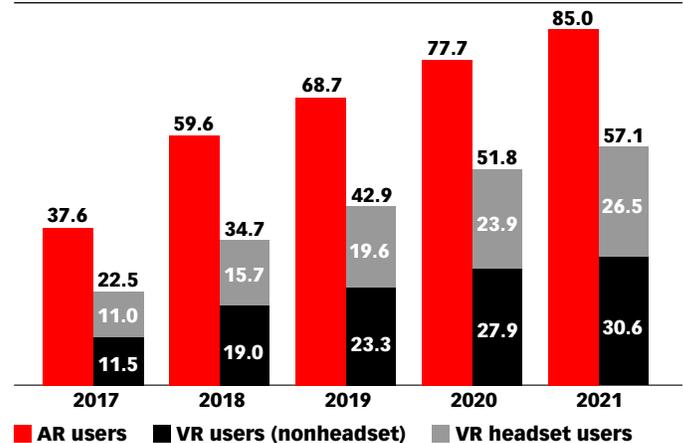
How many people in the US will use virtual and augmented reality in 2019? We anticipate that 42.9 million people will use VR and 68.7 million will use AR at least once per month. This represents 13.0% and 20.8% of the population, respectively.

How are this year's forecasts different from last year's? Since we released our 2018 forecasts, we have revised our VR user estimates downward and our AR user estimates upward to reflect changing market dynamics. We have also added a new metric, "social network AR users," to capture the use of AR features within social networks such as Snapchat, Instagram, Facebook and Pinterest.

Why are there more AR users than VR users in the US? AR applications are increasingly accessible via everyday mobile devices and have the potential to make people's lives easier. In addition to the breakout success of Pokémon Go in 2016, the introduction of Apple's ARKit and Google's ARCore software development kits (SDKs) in 2017 signaled the tech industry's confidence in—and ongoing support of—AR experiences. This is spurring developers to accelerate activity and create more applications.

WHAT'S IN THIS REPORT? This report includes our 2017-2021 forecast for VR and AR users in the US and an analysis of the forces shaping the growth of these technologies.

US Virtual Reality and Augmented Reality Users, 2017-2021
millions



Note: virtual reality (VR) users are individuals of any age who experience VR content at least once per month via any device; augmented reality (AR) users are individuals of any age who experience AR content at least once per month via any device
Source: eMarketer, March 2019
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KEY STAT: This year, 42.9 million people in the US will use VR, and 68.7 million people will use AR at least once per month.

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Behind the Numbers

eMarketer's US VR and AR user forecasts are updated annually to continually incorporate the latest changes and developments in consumers' adoption of VR and AR technology. Our forecasting methodology is based on the analysis of more than 450 survey and traffic metrics from 78 sources, including research firms and regulatory agencies, sales projections, historical trends, company-specific data and demographic and socioeconomic factors. Our methodology incorporates ongoing qualitative trends and changes in major company initiatives, partnerships and innovations to deliver an accurate estimate of how VR and AR technology adoption is expected to evolve.

VIRTUAL REALITY: STILL IN SEARCH OF A 'KILLER' APP

Several years ago, industry analysts hailed VR as the next big thing in consumer technology, but it has yet to live up to expectations. Instead, VR has been plagued by clunky and expensive hardware, complaints of motion sickness and a scarcity of compelling content. Worst of all, many consumers just aren't that interested.

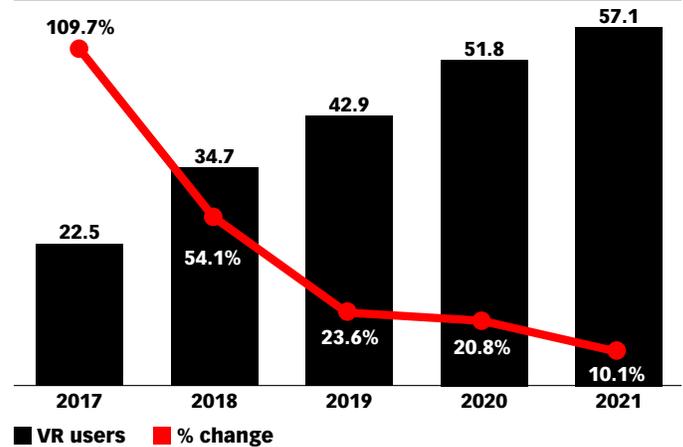
Our complete estimates for US AR and VR users can be found in this report's [accompanying spreadsheet](#).

Despite these challenges, a Who's Who of high-profile tech companies—including Facebook, Samsung, Sony, HTC, Qualcomm, Lenovo and Google—have been working to improve VR experiences. They continue to invest in the technology, rolling out faster processors, lower-cost hardware and untethered (standalone) headsets with more advanced features.

The industry is also working to develop VR beyond its most common use case in video gaming. Applications for healthcare, shopping, design, entertainment and education/training are gaining traction, especially among organizations that can afford higher-end headsets and custom-developed software.

As a result of these consumer- and business-focused advances, VR usage is steadily gaining traction, albeit at a slower-than-expected pace. In 2019, 42.9 million people in the US will use VR at least monthly, via any device. By 2021, that figure will reach 57.1 million. And over the forecast period from 2017 to 2021, the number of users will rise at a compound annual growth rate (CAGR) of 26.2%.

US Virtual Reality Users, 2017-2021
millions and % change



Note: individuals of any age who experience virtual reality (VR) content at least once per month via any device
Source: eMarketer, March 2019

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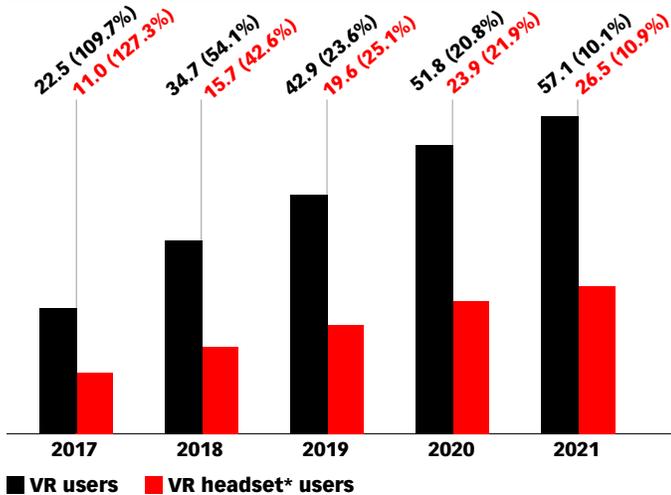
NEW HEADSETS WILL DRIVE GROWTH

While the majority of VR users experience content in the form of 360-degree photos and videos within desktop/laptop and mobile environments (including Facebook and YouTube), the subset of VR headset users (also known as head-mounted display users or HMD users), is also rising. Beginning in 2019, we expect the number of headset users to grow at a slightly higher rate than total VR users as newer, lower-priced and easier-to-use models hit the market.

This year, we expect 19.6 million people in the US (45.7% of VR users) to use VR headsets. By 2021, 26.5 million (46.4% of VR users), will use them. This will represent 5.9% of the US population in 2019 and 7.9% in 2021. Over the forecast period from 2017 to 2021, VR headset use will rise at a CAGR of 24.6%.

US Virtual Reality and Virtual Reality Headset* Users, 2017-2021

millions and % change



Note: individuals of any age who experience virtual reality (VR) content at least once per month via any device; *individuals of any age who experience VR content at least once per month via headsets
Source: eMarketer, March 2019

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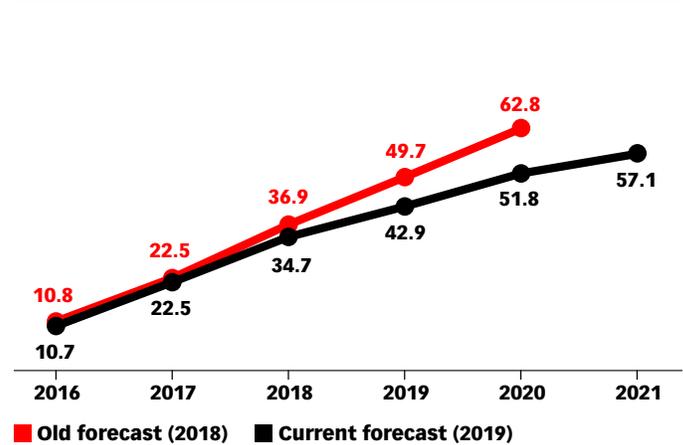
VR's ability to reach mainstream status over time will hinge on the industry's ability to produce wireless, untethered, comfortable and easy-to-use headsets at lower prices, and pair them with compelling content. We also expect that upcoming 5G mobile networks will help boost VR adoption because 5G will decrease the associated latency and enable more stable connections and higher-quality experiences.

WHAT'S CHANGED SINCE LAST YEAR?

While we still see noteworthy technological progress on the VR headset front, there have been no significant software innovations since last year. For this reason, we don't expect the number of overall VR users to rise as quickly as previously projected. We have therefore revised our user forecasts downward. Beginning in 2018 and continuing through 2021, we expect fewer overall VR users than originally estimated. For example, our March 2018 forecasts called for 62.8 million VR users by 2020, but we now expect just 51.8 million.

How Has the Forecast for US Virtual Reality Users Changed from 2018 to 2019?

millions, 2016-2021



Note: individuals of any age who experience virtual reality (VR) content at least once per month via any device

Source: eMarketer, March 2019

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This forecast revision is consistent with other market estimates that reflect the industry's departure from gimmicky, one-off experiments and low-end headsets toward a deeper pursuit of VR applications and content ecosystems that deliver longer-term value.

"The VR market is entering a new stage of maturity, where companies are setting aside the unrealistic expectations around explosive market growth and are focused instead on building more sustainable businesses," Tom Mainelli, group vice president, devices and AR/VR at IDC, said in a December 2018 news release.

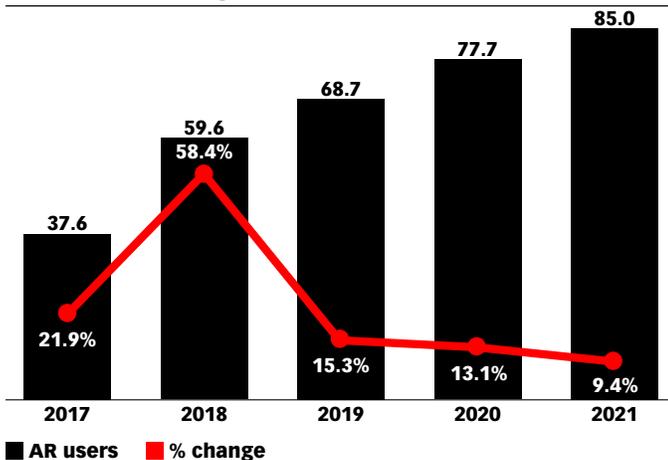
At the same time, however, we have increased our estimates for VR headset users to reflect the higher-than-expected uptake of lower-cost, untethered mass-market hardware. The \$199 Oculus Go—introduced in 2018—and newer devices, including the Lenovo Mirage Solo and the upcoming Oculus Quest all-in-one gaming system, solve many of the problems that plague older devices. These new models are beginning to replace both screenless (e.g., Samsung Gear VR, Google Cardboard and Google Daydream View) and tethered (Oculus Rift, HTC Vive) headsets and have seen higher-than-expected use among businesses. In June 2018, IDC anticipated that standalone HMDs would comprise 55.6% of VR headsets worldwide, up from 16.1% in 2018.

For more detailed information about the VR market, VR applications, devices and market players, read our April 2018 report, [“Virtual Reality Beyond Gaming: Solving Business Problems in Industries.”](#)

AUGMENTED REALITY: MOBILE APPS TAKE OFF

Though VR often receives more media buzz, AR is on its way to becoming mainstream first. Unlike VR, consumers are enthusiastically embracing AR’s more practical value in AR and are enthusiastically embracing it. In 2019, we expect 68.7 million people in the US will use AR on any device (including smartphones, tablets, desktops/laptops, head-up displays, glasses and headsets) at least once per month. By 2021, this number will rise to 85.0 million. The CAGR for the forecast period from 2017 to 2021 will be 22.6%.

US Augmented Reality Users, 2017-2021
millions and % change



Note: individuals of any age who experience augmented reality (AR) content at least once per month via any device
Source: eMarketer, March 2019

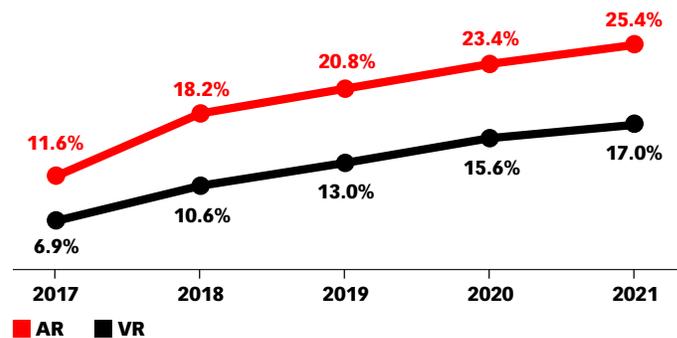
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Since the breakout success of Pokémon Go in 2016, most AR use has been mobile. Games and mobile apps that enable users to create photo lenses and filters, virtually “try on” cosmetics, clothing and accessories, place furniture and manipulate 3-D objects have driven the majority of AR’s growth. This growth will continue, propelled by an increase in AR-enabled smartphones and eventually, other mobile devices such as glasses and

headsets. Other innovative and useful AR applications, such as wayfinding and visual search, will further drive AR development.

More people currently use AR than VR and will continue to do so over the forecast period. In 2019, 20.8% of the US population will use AR at least once per month, compared with just 13.0% using VR. This gap will persist over the forecast period, even though the number of VR users will grow more quickly from a smaller base. By 2021, 25.4% of the population will use AR, compared with just 17.0% using VR.

US Augmented Reality and Virtual Reality User Penetration, 2017-2021
% of population



Note: individuals of any age who experience virtual reality (VR) content at least once per month via any device; individuals of any age who experience augmented reality (AR) content at least once per month via any device
Source: eMarketer, March 2019

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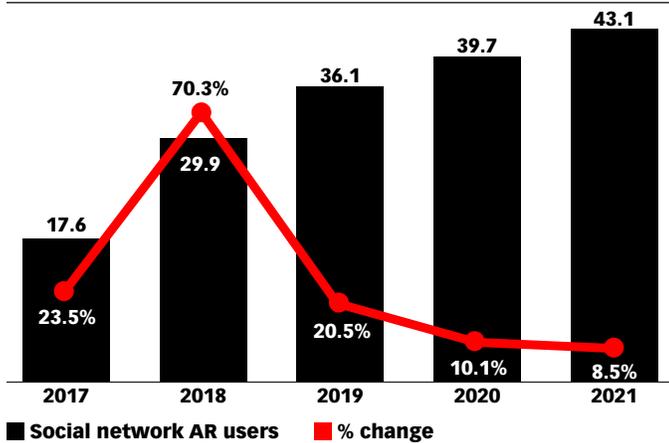
SOCIAL AR MAKES UP HALF OF AR USE

This year, we have added a new forecast metric, “social network AR users,” to reflect the significant percentage of people who use AR within social networks. Specifically, more than half (52.5%) of AR users in 2019 will experience Snapchat Lenses and Filters, Facebook Camera Effects, Instagram Filters, Pinterest visual search, AR-enabled social-network advertising and other AR features.

By 2021, there will be 43.1 million US social network AR users, up from 36.1 million in 2019, representing a CAGR of 25.1% from 2017 to 2021.

US Social Network Augmented Reality Users, 2017-2021

millions and % change



Note: individuals of any age who experience augmented reality (AR) content within a social network at least once per month via any device
Source: eMarketer, March 2019

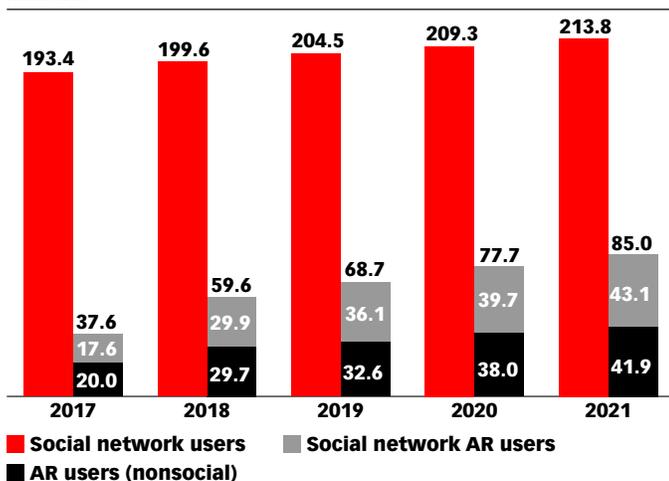
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By the end of 2019, the number of social network AR users will represent 10.9% of the US population, 12.7% of internet users and 17.6% of social network users. By 2021, more than one-fifth of social network users will use AR features within a social network. The majority of this usage will take place on smartphones.

US Social Network Users, Augmented Reality Users and Social Network AR Users, 2017-2021

millions



Note: social network users are internet users of any age who use a social network via any device at least once per month; augmented reality (AR) users are individuals of any age who experience AR content at least once per month via any device; social network AR users are individuals of any age who experience AR content within a social network at least once per month via any device
Source: eMarketer, March 2019

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These forecasts for AR social network users are consistent with projections from other research firms. For example, August 2018 research by Vertebrae found 52.4% of US AR users had experienced AR on Snapchat, and 30.2% had experienced it on Facebook.

Another study, conducted the same month by research and publishing firm ARtillery Intelligence, found that 45% of adults who used AR several times per week used social AR. Our forecasts are higher because they include social AR users of all ages, including teens, who overindex other age groups in their uses of lenses and filters.

WHAT'S CHANGED SINCE LAST YEAR?

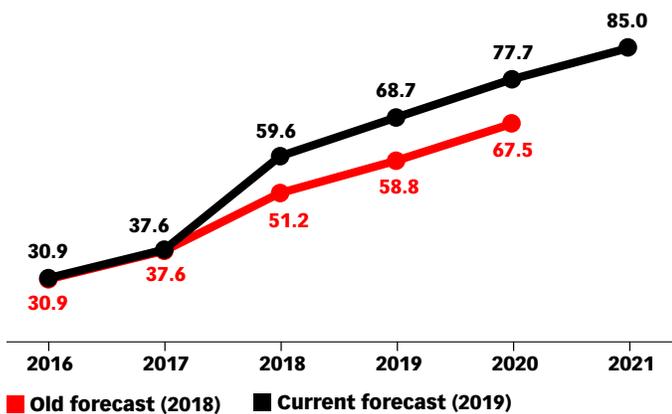
Since we completed our previous forecasts in March 2018, several major developments have occurred in the AR market. In June 2018, Apple introduced its iOS 12 operating system, enabling iOS device users to consume and share AR experiences. It also added enhancements to ARKit, its software development framework that lets developers create AR experiences. Several months later, Google introduced ARCore, a similar tool for Android devices. During the same timeframe, several social networks, including Snapchat, Pinterest, Instagram and Facebook also launched a variety of AR features—including shoppable AR, AR games and AR advertising—to further entice users and boost engagement.

The collective impact from these developments has been significant. By doubling down on AR development tools and supporting development, Apple and Google are encouraging more experimentation and increasing the chances of developing another killer app. They are also acclimating their customers to basic AR experiences and increasing comfort levels with the technology. This will help keep interest high while better hardware and higher-quality content is developed.

We have revised our AR user forecasts upward to reflect higher-than-expected growth and consumer adoption. For example, our March 2018 forecasts called for 67.5 million AR users by 2020; we now anticipate 77.7 million.

How Has the Forecast for US Augmented Reality Users Changed from 2018 to 2019?

millions, 2016-2021



Note: individuals of any age who experience augmented reality (AR) content at least once per month via any device
Source: eMarketer, March 2019

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We also continue to monitor the horizon for other developments that could alter AR's growth trajectory. For example, many industry practitioners believe that AR experiences will migrate from mobile devices to HMDs or glasses within the next five years, especially if major technical challenges—including battery life, continuous network connectivity, a viable app distribution system and cultural acceptability—can be overcome.

Currently, the AR glasses and mixed reality (MR) headsets on the market—including Microsoft's HoloLens, the Magic Leap One and a variety of other head-mounted hardware—remain pricey, niche products in the early development phase. However, Apple's (or another big-tech firm's) introduction of mass-market AR glasses could have an impact on future forecasts.

For more detailed information about specific AR applications and hardware, read our October 2018 report, ["Augmented Reality Marketing and Advertising 2018: Adding Virtual Value to the Real World."](#)

AR and VR Glossary

Virtual Reality: VR immerses a user inside a nonfixed visual environment. Examples of VR include 360-degree videos, photos and product demos via any device (e.g., connected TVs, desktops/laptops, mobile devices and headsets) and games via headsets. Examples of VR headsets include Google Cardboard, Google Daydream View, HTC Vive, Oculus Go, Oculus Quest, Oculus Rift, PlayStation VR and Samsung Gear VR.

Augmented Reality: AR enables a user to interact with virtual objects and other types of digital information that is overlaid on top of real-world views. AR experiences can be app-, web- or headset-/glasses-based or available through head-up displays and other specialized hardware. Examples of AR include filters of videos and photos (e.g., Snapchat Lenses); games (e.g., Pokémon Go); shopping (e.g. Ikea Place app, Sephora Virtual Artist); navigation (e.g., via head-up displays); object interactions (e.g., Blippar, HP Reveal); 3-D product demos and projections via headsets (e.g., enterprise applications).

Mixed Reality: Like AR, MR involves superimposing or projecting virtual images onto the real world. However, experts who distinguish the two say the difference is in MR's ability to let virtual images interact with the real environments onto which they are overlaid. All of today's MR is experienced via headset. Microsoft's HoloLens—a head-mounted holographic computer made available to developers in 2016—is the most well-known example, though Magic Leap debuted its highly anticipated Magic Leap One MR headset last year.

Social Network Augmented Reality: Social network AR enables a user to interact with virtual objects and other types of digital information that is overlaid on top of real-world views within a social network. Examples of social network AR include filters of videos and photos (e.g., Snapchat Lenses, Instagram Filters); games (e.g., Snapchat Snappables, Facebook Messenger video chat games); digital avatars that overlay the real world (e.g. 3-D Bitmojis).

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Katie Hamblin	Chart Editorial Manager
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Erika Huber	Copy Editor
Ann Marie Kerwin	Executive Editor, Content Strategy
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