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Victoria Petrock

US Virtual and Augmented Reality Users 2021

XR Use Expands Beyond Fun and Games

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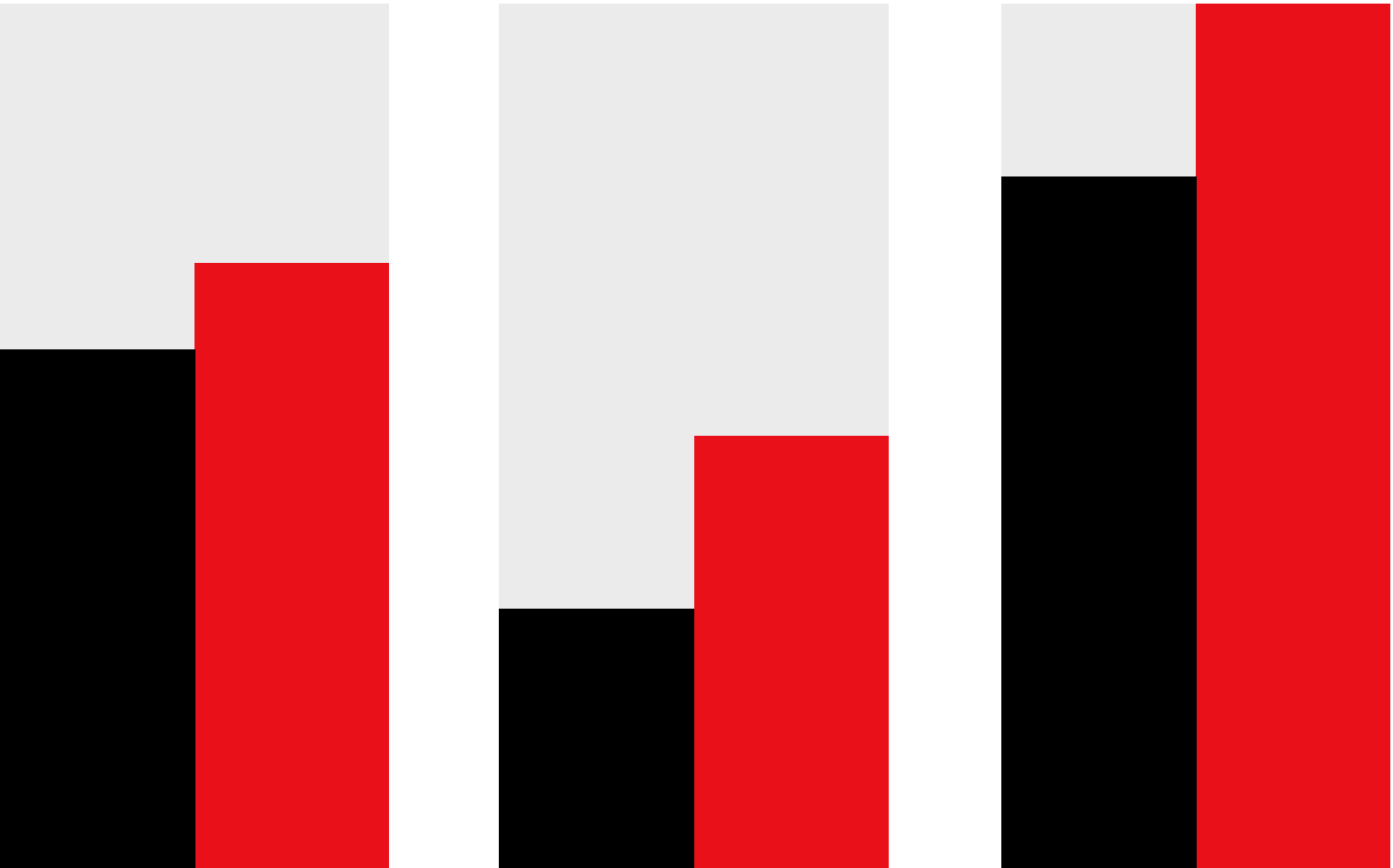


US Virtual and Augmented Reality Users 2021: XR Use Expands Beyond Fun and Games

Extended reality (XR) technologies, including virtual reality (VR), augmented reality (AR), and mixed reality (MR) are still in the early phases of adoption, but they are evolving quickly. While most use cases for VR and AR are still related to gaming, entertainment, and social media, the variety of applications is expanding as more consumers and businesses test out immersive experiences.

How many people in the US will use VR and AR this year?

We expect 58.9 million people will use VR and 93.3 million will use AR at least once per month in 2021. These numbers represent 17.7% and 28.1% of the US population, respectively.

How has the global pandemic affected the market for VR and AR?

Because the pandemic has forced many people to work, socialize, study, and shop at home, they're using XR experiences to replace in-person ones. While supply chain and distribution issues temporarily disrupted shipments of VR hardware in H2 2020, demand for all types of XR content will translate to more users over the forecast period.

How are this year's forecasts different from last year's?

This year, we revised our previous estimates upward to reflect faster-than-expected growth in both VR and AR users. Pandemic-induced conditions have catalyzed interest in both technologies, and developers are stepping up to meet increased demand.

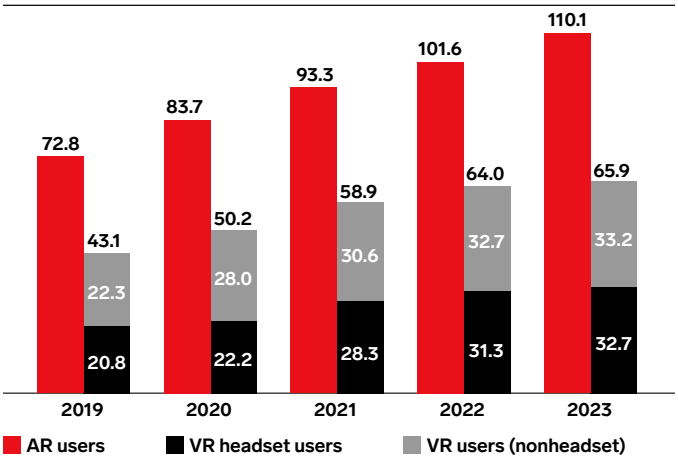
How will the introduction of 5G wireless connectivity and other advanced technologies affect VR and AR usage?

The convergence of 5G, artificial intelligence (AI), and edge cloud processing will soon make it easier to deliver more seamless, enjoyable, and cost-effective XR experiences across a variety of connected devices.

WHAT'S IN THIS REPORT? This report includes our 2019–2023 forecasts for VR and AR users in the US, along with an analysis of the forces shaping the growth of these technologies.

US AR/VR Users, 2019-2023

millions



Note: individuals of any age who experience VR content at least once per month via any device; AR users are individuals of any age who experience AR content at least once per month via any device
Source: eMarketer, March 2021

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KEY STAT: This year, 58.9 million people in the US will use VR, and 93.3 million people will use AR at least once per month.

Contents

Behind the Numbers

Our **US VR and AR user forecasts** are updated annually to 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 500 data points 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.

XR Definitions

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- or glasses-based or available through head-up displays and other specialized hardware. Examples of AR include overlays on 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; and 3D product demos and projections via headsets (e.g., enterprise applications).

Extended reality (XR): A relatively new umbrella term used to describe the various types of computer-generated immersive technology. XR encompasses VR, AR, MR, and any other blended environments or emerging realities that may be developed in the future.

Mixed reality (MR): 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 to create a "hybrid" view. Much of today's MR is experienced via headset. Microsoft's HoloLens and Magic Leap's Magic Leap 1 MR, which are primarily used in enterprise applications, are two of the most well-known examples.

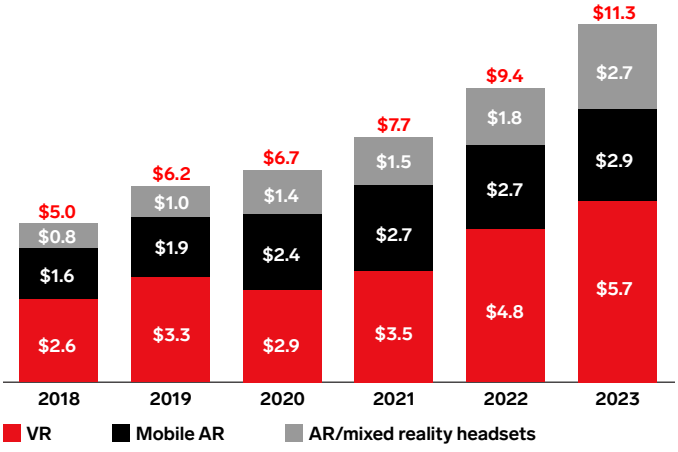
Social network AR: Enables a user to interact with virtual objects and digital information that is overlaid on top of real-world views within a social network. Examples of social network AR include filters of videos and photos (e.g., Snapchat Lenses, Instagram filters); games (e.g., Snapchat Snappables,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

Virtual reality (VR): VR is a simulated environment in which a user can interact within nonfixed three-dimensional computer-generated content using electronic devices. Various types of VR content can be consumed with or without specialized headsets. Examples of VR include 360-degree videos, photos, and product demos consumed via any device (e.g., connected TVs, desktops/laptops, mobile devices, and headsets) and games used with headsets. Top VR headsets currently on the market include HTC Vive, Oculus Quest 2, Oculus Rift, Valve Index, and Sony PlayStation VR.

Pandemic Galvanizes XR Landscape

For the past several years, the market for VR and AR has steadily increased, albeit not dramatically. Last year, SuperData Research estimated that combined consumer VR and AR revenues worldwide would grow from $6.2 billion in 2019 to $6.7 billion in 2020. However, the firm expects 2021 to be a turning point when growth in both XR technologies accelerates, propelling revenues to $11.3 billion by 2023.

Consumer AR/VR Revenues Worldwide, by Category, 2018-2023
billions



Note: sales revenues only; excludes ad revenues
Source: SuperData Research as cited in company blog, Oct 28, 2020

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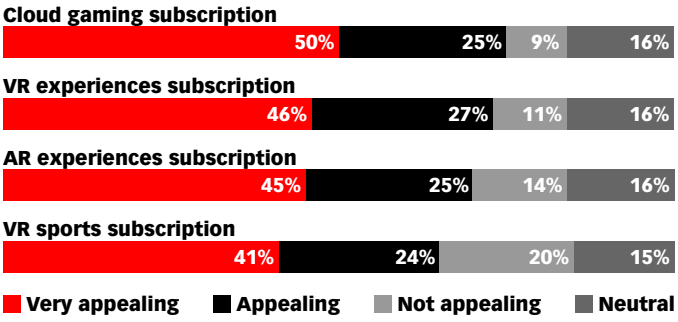
VR and AR are different technologies growing at different rates, but the pandemic appears to have galvanized the market for both, deepening interest and development for similar reasons:

- **Established use cases have increased.** VR and AR usage has increased as more people stay home and pursue activities aligned with crowd avoidance and social distancing, including video gaming, consuming entertainment, participating in social VR, using AR features on social networks, and experimenting with virtual try-ons, virtual shopping, and 360-degree travel videos. For example, June 2020 research by Ipsos and the Global Myopia Awareness Coalition (GMAC) found that 58% of US children and teens spent more time with smartphones, 53% spent more time with video game consoles, and 15% spent more time with VR headsets since the pandemic began. In general, people who owned VR headsets used them more; others explored nonheadset options or considered buying headsets.
- **New use cases are attracting interest.** The move to remote and virtual work, studying, and other home-based activities has created interest in new and more useful applications of VR and AR beyond gaming. Virtual fitness, business collaboration, and distance learning are just three of many examples. With more development and more demand, VR and AR are increasingly being seen as viable replacements for in-person training, meetings, events, conventions, customer service, healthcare, and other activities.
- **Big Tech sees big opportunity.** The pandemic has turned XR into an even more important growth area for Big Tech. While Facebook is on its way to becoming the VR leader in the US with its Oculus ecosystem, it is also investing in AR. Other heavy hitters, including Apple, Google, Microsoft, and Samsung, are all reported to be racing to introduce their own VR, AR, and/or MR solutions to grow the market and capitalize on increasing demand.
- **5G is becoming more available.** XR developers are optimistic about the rollout of 5G wireless service—both in the US and around the world. Higher-speed 5G networks are expected to eliminate many persistent technical difficulties and boost XR's viability. In an April 2020 survey conducted by Toluna and Advertiser Perceptions on behalf of Verizon Media, 44% of US adults cited streaming VR content and 36% cited AR experiences as expected benefits of 5G technology. Likewise, a majority of adults in South Korea, the UK, and the US found the idea of subscription-based VR and AR at least somewhat appealing, according to a January 2020 Nokia poll conducted by Parks Associates. Nearly three-quarters (73%) of respondents found a subscription to VR experiences appealing or very appealing, while 70% and 65%, respectively, said the same for AR experiences and VR sports.

Appeal of 5G Immersive Technology Subscriptions According to Adults in South Korea, the UK, and the US, Jan 2020
% of respondents



Source: Nokia, "The value of 5G services: Consumer perceptions and the opportunity for CSPs" conducted by Parks Associates, June 10, 2020

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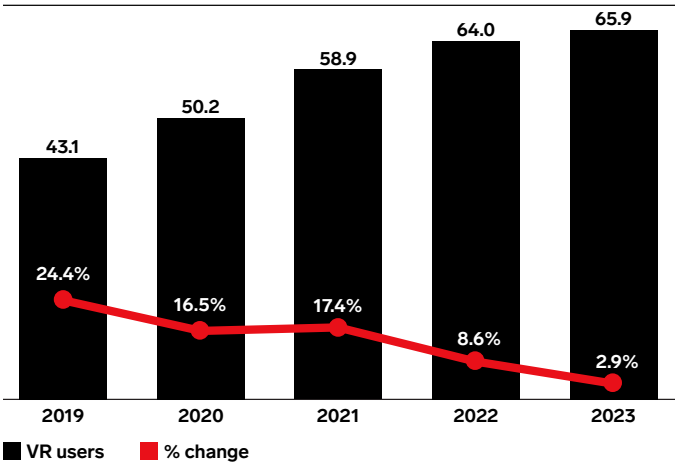
Virtual Reality: A Bumpy Road to Growth

Despite a bumpy 2020 that included a worldwide VR headset shortage and a temporary decline in VR revenues, demand for VR content and headsets is growing. People are spending more time at home during the pandemic and have more free time for gaming and entertainment, two top uses of VR. All of this time working, studying, and exercising from home has also piqued new interest in VR applications that can replicate and replace in-person experiences.

The promise of these new uses has attracted a who's who of high-profile tech companies—including Facebook, Apple, Google, Samsung, Microsoft, Sony, Valve Corporation, HTC, Qualcomm, Panasonic, and Lenovo—all reportedly ramping up research and development investments and potential new product offerings. As a result of this activity, we expect 58.9 million people in the US will be using VR at least monthly by the end of this year via any device. By 2023, this will rise to 65.9 million users.

US VR Users, 2019-2023

millions and % change



Note: individuals of any age who experience VR content at least once per month via any device
Source: eMarketer, March 2021

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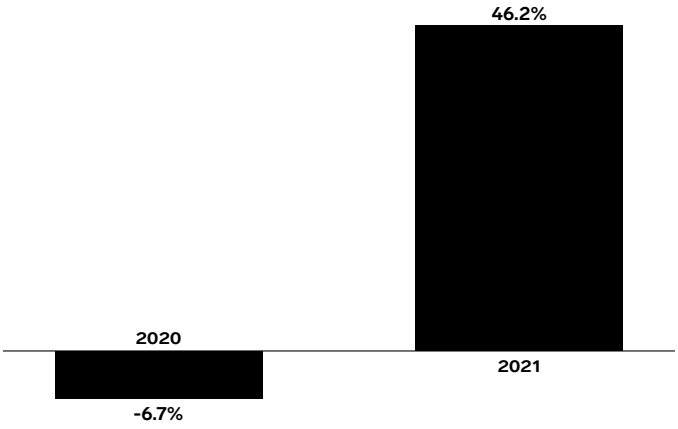
Coronavirus Impact: VR Device Shipment Growth Worldwide, 2020 & 2021

% change vs. prior year



Note: includes standalone VR devices, tethered VR devices, and screenless viewers that frame the user's smartphone
Source: International Data Corporation (IDC), "Quarterly Augmented and Virtual Reality Headset Tracker" as cited in press release, Sep 16, 2020

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VR Headset Supply Declines as Demand Surges

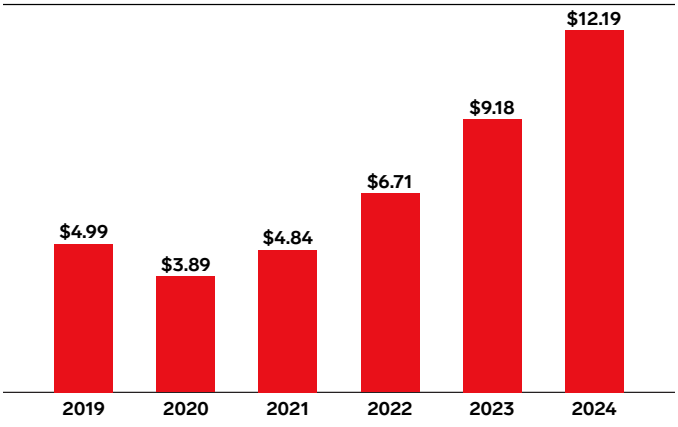
Growth in the VR market has historically correlated with the introduction of more affordable, higher-quality headsets and compatible content. In recent years, innovative headsets have included the Oculus Rift S, Oculus Quest, and Oculus Quest 2, as well as the HTC Vive Cosmos Elite and Vive Pro Eye, the Sony PlayStation VR, and the Valve Index. New hardware and new games tend to drive up purchases, use cases, and revenues.

But in 2020, hardware supply and demand moved in opposite directions. The International Data Corporation (IDC) reported that VR headset shipments worldwide saw a 6.7% year-over-year (YoY) decline and became scarce, even as interest in VR surged. Despite these declines, IDC estimated that shipments will surge 46.2% this year as supply issues start to ease, new headsets gain a foothold in the market, and pent-up demand is satisfied.

VR revenue forecasts from ARtillery Intelligence published in November 2020 also reflect this dip. The firm predicted that combined revenues from consumer- and business-focused applications of VR would decline from $4.99 billion in 2019 to $3.89 billion in 2020, though they would rebound to $4.84 billion in 2021 and hit $6.71 billion in 2022.

VR Revenues Worldwide, 2019-2024

billions



Note: consumer and enterprise
Source: ARtillery Intelligence, "VR Global Revenue Forecast, 2019-2024," Nov 11, 2020

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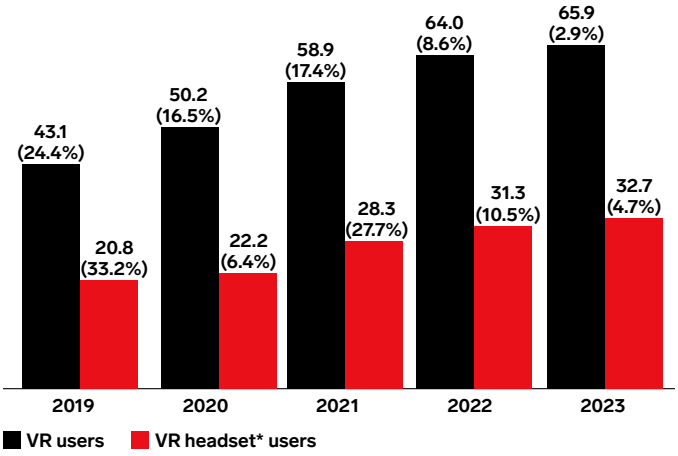
These declines—and subsequent surges—happened for two reasons. Pandemic-related chip shortages and supply chain disruptions caused slowdowns in headset shipments. At the same time, top headset makers were in the midst of changing their product lineups and shifting focus. For example, Facebook's Oculus shipments fell just before the company replaced its original Oculus Quest with the Oculus Quest 2 in October 2020. And shipments of the Sony PS VR (originally designed for the PlayStation 4) also declined as the company shifted focus to introducing its new PlayStation 5 console in late 2020. While Sony has announced it will eventually ship new VR headsets that are easier to use with the PS5, it's unlikely that will come until after 2021.

Our VR user forecasts, which include both people who consume 360-degree photos and videos within desktop/laptop and mobile environments (including Facebook and YouTube), and those who use headsets (also known as head-mounted displays or HMDs), reflect these market dynamics with slower uptake of headset use in 2020 and a significant rebound in 2021. This year, we expect 28.3 million people in the US to use VR headsets, and by 2023, 32.7 million will use them.

US VR and VR Headset* Users, 2019-2023
millions and % change



*Note: individuals of any age who experience 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 2021

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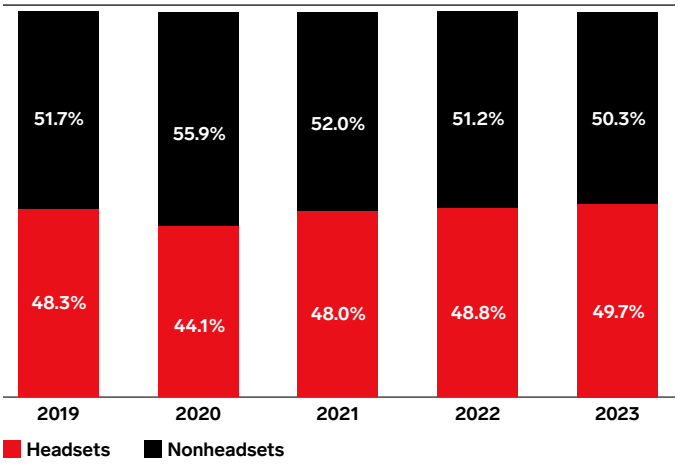
While nonheadset users have historically made up a higher percentage of VR users, the tide is slowly turning in favor of headset users. This year, 48.0% of total US VR users will consume VR via headsets.

Share of US VR Users Who Experience VR via Headsets, 2019-2023
% of total



Note: individuals of any age who experience VR content at least once per month
Source: eMarketer, March 2021

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We expect this percentage to rise over the remainder of the forecast period, reaching 49.7% by 2023.

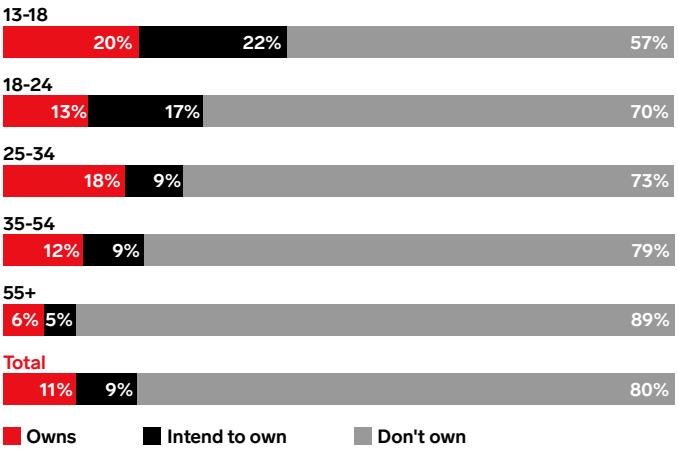
Beyond Gaming: New Horizons for VR

Video gaming remains the undisputed top application of VR and is already big business. In February 2021, Oculus's vice president of content Mike Verdu announced in a blog post that more than 60 games available for the Oculus Quest and Quest 2 were "generating revenues in the millions," with six topping $10 million each. And in an earnings call, Facebook CEO Mark Zuckerberg revealed that pre-orders for the Quest 2 were five times higher than those of the original Quest, released in May 2019.

Not surprisingly, the demographics of VR headset use track closely with the demographics of gamers. For example, a January 2021 survey by CivicScience found that the majority of headset users and those who intended to use the technology were under 35.

Ownership of VR Headsets Among US Teens/Adults, by Age, Jan 2021

% of responses



Note: n=64,600 surveyed Oct 20, 2020-Jan 18, 2021; e.g., Vive, Oculus, Samsung Gear; numbers may not add up to 100% due to rounding
Source: CivicScience as cited in company blog, Jan 20, 2021

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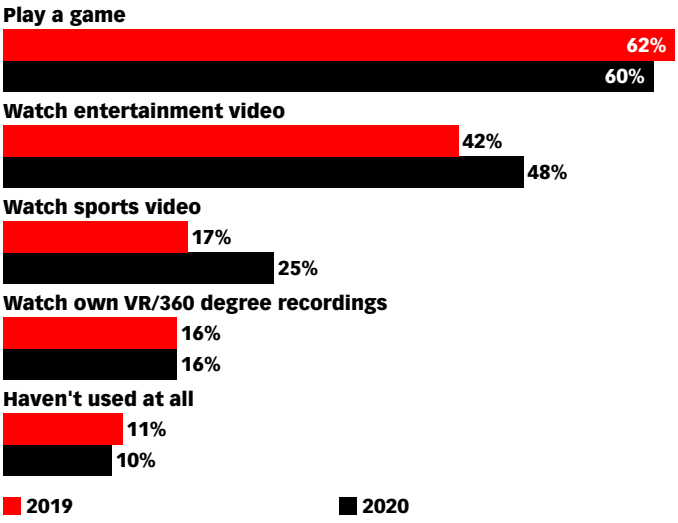
But industry players see a bigger future beyond gaming. Not only are pandemic-induced lockdowns and restrictions on in-person activities encouraging gamers to explore different kinds of immersive content, but they're also attracting a more diverse base of users who use VR as part of their daily routines. For example, Oculus's Verdu noted that subscriptions have more than doubled for the Quest 2 fitness app "Supernatural" since the headset started shipping. He also said the app enjoys an "incredibly diverse subscriber base that currently includes an equal gender split across all different age groups and backgrounds," and a "passionate and active" VR Facebook community. Similarly, workout video app FitXR is among the top nongaming apps on the Quest 2 platform, experiencing 535% YoY sales growth in Q4 2020 and fourfold growth in weekly active users since the Quest 2 launched.

Users of other types of applications are also on the rise. An April 2020 report by Hub Research found that the percentage of US VR headset owners who watched entertainment videos via VR jumped from 42% to 48% between 2019 and 2020. The percentage watching sports videos jumped from 17% to 25%, while the percentage of those playing games declined slightly (62% to 60%).

Activities that US VR Headset Owners Have Conducted via VR, 2019 & 2020

% of respondents



Note: ages 16-74
Source: Hub Research, "Entertainment in the Connected Home," April 14, 2020

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Additionally, heightened interest in VR social platforms like Facebook Horizon is spurring businesses in various industries to explore both customer-facing applications—including virtual shopping, customer service, and virtual education and training programs—as well as those that enable virtual work and collaboration among employees. Examples include VR for surgical training, therapy, and rehabilitation in the healthcare industry; concept design in automotive; and manufacturing and marketing research in retail.

"While gaming remains at the forefront of consumer VR, other use cases such as virtual concerts and virtual workouts are also starting to resonate with buyers," Jitesh Ubrani, research manager for worldwide mobile device trackers at IDC, said in a September 2020 news release. "Meanwhile, many enterprises continue to ramp up their use of VR, with training, collaboration, design, and manufacturing use cases driving momentum. We expect the commercial segment to grow from 38% of the worldwide market in 2020 to 53% by 2024."

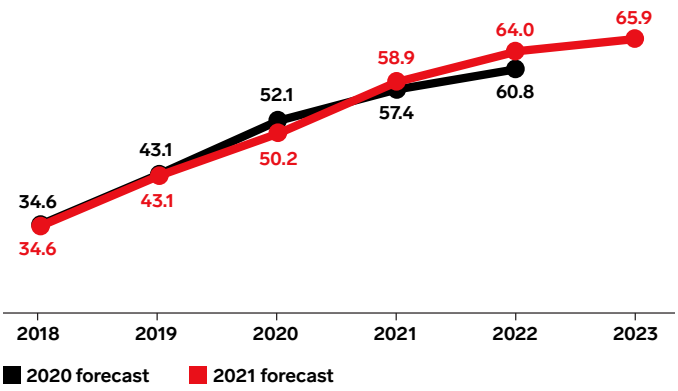
What's Changed Since Last Year?

Despite supply chain disruptions, silicon chip shortages, and a decline in VR headset shipments in 2020, a combination of pent-up, pandemic-fueled demand and steady technological innovation will drive stronger-than-anticipated growth in the number of US VR users over the next several years.

This growth will take place among both consumers and businesses. Newer, lower-priced headsets like the Oculus Quest 2—and increasingly advanced and lightweight models—will gain favor among gamers. They'll also establish a foothold among nongaming audiences for entertainment, fitness, travel, learning, shopping, and business collaboration. Meanwhile, commercial enterprises will continue to roll out applications for training, design, meetings and conferences, and customer service.

As a result, we've adjusted our latest forecast to reflect a lower number of users in 2020 than originally expected, but we have revised our figures upward starting this year to reflect higher demand and faster-than-expected adoption of new devices and applications for the remainder of the forecast period. For example, our March 2020 forecast called for 52.1 million VR users by the end of 2020; we now believe that number was 50.2 million.

How Has the Forecast for US VR Users Changed from 2020 to 2021?
millions, 2018-2023



Note: individuals of any age who experience VR content at least once per month via any device
Source: eMarketer, March 2021

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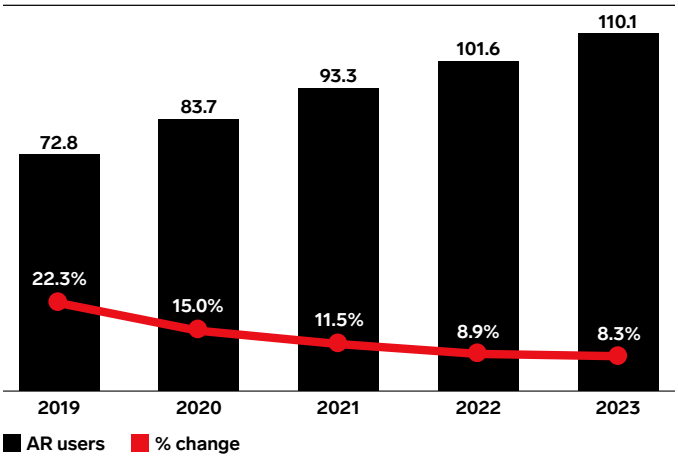
We're also expecting 64.0 million users in 2022, up from the 60.8 million we forecast last year.

Augmented Reality: Greater Utility Drives More Use

Though AR often receives less buzz than VR, it is more readily available and has a larger user base. Because the technology is built into most newer smartphones, its popularity for gaming (e.g., Pokémon Go) and use on social networks has already made it a part of people's daily routines. Over the next several years, we anticipate a significant increase in the use of AR on mobile devices and the eventual introduction of AR headsets and/or AR glasses.

This year, we expect 93.3 million people in the US to use AR on any device (including smartphones, tablets, desktops/laptops, head-up displays, glasses, and headsets) at least once per month. By 2023, there will be 110.1 million AR users. The compound annual growth rate (CAGR) for the forecast period from 2019 to 2023 will be 8.6%.

US AR Users, 2019-2023
millions and % change



Note: individuals of any age who experience AR content at least once per month via any device
Source: eMarketer, March 2021

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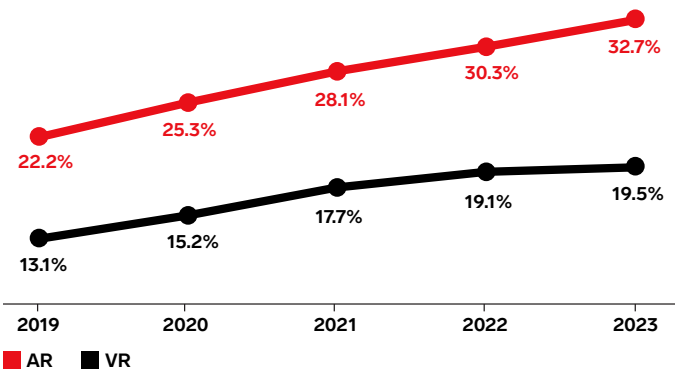
Because AR can be more easily consumed on smartphones than VR can, there are more users. This trend will continue over the forecast period. In 2021, 28.1% of the US population will use AR at least once per month, compared with the 17.7% using VR. Over time, this gap will widen as the number of AR users grows at a higher rate. By 2023, we expect 32.7% of the population to be using AR, compared with just 19.5% using VR. However, these metrics don't measure changes in the volume of content that existing VR and AR users consume, just changes in the number of users.

US AR/VR User Penetration, 2019-2023

% of population



Note: individuals of any age who experience VR content at least once per month via any device; individuals of any age who experience AR content at least once per month via any device
Source: eMarketer, March 2021

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While we don't forecast specific demographic breakouts for AR users, a January 2021 analysis by ARtillery Intelligence and Thrive Analytics found that the majority (57%) of users were male, and more than one-third were between ages 25 and 34.

Demographic Profile of US AR Users, Jan 2021

% of total

Gender	
Male	57%
Female	43%
Age	
18-24	25%
25-34	34%
35-44	26%
45-54	10%
55-64	4%
65+	2%
Income	
<$25K	20%
$25K-$50K	30%
$50K-$75K	19%
$75K-$100K	12%
$100K+	20%

Note: numbers may not add up to 100% due to rounding
Source: ARtillery Intelligence and Thrive Analytics, "AR Usage & Consumer Attitudes, Wave IV," March 31, 2021

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The analysis also revealed that a plurality (30%) of US AR users had annual household incomes between $25,000 and $50,000.

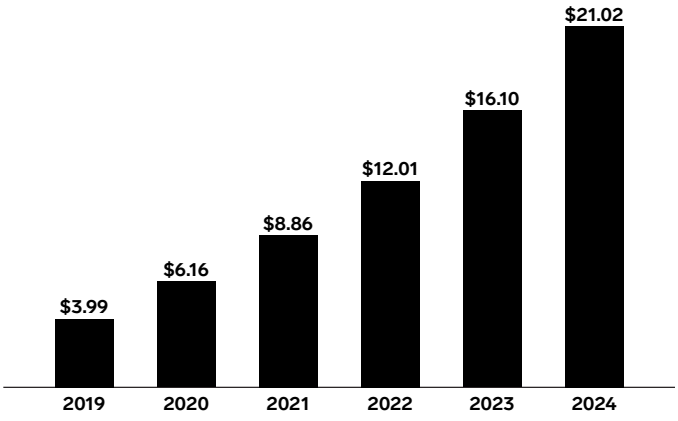
Strong Focus on Mobile Apps

AR today is overwhelmingly consumed via smartphones and tablets, so it's no surprise that the bulk of AR development is focused on these devices. The introduction of Apple's ARKit and Google's ARCore software development kits (SDKs) in 2017, coupled with new smartphone technology, including lidar and voice-control features, continue to provide a solid foundation for mobile AR growth, and they have become the industry standard for creating mobile AR applications.

ARKit and ARCore are helping to democratize AR creation, making it available to a wider number of developers and enabling companies to create their own branded experiences (e.g., Ikea's furniture placement and Mercedes-Benz's AR owner's manual). As the number of newer, AR-capable smartphones grows, so too will the number of AR applications, AR users, and mobile AR revenues. In September 2020, ARtillery Intelligence estimated that mobile AR revenues worldwide from consumer and enterprise applications will hit $8.86 billion this year and reach $21.02 billion by 2024.

Mobile AR Revenues Worldwide, 2019-2024

billions



Note: consumer and enterprise applications; includes productivity, advertising, in-app purchases, premium apps, media/content creation, and retail/ecommerce enablement
Source: ARtillery Intelligence, "Mobile AR Revenue Forecast, 2019-2024" as cited in company blog, Sep 17, 2020

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As with VR, gaming is by far the top use of mobile AR content, according to the ARtillery Intelligence/Thrive Analytics research published in March 2021.

What Types of Mobile AR Content Have US AR Users Experienced?

% of respondents, 2018-2020

	2018	2019	2020	2021
Games (e.g., Pokémon Go, NBA AR)	83%	82%	84%	86%
Social (e.g., Snapchat lenses)	36%	37%	40%	41%
Furniture or car visualization (e.g., Ikea Place, BMW iVisualizer)	31%	25%	35%	34%
Visual search (e.g., using smartphone camera to identify items)	-	24%	37%	28%
Educational	24%	24%	22%	30%
Utilities	19%	15%	22%	22%
Other	2%	2%	2%	2%

Source: ARtillery Intelligence and Thrive Analytics, "AR Usage & Consumer Attitudes, Wave IV," March 2021

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The research also found that AR users' interest in other experiences—including social media, retail assistance, and visual search—has grown since 2018 as more content has become available. As with VR, developers are increasingly focusing on AR-based smartphone applications that can help people with everyday tasks, such as shopping, wayfinding and navigation, translation, customer service, remote assistance, visual search, and education. For example, an increasing number of apps let consumers virtually "try on" cosmetics, shoes, clothing, and accessories; navigate around various venues; translate words; identify things around them; place furniture and decor; and manipulate other 3D objects.

As these more useful apps proliferate, industry watchers expect to see more convergence and integration between them and other platforms and services. For example, Snapchat's Snap Camera enables users to use Snapchat Lenses on their computer while streaming video and during Zoom or Google Hangouts video calls, and it may soon be possible to use Google Lens visual search functionality within YouTube or cloud gaming service Google Stadia.

In other promising news for mobile AR, the research from ARtillery/Thrive Analytics also found that the percentages of AR users who are willing to pay for more expensive AR mobile apps is rising. This suggests that users are seeing more value and utility in the technology and may be willing to invest more money over time.

There's also ongoing development of several larger-scale projects that could eventually bring together the fragmented XR ecosystem that exists today:

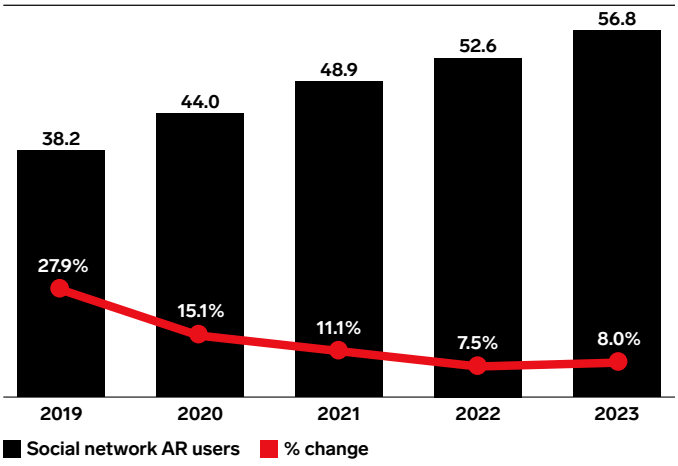
- **Web-based AR:** Enables AR experiences to be accessed through a mobile web browser without the need to download a specific app. WebAR is not yet as advanced as app-based AR, and its long-term future remains murky. However, Google, Mozilla, and Apple are among the companies working behind the scenes on WebAR. This will enable all smartphone users to experience AR content via their web browsers and eliminate the need to own a newer smartphone with a particular operating system to access specific content.
- **AR cloud:** Google and Apple are also among the companies reported to be investing in AR clouds (also known as "the internet of places" or "mirrorworlds"), which involve creating real-time 3D digital copies of the world that can be overlaid on projections of reality. Google's Live View AR tool, which draws upon the massive image, object-recognition, and geolocation database it has built, is a product of this work. Apple, which introduced its own AR cloud in several US cities last summer, will use "localization imagery" to create location-based AR experiences. These concepts will likely require 5G connectivity and could eventually provide one or more platforms for large-scale AR projects, along with the means to unify experiences across devices.
- **Unified XR platform:** In March this year, Microsoft announced Mesh, a new cloud-based MR platform that attempts to bring multiple VR and AR systems together within one united ecosystem. Through a cross-platform SDK, the firm aims to help developers build XR apps across multiple platforms. This could potentially create a unified, interoperable platform that can tie together a variety of emerging XR options from competing manufacturers. In turn, this could integrate the XR experience and alleviate lingering consumer skepticism holding back XR's mass adoption.

Social AR Grows Up

The number of people who use AR within social networks is booming, and our 2021 forecasts include a slight upward revision over last year's estimates. This year, 48.9 million AR users in the US—representing 52.4% of all AR users—will experience Snapchat Lenses, Facebook Camera Effects, Instagram filters, Pinterest visual search, AR-enabled social network advertising, and other social AR features. By 2023, the number of social network AR users will rise to 56.8 million. This will represent 51.6% of all AR users, a slight drop from 2020 as other forms of AR begin to gain traction.

US Social Network AR Users, 2019-2023

millions and % change



Note: individuals of any age who experience AR content within a social network at least once per month via any device
Source: eMarketer, March 2021

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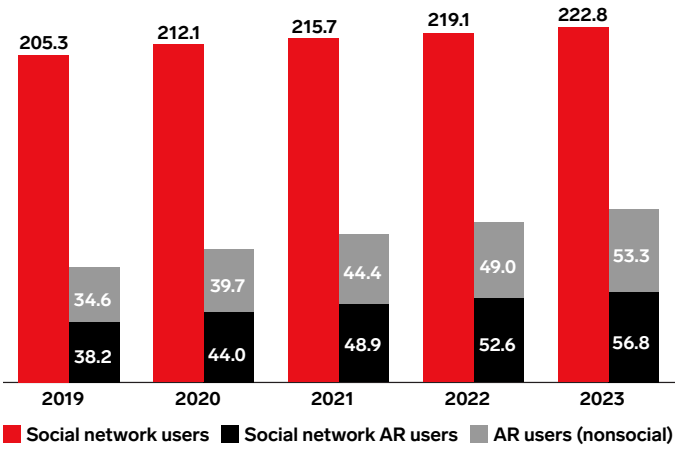
By the end of 2021, the number of social network AR users will represent 14.7% of the US population, 16.6% of internet users, and 22.7% of social network users. By 2023, 25.5% of social network users will use AR features within a social network. The majority of this usage will be on smartphones.

US Social Network Users, AR Users, and Social Network AR Users, 2019-2023

millions



Note: social network users are internet users of any age who use a social network via any device at least once per month; 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 2021

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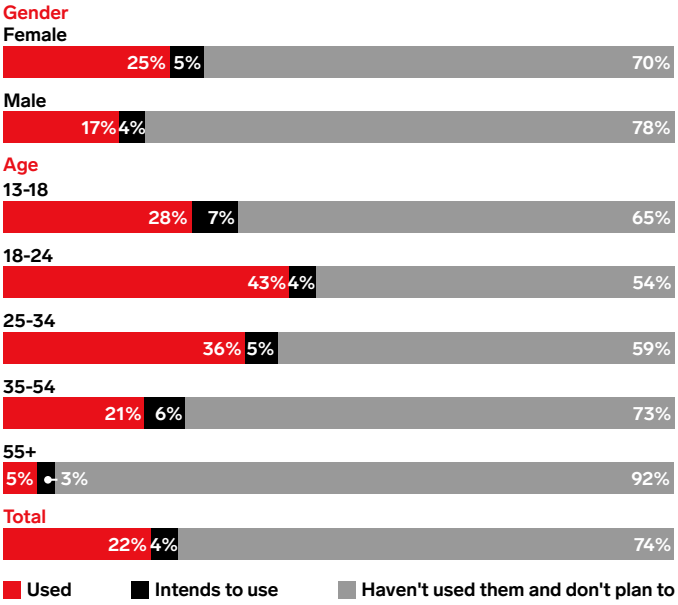
While men are more likely to use AR overall, women are more likely to use it on social networks. In the January 2021 poll by CivicScience, 22% of US teens and adults said they used AR features on social media. The study also found that females and individuals in the 18-to-24 age bracket were most likely to use such features.

Usage of AR Features on Social Media Among US Teens/Adults, by Demographic, Jan 2021

% of responses in each group



Note: n=2,757 surveyed Jan 18-20, 2021; e.g., Snapchat lenses, Instagram filters, Pinterest "Try On"; numbers may not add up to 100% due to rounding
Source: CivicScience as cited in company blog, Jan 20, 2021

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Most of the largest social networks are working to make their AR features less gimmicky and more sophisticated, useful, and collaborative. For example, Snapchat is now compatible with Apple's ARKit and the iPhone 12's lidar technology, incorporating voice commands to help users find new Lenses. The company also sees branding and shopping among its biggest opportunities, especially during the pandemic. "I think 2021 is going to be one of those years in which we evolve augmented reality out of this pure communication or social media use case, into things that can actually make our lives better in a much broader way," Sophia Dominguez, Snapchat's head of camera platform partnerships, told CNET in December 2020.

To learn more about AR's growing presence in social media, see our August 2020 report, **"Augmented Reality in Social Media: It's Growing Up, and the Pandemic Is Playing a Role."**

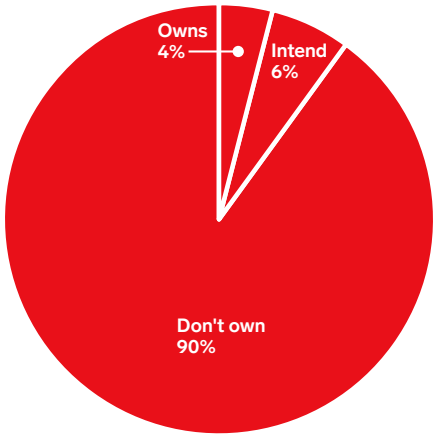
Consumer AR Headsets Remain Elusive

Most AR and MR headsets and smart glasses on the market today—including the Vuzix Blade, ThirdEye's Gen X2, the Microsoft HoloLens 2, Google Glass Enterprise Edition, and the Magic Leap 1—remain pricey and high-end. AR hardware is primarily used for niche, commercial applications in the military and in the healthcare, education, travel, real estate, and automotive industries. But unlike VR headset shipments, which fell in 2020, AR headsets rose (albeit from a much smaller base) as the result of higher demand for remote collaboration and telemedicine during the pandemic, according to IDC.

On the consumer side, ownership and use of AR headsets and glasses remains extremely low. The January 2021 poll by CivicScience found that just 4% of US teens and adults owned an AR headset, and 6% intended to buy one. There are still no killer applications, no content ecosystem, no category leader, and no affordably priced mass-market devices.

Ownership of AR Headsets Among US Teens/Adults, Jan 2021

% of responses



Note: n=64,295 ages 13+ surveyed Oct 21, 2020-Jan 19, 2021; e.g., HoloLens, Magic Leap; numbers may not add up to 100% due to rounding
Source: CivicScience as cited in company blog, Jan 20, 2021

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Despite these challenges, most industry analysts predict—with a fair degree of certainty—that AR experiences will migrate from mobile devices to headsets or glasses within the next five years as developers overcome technical and privacy challenges and push for more widespread cultural acceptability.

ARtillery Intelligence estimated in 2020 that there would be just 410,000 units of AR glasses sold globally this year. But the firm expects one or more tech giants, including Apple, Facebook, Google, and Microsoft, to introduce an affordable mass-market product in 2022 or 2023, which will disrupt the market and drive sales to 3.9 million units by 2024.

Many industry watchers believe that Apple, in particular, is uniquely positioned to bring AR glasses into the mainstream if it can replicate its previous success with other consumer devices for its hardware and software ecosystem. Rumors of Apple's AR glasses date back to 2017, but a more recent Bloomberg article claimed that they would work with the iPhone and 5G service to "display things such as text, emails, maps, and games over the user's field of vision." There have also been reports, fueled by Apple's 2020 acquisition of several VR-focused companies, that they will be compatible with a rumored Apple Car.

Since much of this development remains speculative, we are watching the market closely and will adjust our XR user forecasts accordingly when we get more clarity about the rollout of any potential mass-market devices.

What's Changed Since Last Year?

Since our last forecasts were published in March 2020, the number of AR users has grown faster than expected. ARKit and ARCore have provided the foundation for more sophisticated app development, and the rising penetration of newer, AR-capable and 5G smartphones, including those with lidar, continues to drive interest and adoption. In addition to a growing list of AR games, social media activations, and apps that provide wayfinding assistance and object identification (e.g., Google Lens), the use of educational and utility-focused tools is picking up steam.

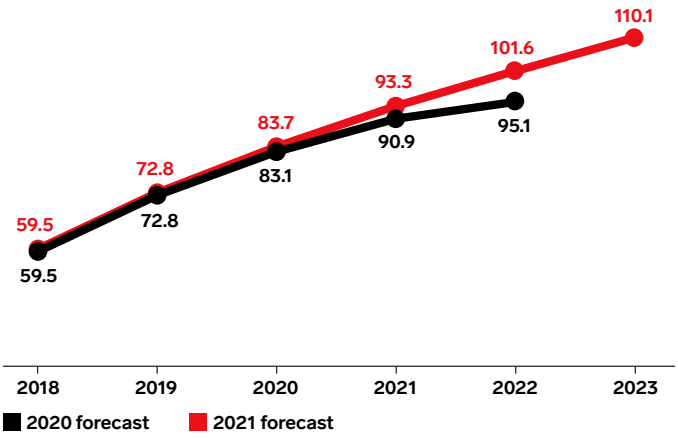
For example, geometry app GeoGebra—which was originally built for iOS with Apple's ARKit but is now also available for Android devices—helps simplify complex concepts by overlaying 3D geometric shapes on everyday surfaces and enabling students to explore them from various angles. Another app, Ink Hunter—also built for both iOS and Android—helps those considering getting a tattoo envision the design on their skin before committing to the real thing.

As more people engage with these apps, it's more likely now than before the pandemic that "hybrid" real/virtual experiences will have staying power after the global crisis is over. On the enterprise side, higher-end commercial applications, and the development of better headsets and glasses on which to run them, are becoming viable for a growing list of industries.

We have revised our AR user forecasts upward to reflect higher-than-expected growth in consumer and business adoption starting in late 2020. For example, our March 2020 forecasts called for 90.9 million AR users this year; our March 2021 forecast anticipates 93.3 million. And we are now forecasting 101.6 million AR users by 2022, up from the 95.1 million we predicted last year.

How Has the Forecast for US AR Users Changed from 2020 to 2021?

millions, 2018-2023



Note: individuals of any age who experience AR content at least once per month via any device
Source: eMarketer, March 2021

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We will continue to monitor emerging developments and revise future projections as appropriate.

Key Takeaways

- **VR and AR are in the early phases of adoption, but use is rising.** While gaming remains the top application for both technologies, consumer and business use cases are expanding.
- **AR use continues to outpace VR use because of widespread availability on mobile devices** and standardized platforms for developing iOS and Android apps. Ongoing work on web-based AR solutions and AR cloud projects could also increase demand.
- **Nearly half of all VR users consume VR on headsets, and this percentage is slowly creeping up.** Pandemic-related supply chain disruptions and changes to product lineups temporarily reduced shipments of VR headsets and user numbers in H2 2020 but will not significantly impact longer-term user forecasts.
- Most people today consume AR on smartphones and tablets, but **industry experts believe that mass-market headsets or glasses will disrupt the market within the next five years.** We are watching these developments to assess how they affect user numbers.
- The number of social network AR users continues to grow, and **social networks are moving to offer more useful applications.** They're working to capitalize on more monetizable shopping, branding, and entertainment experiences.
- **The rollout of 5G wireless networks will be a boon for XR applications.** Developers are optimistic that these services will eliminate many persistent technical difficulties and boost XR's viability.

Read Next

Augmented Reality in Social Media: It's Growing Up, and the Pandemic Is Playing a Role

How 5G Will Change Media, Entertainment, and Marketing: 5 Key Opportunities for Growth

How 5G Will Change Retail: 5 Key Opportunities for Growth

Social Commerce 2021: Media and Commerce Convergence Creates Growth Opportunity for Brands

The Pandemic Is Accelerating AR Adoption for Retailers and Entertainers

Sources

Advertiser Perceptions

ARtillery Intelligence

CivicScience

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International Data Corporation (IDC)

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