

Virtual and Augmented Reality StatPack

Current Forecasts and the State of the Market

July 2017

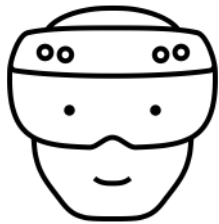
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VR and AR: What's the difference?



Virtual reality (VR): VR fully immerses a user inside a nonfixed visual environment, such as a virtual world or experience. Examples of VR include 360-degree videos, photos and product demos via any device (e.g., connected TVs, desktops/laptops, mobile devices and headsets that let users navigate through the experience), and games via head-mounted displays (HMDs). Examples of VR headsets include AuraVisor, Google Cardboard, Google Daydream View, HTC Vive, Oculus Rift, PlayStation VR and Samsung Gear VR.



Augmented reality (AR): AR enables a user to interact with virtual objects and other types of digital information that are overlaid over the real world. Examples of AR include filters for videos and photos (e.g., Snapchat Lenses); games (e.g., Pokémon Go); navigation (e.g., heads-up displays [HUDs]); interactions with objects (e.g, Blippar, HP Aurasma); and 3-D product demos and projections via headsets and smart glasses.

eMarketer definitions

- **Virtual reality (VR) users:** Individuals of any age who experience VR content at least once per month via any device. This definition includes users who view 360-degree photos/videos and 3-D animations on any device, including desktops/laptops, mobile devices, game consoles or HMDs.
- **360-degree video:** Video footage recorded using a collection of cameras, or an omnidirectional camera that enables the viewer to control the viewing direction. This format is also known as immersive video or spherical video.
- **Head-mounted displays (HMDs):** Devices used to experience VR and AR content that are held up to the eyes or worn on the head. HMDs are either stereoscope-style headset enclosures that can incorporate a smartphone, or dedicated HMDs that contain their own screens and are tethered to computers or game consoles. Examples include Oculus Rift, Google Daydream View and PlayStation VR. HMDs are also commonly referred to as “headsets.”
- **VR headset users:** Individuals of any age who experience VR content at least once per month via specialized HMDs.
- **Augmented reality (AR) users:** Individuals of any age who experience AR content at least once per month via any device.
- **Smart glasses:** Wearable computer glasses used in AR applications that display information that supplements what the wearer is seeing. Examples include Google Glass, Epson Moverio and Vuzix Blade 3000.
- **Heads-up displays (HUDs):** Transparent displays that project information and imagery onto a surface (often a windshield) without requiring viewers to look down or away from what they are focusing on. They are most often used in AR applications, as with aircraft or automobiles.

Virtual Reality

**42.9
million**

**people in the US will
be VR users by 2019**

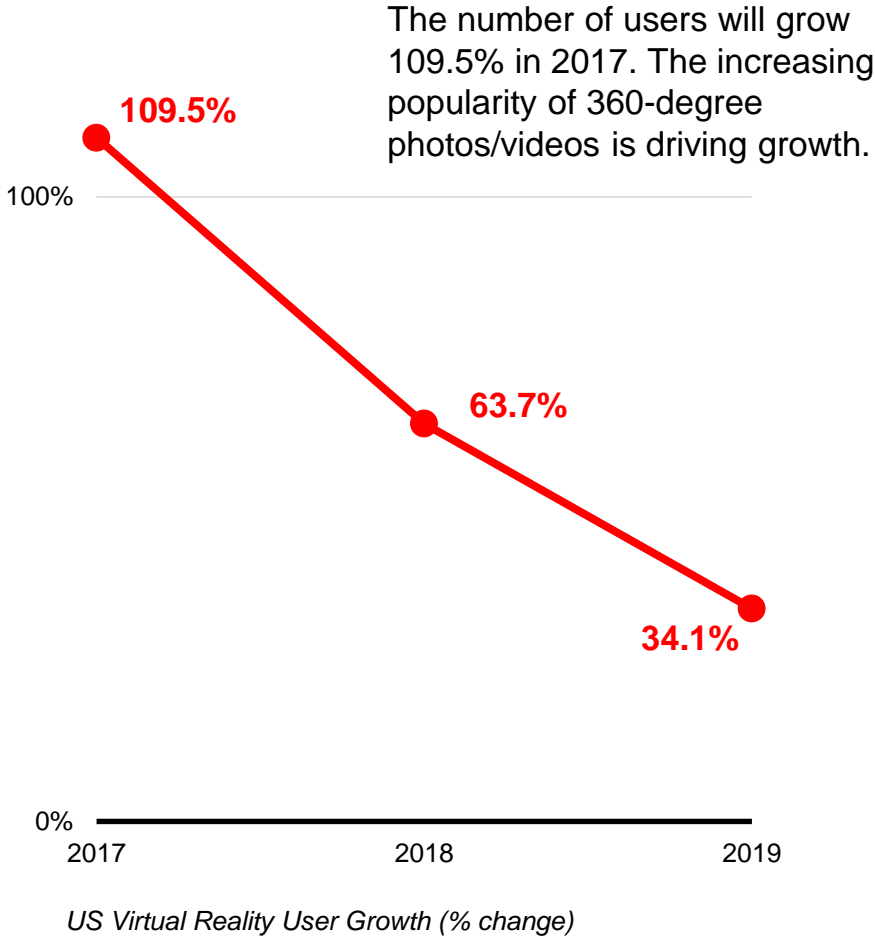
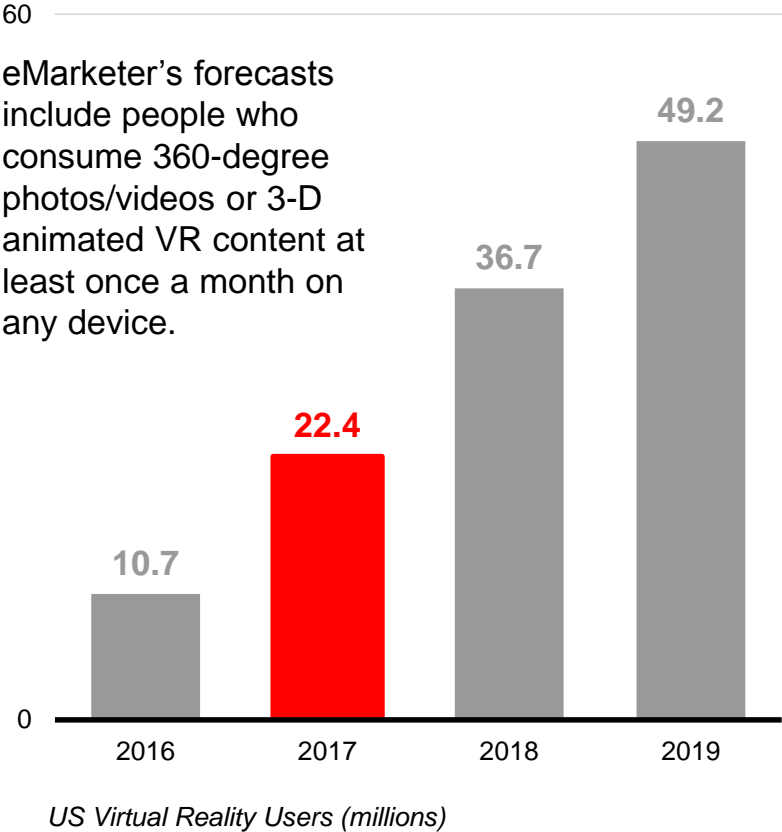


That's

14.8%

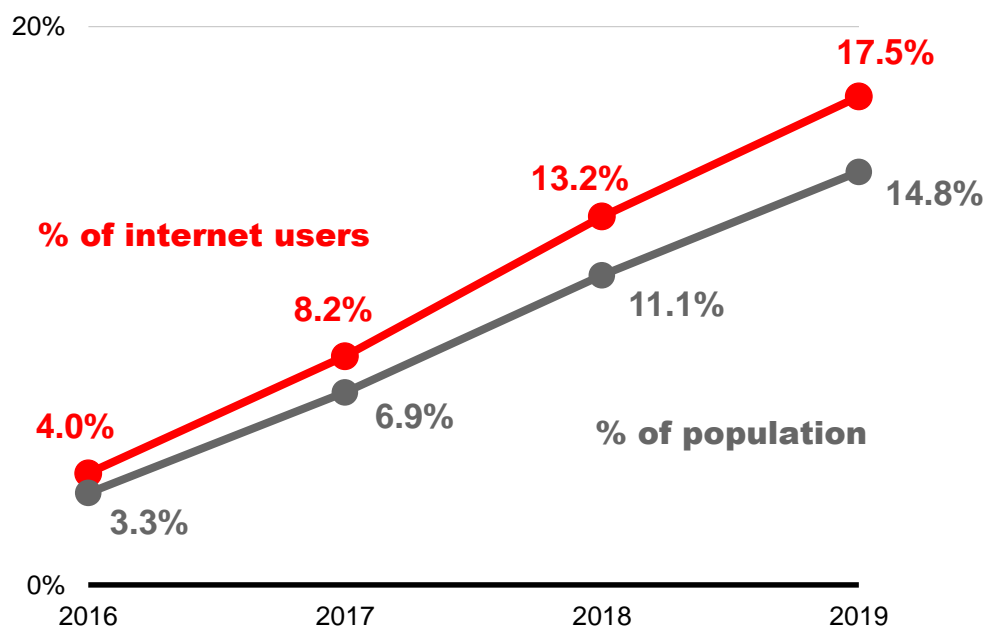
of the population

The number of **VR** users in the US will more than double in 2017



Though **VR** penetration will remain relatively low, it will continue to grow

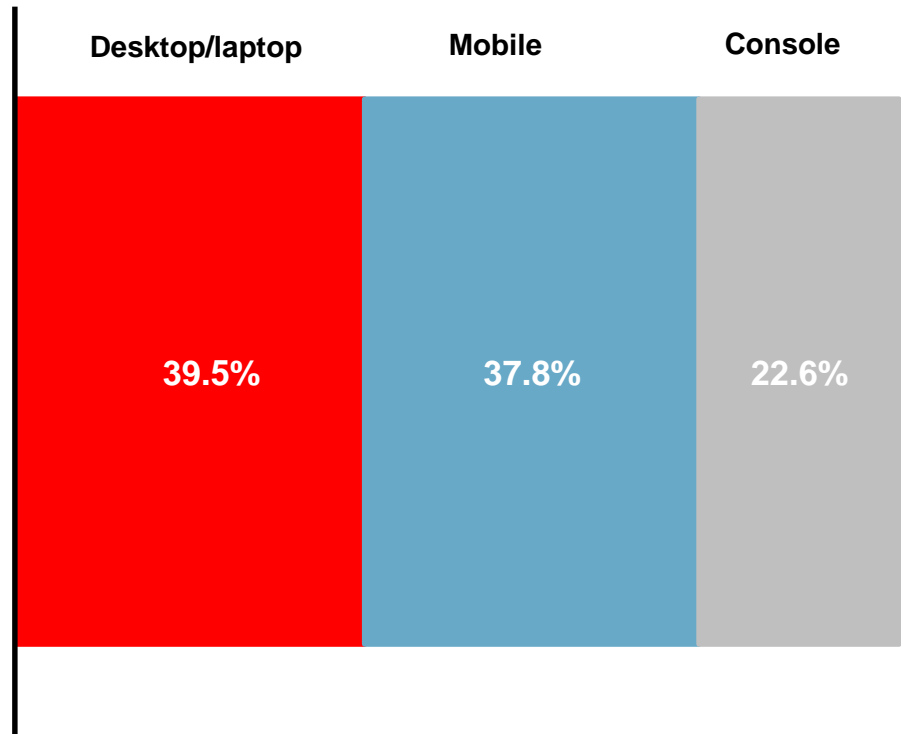
By 2019, nearly 15% of the US population and 17.5% of internet users will be VR users.



US Virtual Reality User Penetration (% of internet users and % of population)

Most **VR** is consumed on computers and mobile devices

- VR generally falls into two categories: 360-degree photo/video and 3-D animation. It can be consumed via desktop/laptop, mobile device, game console or HMD/headset.
- Most of today's VR is consumed via desktops, laptops and mobile devices in the form of 360-degree photo/video.
- Specific HMDs used to view VR are designed to tether to one or another of these devices. HMDs currently make up less than one-quarter of VR device sales.
- The majority of today's VR content is related to gaming and entertainment, but there are also promising applications in other industries.



Virtual Reality Device Sales Share Worldwide, by Type, 2016 (% of total)

The majority of 360-degree photos/videos are consumed via YouTube and Facebook



360-degree photos and videos are the most widely viewed type of VR content



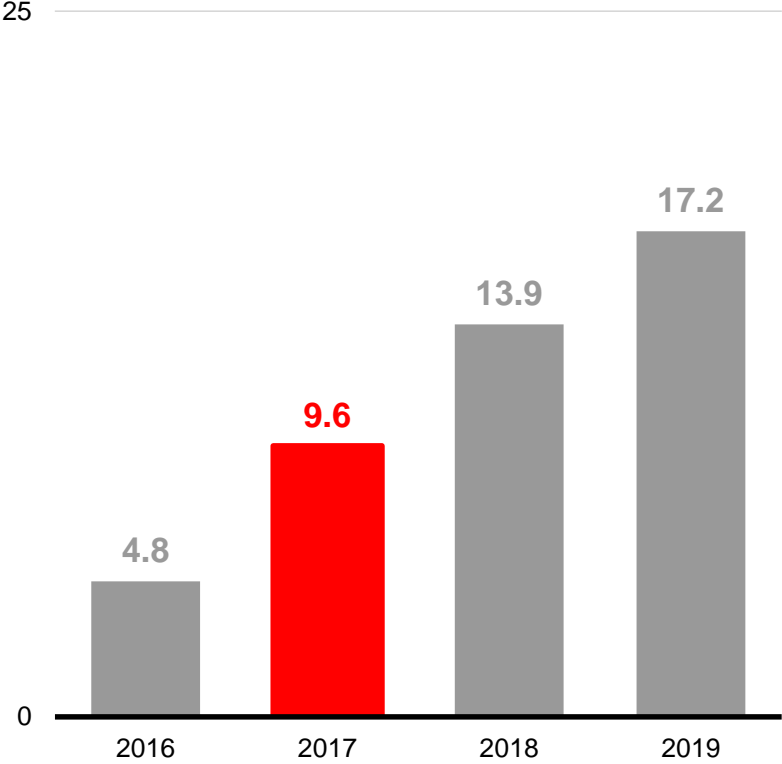
“YouTube has **hundreds of thousands** of 360-degree videos available.”

—Amit Singh, Vice President, Business Operations, AR & VR, Google, February 2017

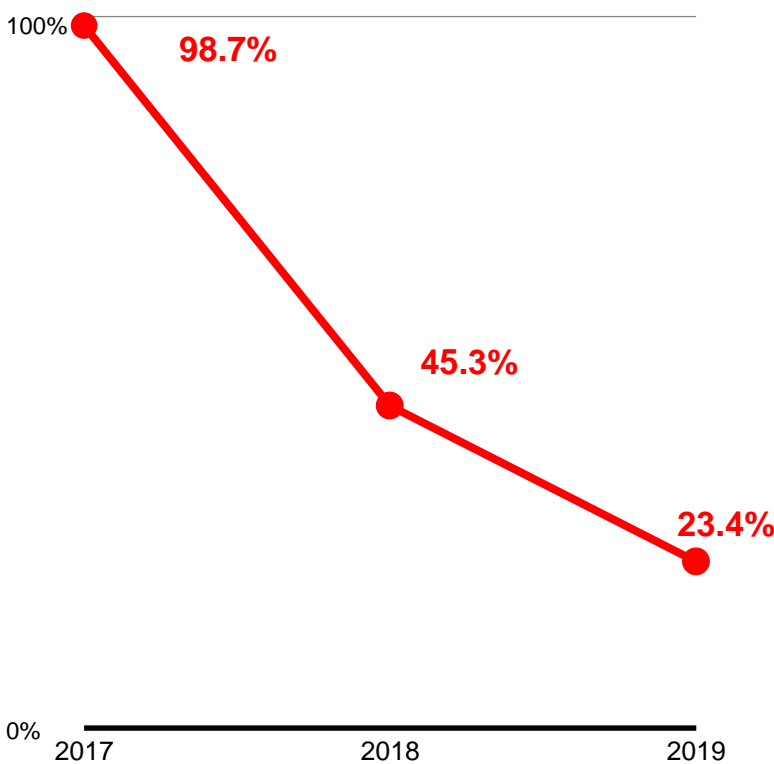
“More than **25 million** 360-degree photos and more than **1 million** 360-degree videos [have been] posted on Facebook to date.”

—Brent Ayrey, Product Director, and Christopher Wong, Software Engineer, Facebook, March 2017

The number of US **VR** headset users is expected to double this year



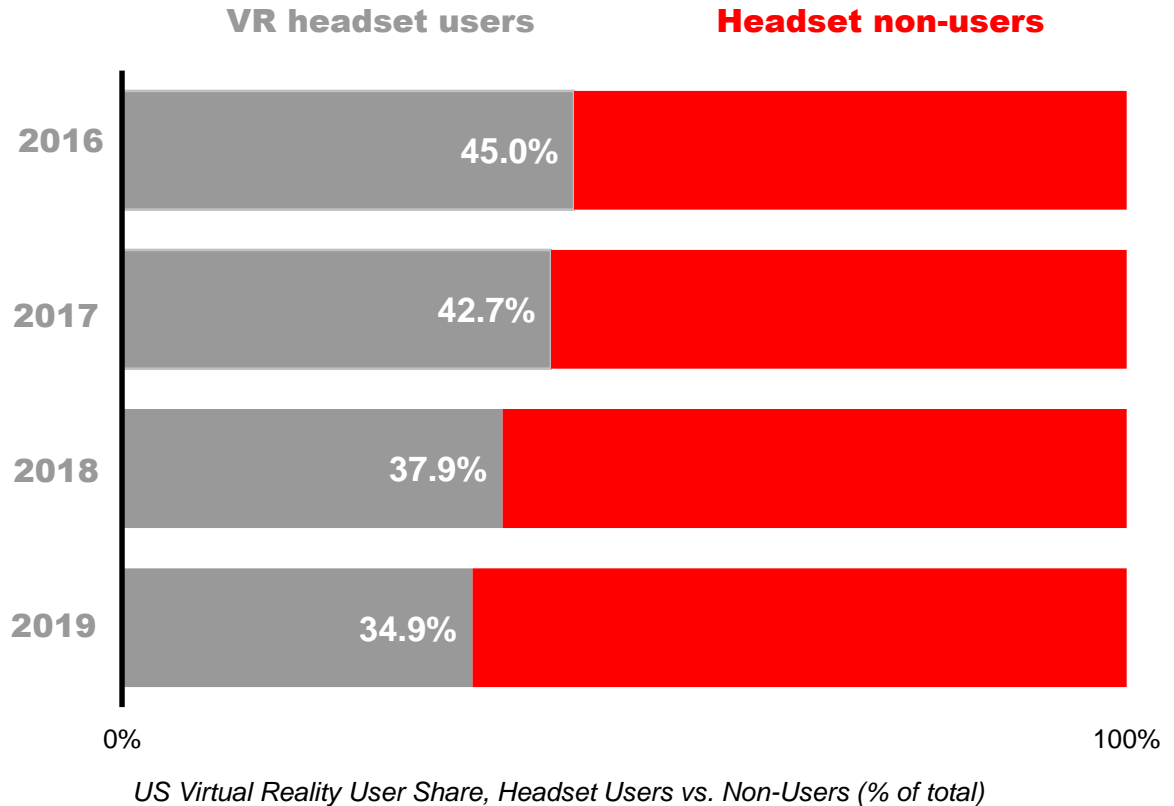
US Virtual Reality Headset Users (millions)



US Virtual Reality Headset User Growth (% change)

But **VR** headset users will still make up less than half of total **VR** users

VR headset users' share of overall US VR users will decline over time. The sales and use of cheaper headsets will decrease, and more people will watch 360-degree photos and videos on other devices.



A number of headsets are now on the market



Google Cardboard
June 2014



Samsung Gear VR
November 2015



Oculus Rift
May 2016



PlayStation VR
October 2016

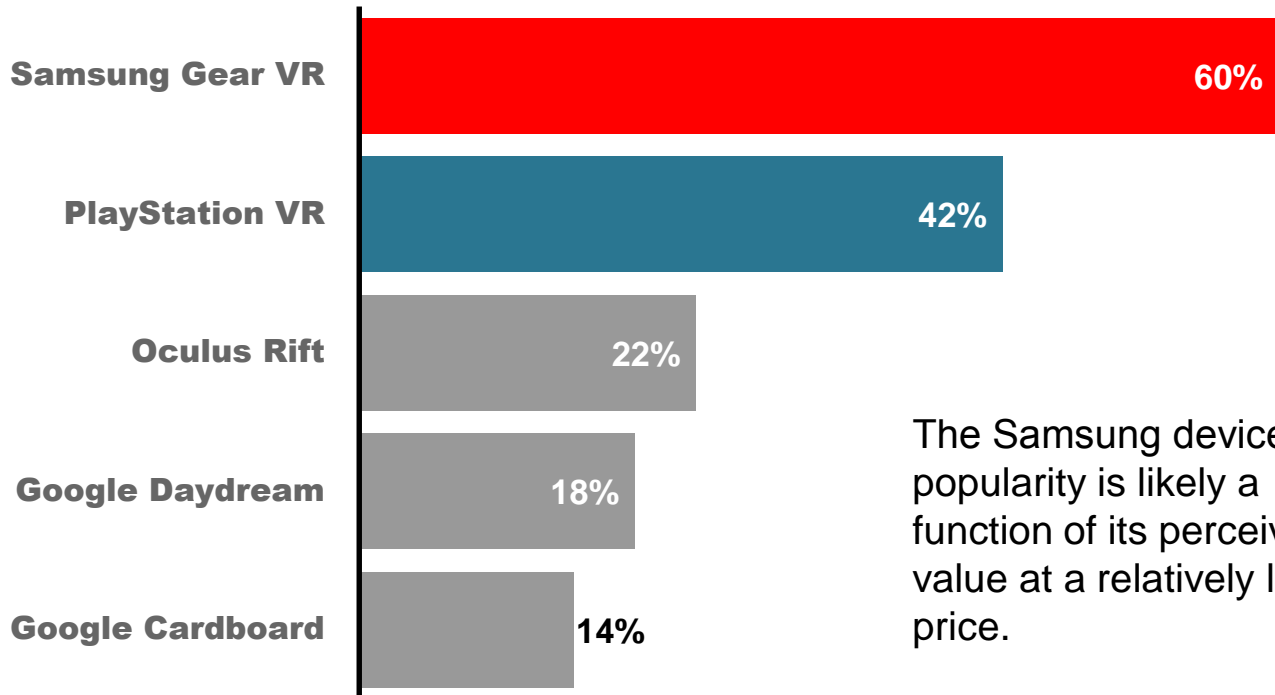


HTC Vive
June 2016



Google Daydream View
November 2016

So far, **Samsung Gear VR** and **PlayStation VR** lead the pack



The Samsung device's popularity is likely a function of its perceived value at a relatively low price.

Virtual Reality Headsets Used by US VR Headset Owners (% of respondents)

**BI Intelligence expects
global VR headset shipments
will increase from**

12 million

in 2017 to more than

55 million

in 2022

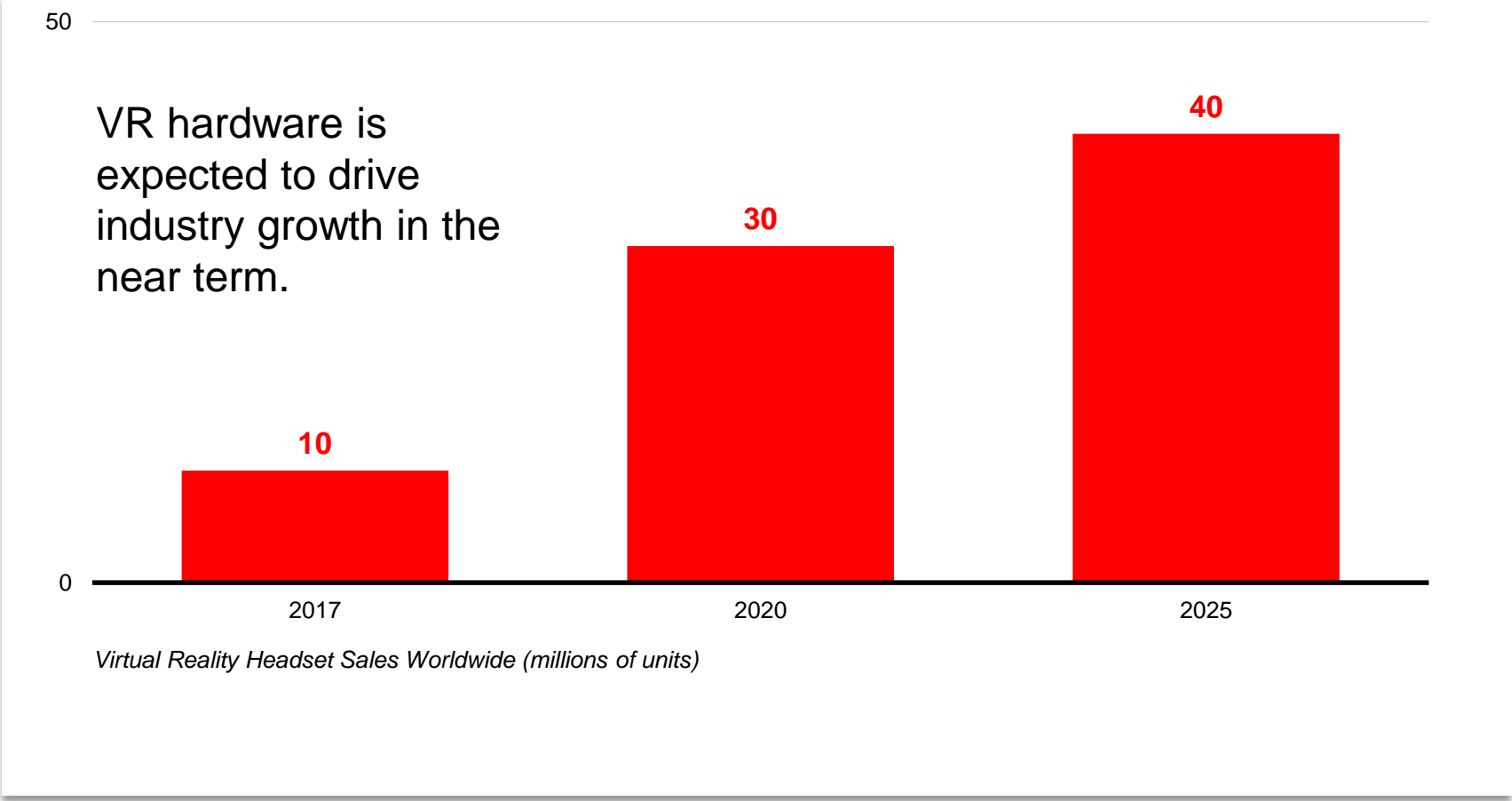


That's

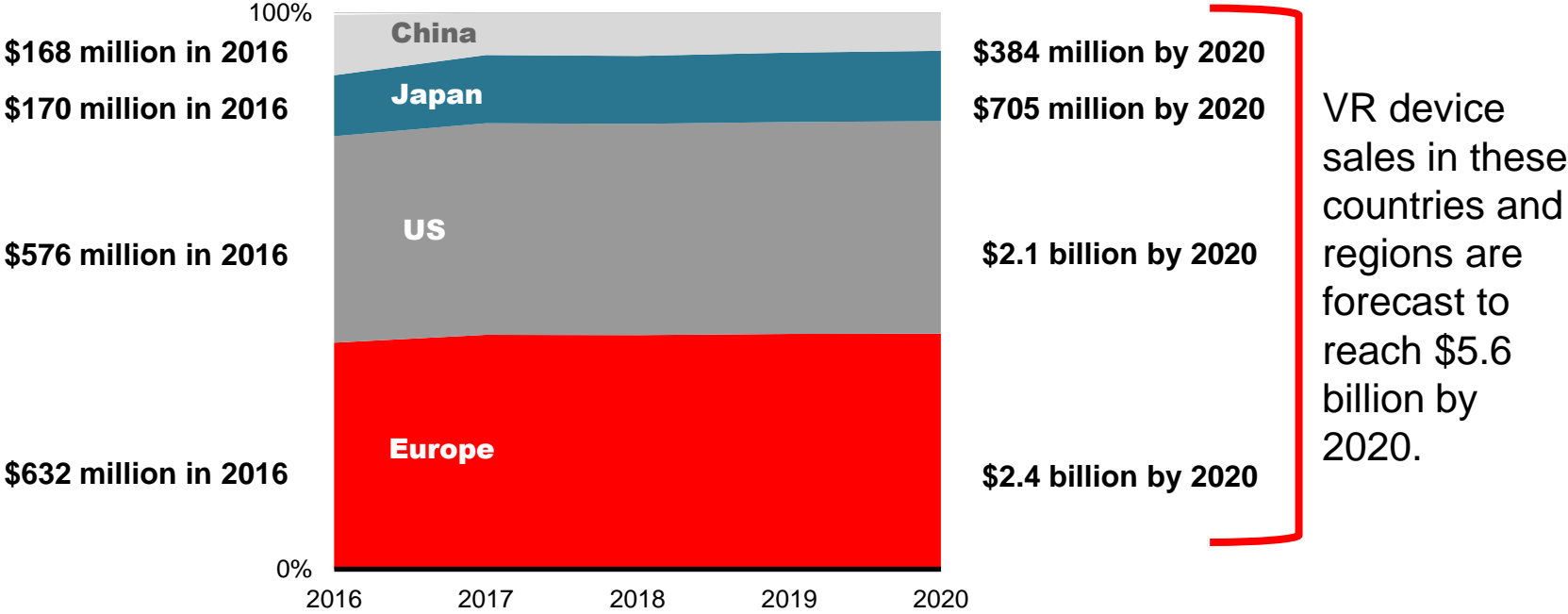
359%

**growth over the next
six years**

Citigroup expects worldwide **VR** headset sales to quadruple between 2017 and 2025



The US, Europe, China and Japan are among the biggest markets for VR headsets



Virtual Reality Device Sales in Select Countries/Regions (millions/billions and % of total)

VR headset users generally have positive things to say about them

Most consumers who purchased headsets reported experiences that met or exceeded their expectations.

US Virtual Reality (VR) Device Users' Attitudes Toward VR Headsets, by Device Type, Jan 2017

% of respondents

- 1 Far better than my expectations**
- 2 Slightly better than my expectations**
- 3 As well as I expected it to**
- 4 Slightly below my expectations**
- 5 Far below my expectations**

	1	2	3	4	5
VR headset designed for a specific smartphone	41%	13%	37%	6%	3%
PlayStation VR headset	35%	28%	25%	8%	4%
VR headset that connects to your PC	35%	29%	31%	2%	2%
VR headset that works with any smartphone	30%	30%	31%	6%	3%

*Note: ages 18-64 who purchased a VR device during the holiday season
Source: Frank N. Magid Associates, "Virtual Reality and Consumer Perceptions," March 26, 2017*

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But many consumers remain lukewarm

Fewer than

15% of internet

users worldwide are interested in purchasing a VR headset...

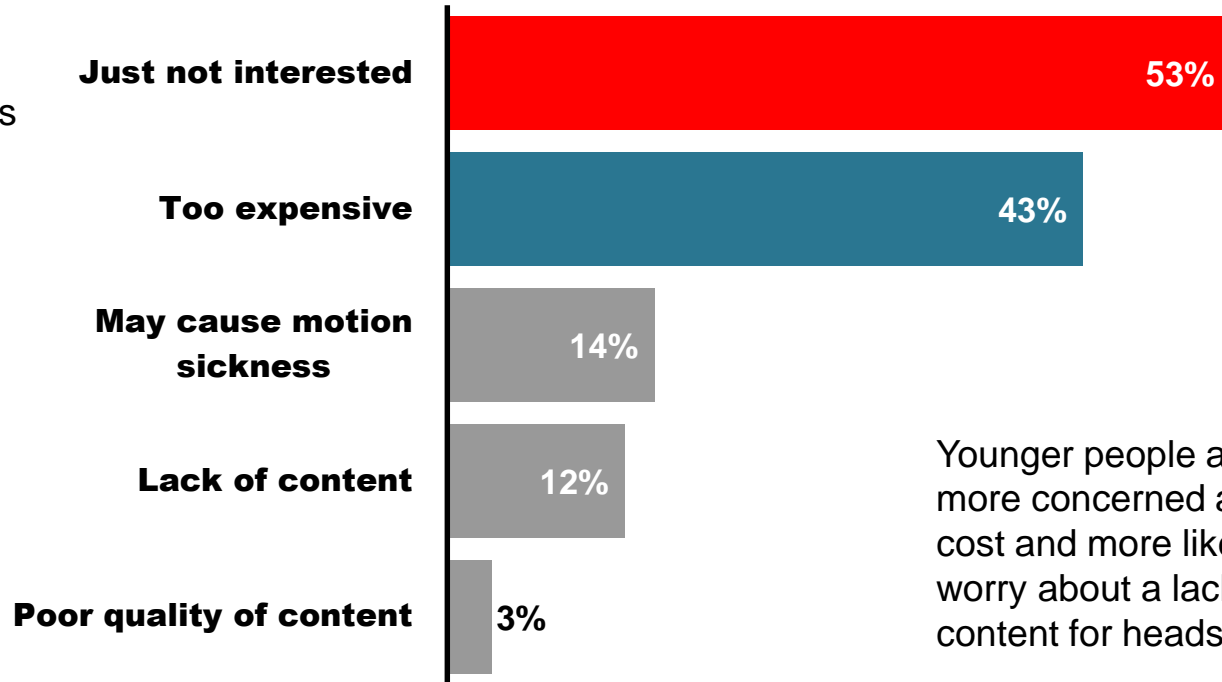


while **59.6%** are not interested and

25.6% are unsure

Lack of interest and cost are the biggest obstacles to headset adoption

Older people are more likely to say they aren't interested, but less likely to be concerned about motion sickness.

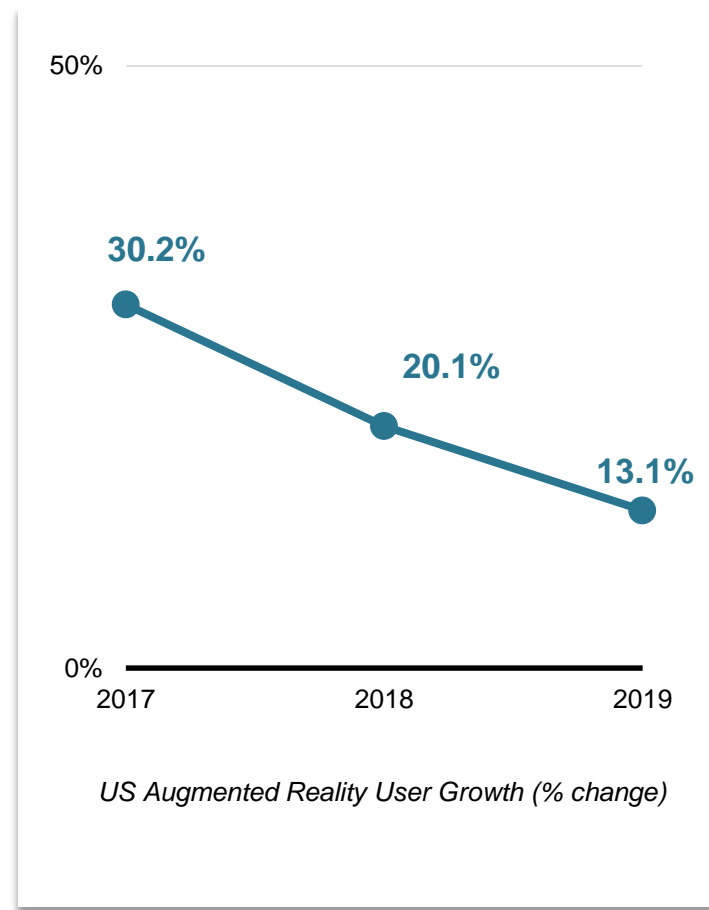
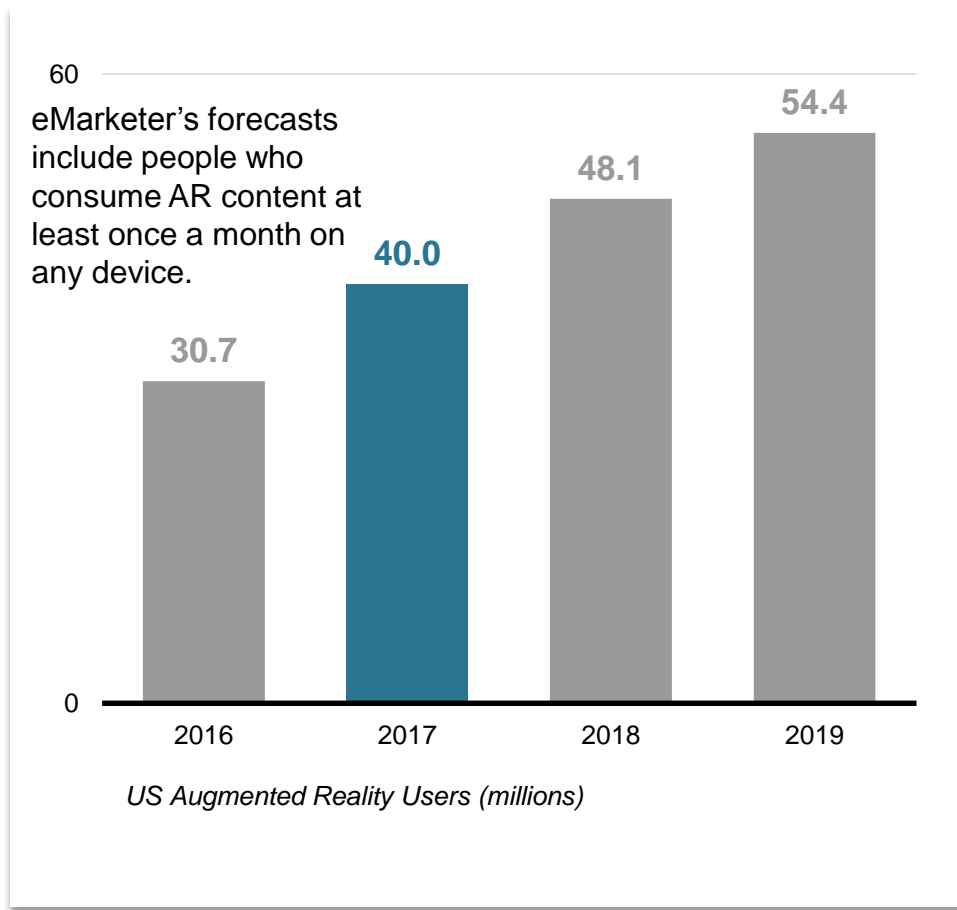


Younger people are more concerned about cost and more likely to worry about a lack of content for headsets.

Reasons that US Internet Users Are Not Interested in Owning a Virtual Reality Headset (% of respondents)

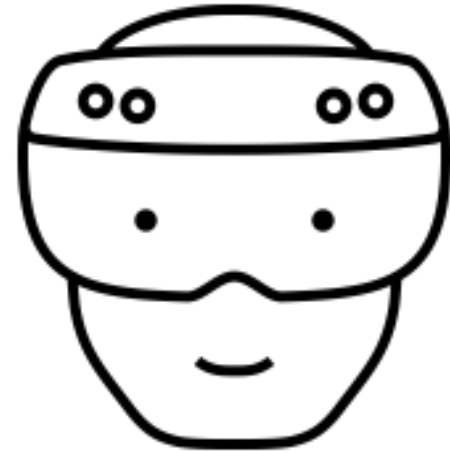
Augmented Reality

The number of **AR** users in the US is also steadily rising



**54.4
million**

**people in the US will
use AR by 2019**

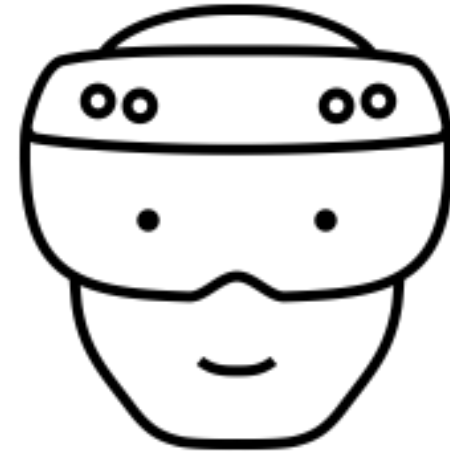


That's

16.4%

of the US population

**The global AR market will
be worth more than
\$165 billion
by 2024**

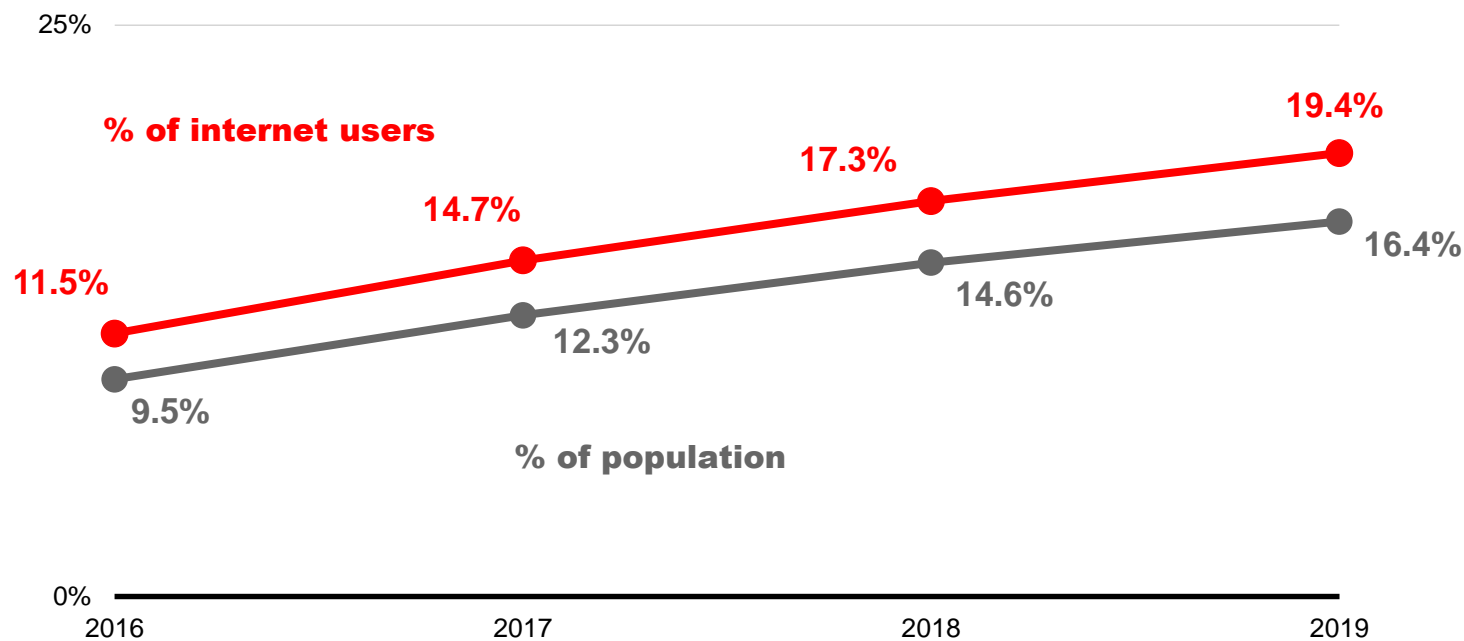


**That's a compound
annual growth rate
(CAGR) of**

81%

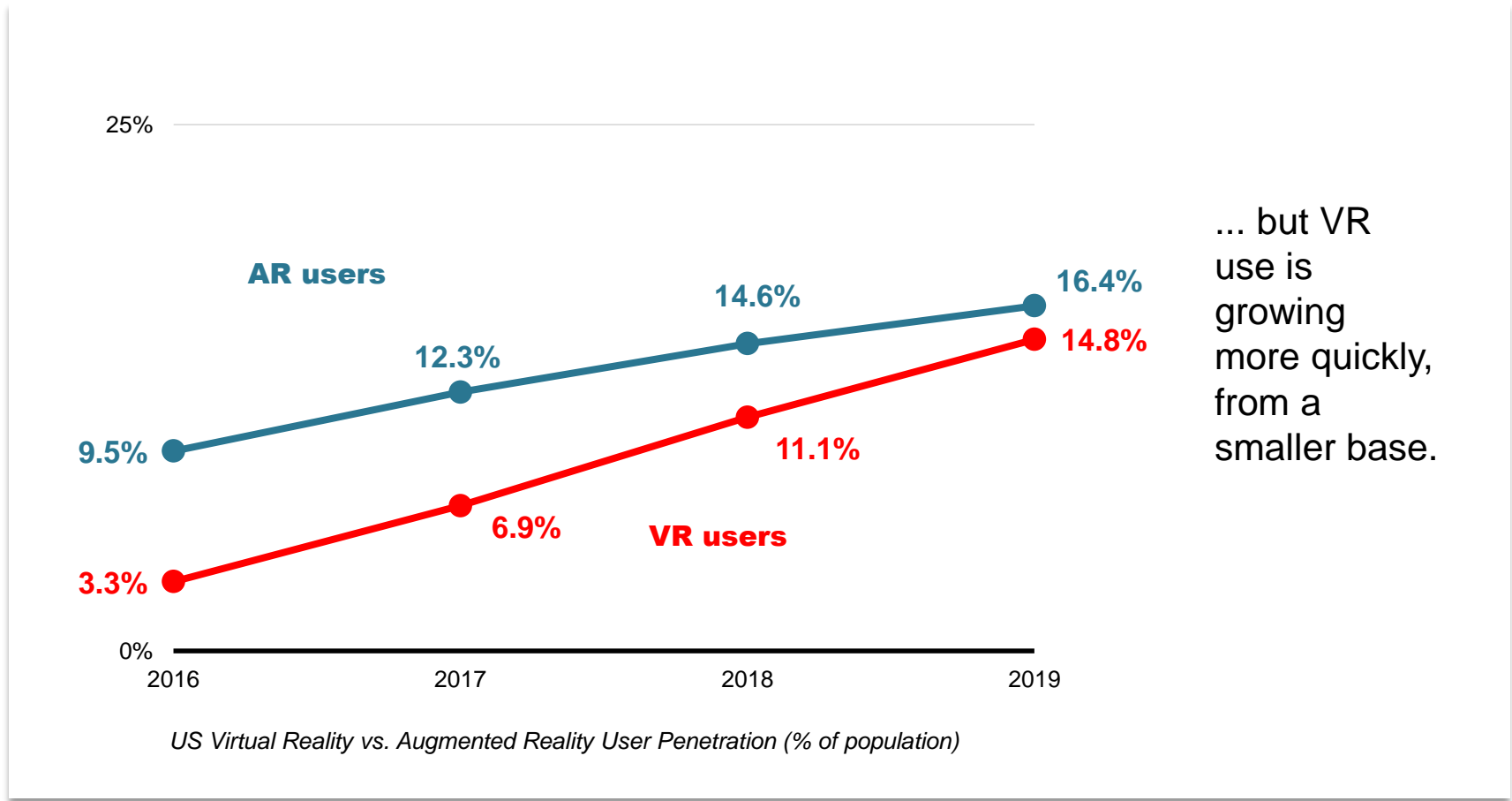
between 2016 and 2024

By 2019, nearly one-fifth of US internet users will be AR users

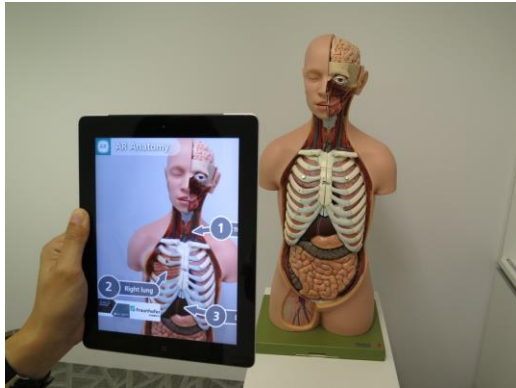


US Augmented Reality User Penetration (% of internet users and % of population)

Right now, there are more US **AR** than **VR** users



AR content can be viewed with several types of devices



Handheld devices

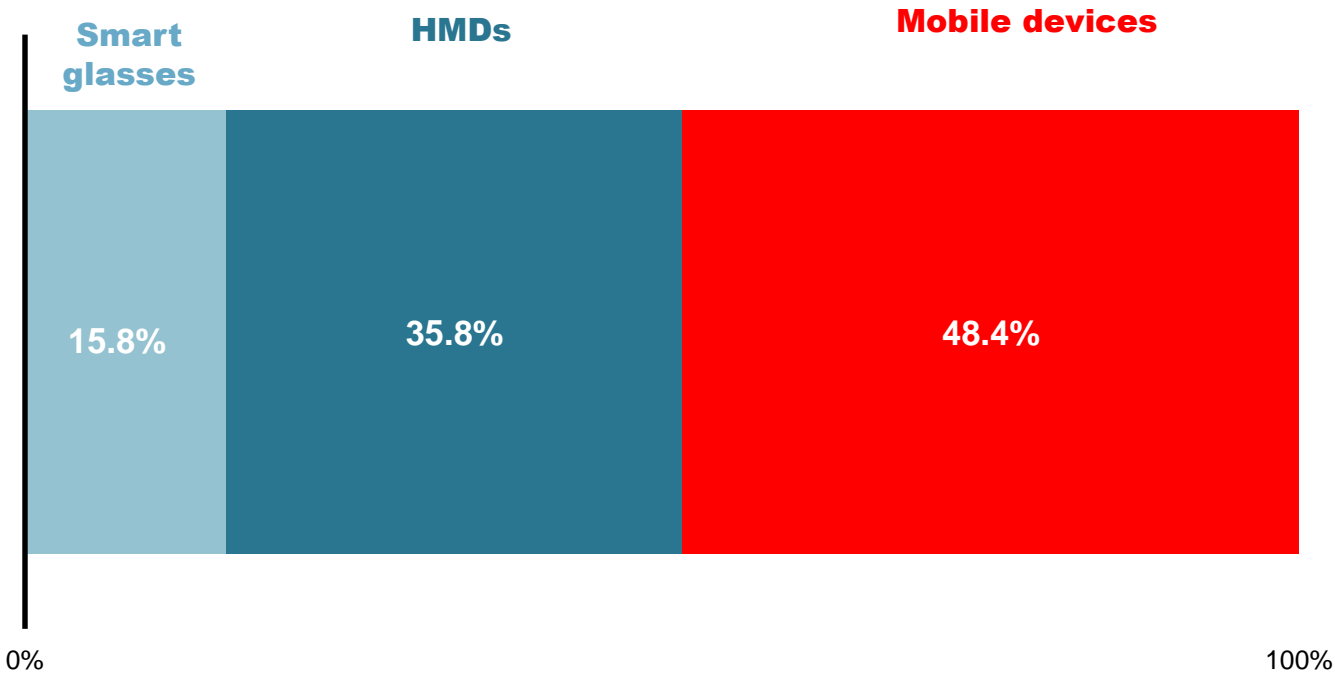


HUDs



Smart glasses and HMDs

Most of today's AR experiences take place on handheld devices



Augmented Reality Device Revenue Share Worldwide, by Type, 2016 (% of total)

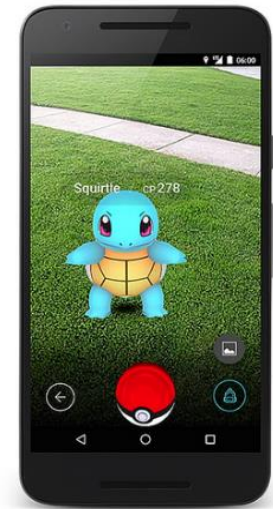
Apps and filters for mobile devices are among the most popular **AR** uses right now



Snapchat and Instagram lenses, filters and stickers



Facebook Messenger filters, 3-D masks and camera effects



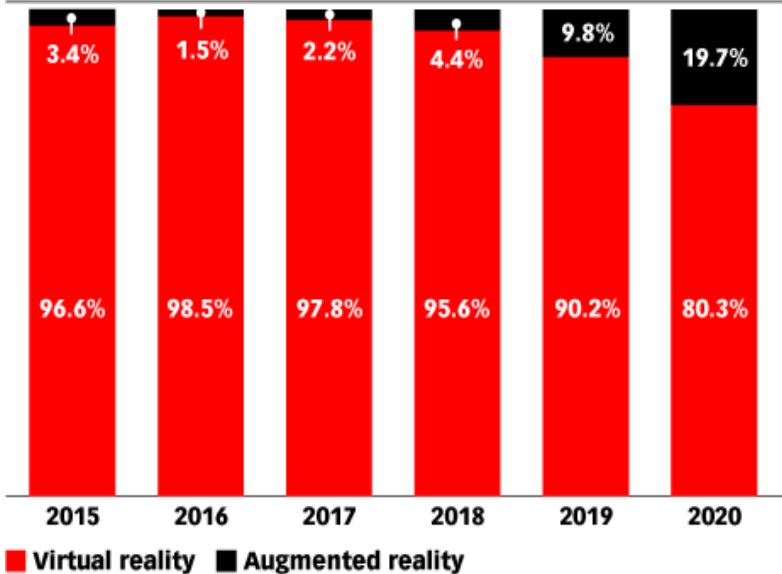
Pokémon Go

Shipments of dedicated **VR** hardware dwarf shipments of **AR** hardware

VR hardware is much further along on the development and adoption curve; much of the AR hardware remains experimental.

Virtual vs. Augmented Reality Headset Shipment Share Worldwide, 2015-2020

% of total

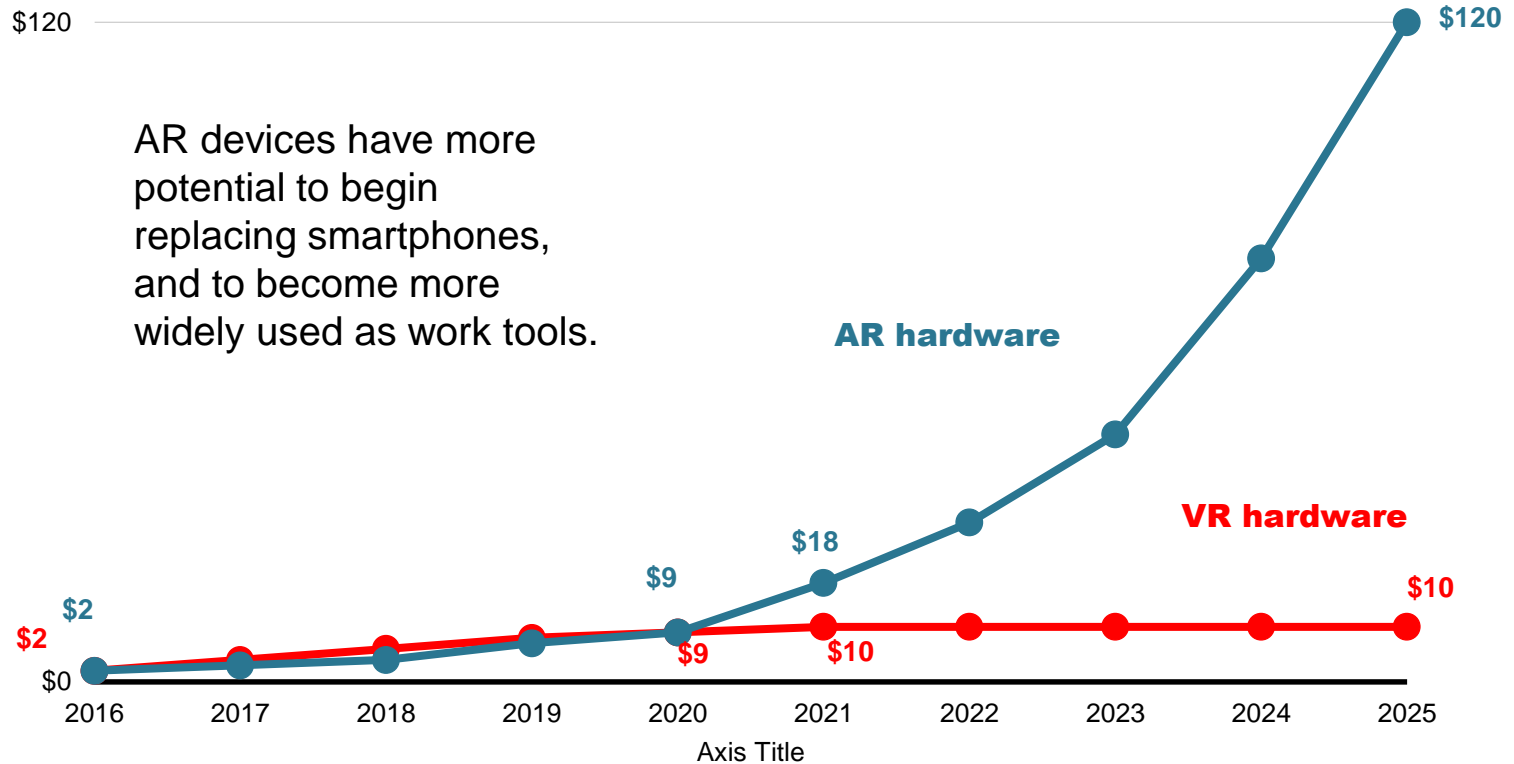


Source: International Data Corporation (IDC), "Worldwide Quarterly Augmented and Virtual Reality Headset Tracker" as cited in press release, Dec 15, 2016

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But **AR** hardware is expected to generate more revenues than **VR** hardware by 2021



Augmented Reality vs. Virtual Reality Hardware Revenues Worldwide (billions)

Both **VR** and **AR** have use cases in many industries



Video Gaming



Travel, Tourism & Transportation



Real Estate



Healthcare



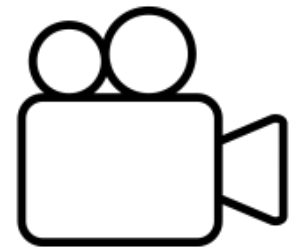
Automotive



Retail & Marketing



Education

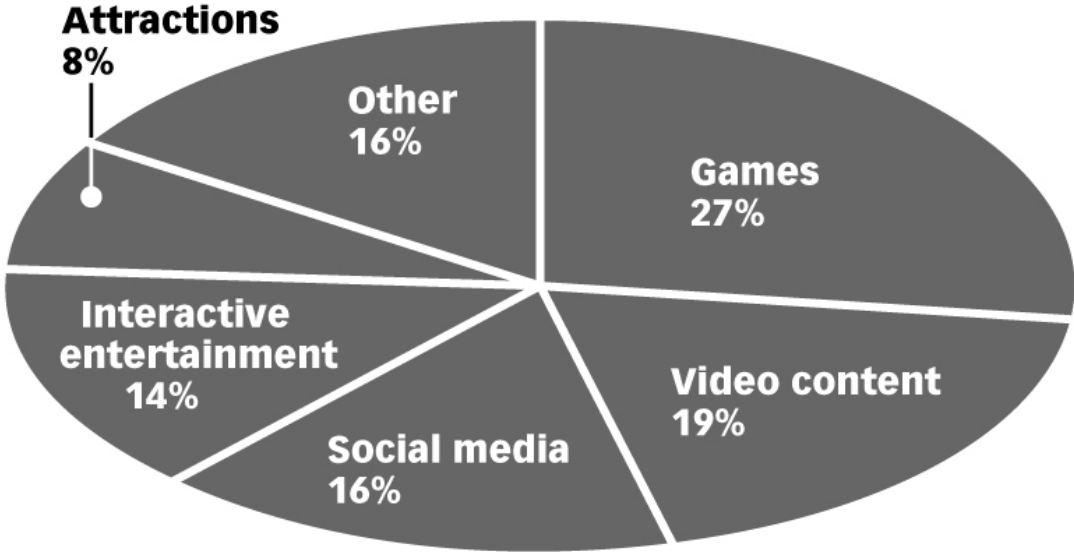


Digital Entertainment

Gaming and entertainment will continue to drive revenues in the near term

Virtual Reality Software Revenue Share Worldwide, by Segment, 2020

% of total

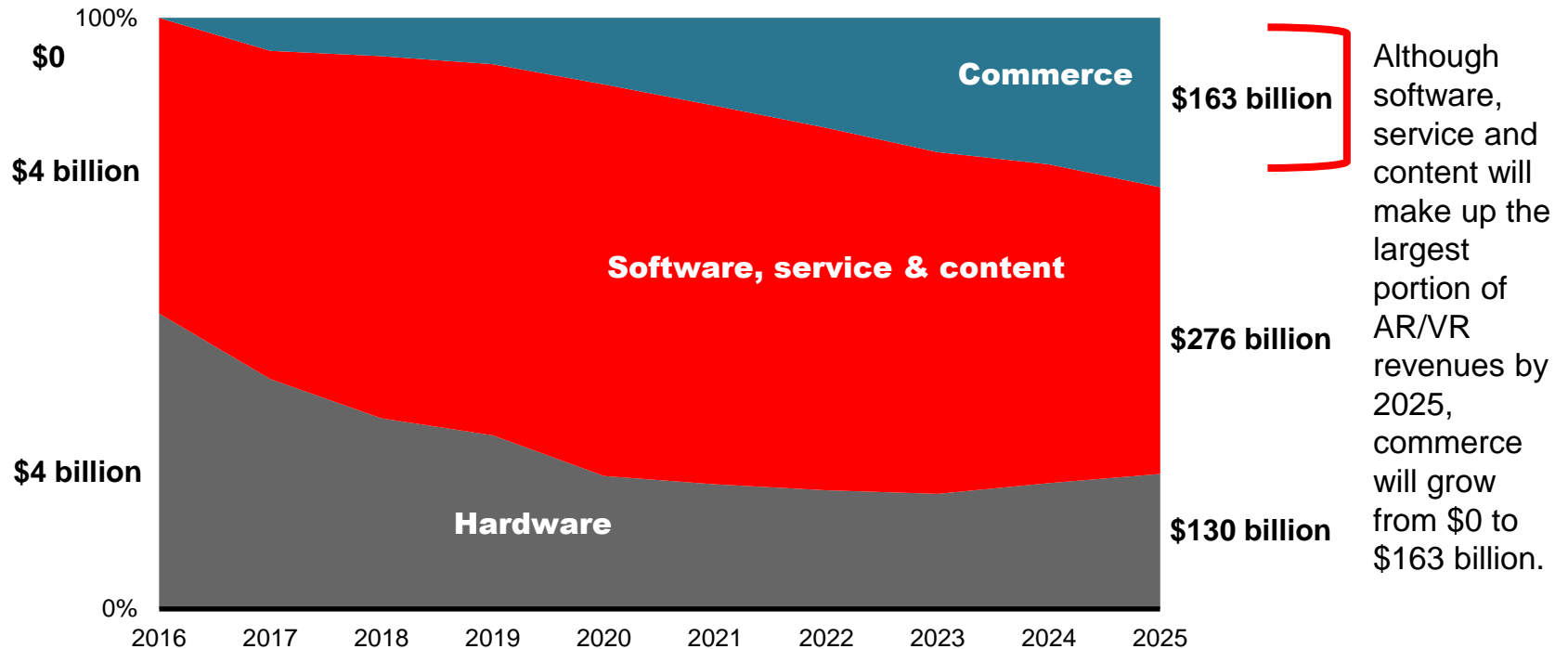


Source: SuperData Research as cited in company blog, Feb 24, 2017

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By 2025, AR and VR revenues worldwide are expected to reach at least \$569 billion



Augmented and Virtual Reality Revenues Worldwide, by Segment (billions and % of total)