VR Usage & Consumer Attitudes, Wave V

An ARtillery Intelligence Briefing

THRIVE ANALYTICS

ARtillery Intelligence

📁 Executive Summary

How do consumers feel about VR? Who's using it? How often? And what do they want to see next? Perhaps more important, what are non-users' reasons for disinterest? And how can VR software and hardware developers optimize product strategies accordingly?

These are the questions we set out to answer. Working closely with **Thrive Analytics**, **ARtillery Intelligence** wrote questions to be presented to more than **46,000** U.S. adults through Thrive's established consumer survey engine. The results are in and we've analyzed the takeaways in a narrative report.

This follows similar reports we've completed over the past five years (and last month's similar report[i] on AR). Wave V of the research now emboldens our perspective and brings new insights and trend data to light. All five waves represent a significant sample of U.S. adults for robust longitudinal analysis. This will continue to expand with each survey wave.

So what did we find out? At a high level, **23 percent** of households own or have access to a VR headset, up from **19 percent** in 2020. More importantly, VR users indicate high levels of satisfaction with the experience: **70 percent** are either satisfied or extremely satisfied.

As for price sensitivity, demand inflects in the **$200-$400** price range. This is notably the price range where **Oculus Quest 2** resides. This validates evidence we've seen elsewhere – and market-sizing estimates[ii] we've made – for **Quest 2's** growth. It continues to hold a quality edge, aggressive price competition, and accelerating VR market share.

Furthermore, standalone VR – embodied by **Quest 2** and other emerging headsets – represents a key inflection point. Though still early, standalone VR addresses many

consumer objections to PC-based VR including cost, confinement, and setup friction.

However, it's not all good news: Non-VR users report relatively low interest in VR ownership – **20 percent**, down from **29 percent** in Wave IV – and explicit ambivalence towards the technology. This downward trend is concerning for VR, as public interest in the technology continues to wane from its peak during the industry's circa-2017 hype cycle.

Moreover, the disparity between current-user satisfaction and non-user disinterest underscores a key challenge for VR: you have to "see it to believe it." In order to reach high satisfaction levels, VR has to first be tried. This presents marketing and logistical challenges for the industry to push that first taste.

But if anything is going to bring that accessibility and interest to mainstream markets, it's the lowered pricing and compelling play of standalone VR headsets like **Quest 2.** The device continues to turn heads and break pricing barriers, given **Oculus'** loss-leader pricing strategy to subsidize hardware in order to build a network effect.

These points join several other strategic implications that flow from the latest consumer VR sentiments. We'll examine those takeaways in the coming pages, including the latest wave of findings, and our analysis for what it means. The goal, as always, is to empower you with a knowledge edge.

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🗒️ Table of Contents

🌈 Key Takeaways

23 percent of consumers own or have tried VR, up from 19 percent last year.
This equals roughly 65 million U.S. VR users, up from 54 million last year.
This is different than headset sales or installed base, given multiple users per headset.
Of these users, 20% engage VR monthly, 31% weekly, and 32% daily.

PSVR had the greatest usage (39%), followed by Oculus Quest 1 & 2 (24%) and Oculus Rift (19%).
PSVR is in a strong position due to an installed base of 100-million PlayStation4 consoles and a low price.
Though PSVR has inferior specs, its success is due to a more approachable "experience sell."
There will be healthy, though niche, traction for high-end PC VR such as Valve Index and HP Reverb.

Standalone headsets show the most momentum, taking share from PC and console VR incumbents.
Quest 2 demonstrates the greatest year-over-year growth in these survey results (and in-market sales).
The device's quality/price ratio is unmatched, and it's the current leading seller among VR headsets.
Much of this stems from Facebook's investments in VR quality and aggressive pricing.

70% of VR users are *satisfied* (30%) or *very satisfied* (40%) with the experience.
This contrasts 16% of users that are either *dissatisfied* (6%) or *very dissatisfied* (10%).
These are strong quality signals: there are few consumer products that show such high satisfaction.
The bad news is that this satisfaction stands in stark contrast to non-user sentiments (explored below).

56% of VR users want more functionality; 43% want higher quality content; 31% want more content.
Content volume was the biggest desire in past waves but has been satisfied to some degree.
This has evolved with more available content and broader libraries of highly-rated VR experiences.
Oculus Quest and PSVR – the most popular headsets – have expanding and compelling curated libraries.
Oculus' App Lab will expand this volume even further, as will PSVR 2's evolution on the PS5 console.

VR users are most interested in cinematic experiences (63%), gaming (55%), and travel apps (54%).
Cinema's lead is surprising in that it's not "native" to VR (viewing 2D movies in an immersive environment).
Though 2D cinema doesn't embody VR's true potential, users want what they're most comfortable with.
Eventual VR successes will design native and immersive experiences that can *only* exist in VR.
VR will be conceptualized in activities that consumers know until native experiences reframe their thinking.

20% of non-VR users are interested in owning or trying VR, down from 29% in Wave IV.
This is discouraging for VR, and part of an ongoing downward trend from its circa-2016 hype cycle.
VR could return to or exceed those hyped interest levels, but it could take several years.

The biggest reason for disinterest among non-VR users was "just not interested."
This definitive sentiment represents VR's biggest challenge and deviates from the user sentiments above.
Getting more users to *try VR* is therefore the name of the game, partly through lower-friction standalone VR.
Compelling content and VR killer apps will likewise be needed to attract more users to VR.

33% of VR users will pay up to $400, and 19% of non-users would pay up to $200 for a headset.
These demand-inflecting price points should be price targets for VR hardware manufacturers.
VR user price sensitivity aligns well with Oculus Quest 2 and PSVR in the $299-$399 range.

Simplicity in design and marketing, versus a hardware-specs arms race, is a success factor.
This "Nintendo-like" approach is showing results for VR market-share leaders like PSVR and Quest 2.

🟦 Introduction: A Snapshot

ARtillery Intelligence often covers topics like VR's growth, product strategies, and revenue potential. This is valuable but it compels additional dimension. And the best way to get that is to ask consumers how they feel. The result is the latest VR consumer survey.

Working closely with **Thrive Analytics**, **ARtillery Intelligence** wrote questions for a sample of more than **46,000** U.S. adults. This represents the fifth wave of Thrive Analytics'

Virtual Reality Monitor. Now that the results are in, there are several implications and takeaways to analyze and unpack.

The survey results are a telling snapshot of VR adoption, which we'll detail in the coming pages. That will include charts and a narrative story arc that unpacks strategic takeaways, and our outlook for consumer VR. But before we take that deeper dive, here's a highlight reel of survey findings.

- **AR** **23%** of respondents own or have tried VR, up from **19%** last year.
- **AR** **20%** of users engage VR monthly, **31%** weekly, and **32%** daily.
- **AR** **39%** of users have tried **PSVR**, followed by **Quest 1 & 2** (**24%**) and **Oculus Rift** (**19%**).
- **AR** **70%** of users are satisfied or very satisfied with VR, **16%** are dissatisfied or very dissatisfied.
- **AR** **31%** of users want more content, **43%** want better content and **56%** want better functionality.
- **AR** **20%** of non-VR users are interested in owning or trying VR, down from **29%** last year.
- **AR** **61%** of disinterested non-VR users cite "just not interested" as the reason.
- **AR** **33%** of VR users would pay up to **$400** for a headset. **19%** of non-users would pay up to **$200**.
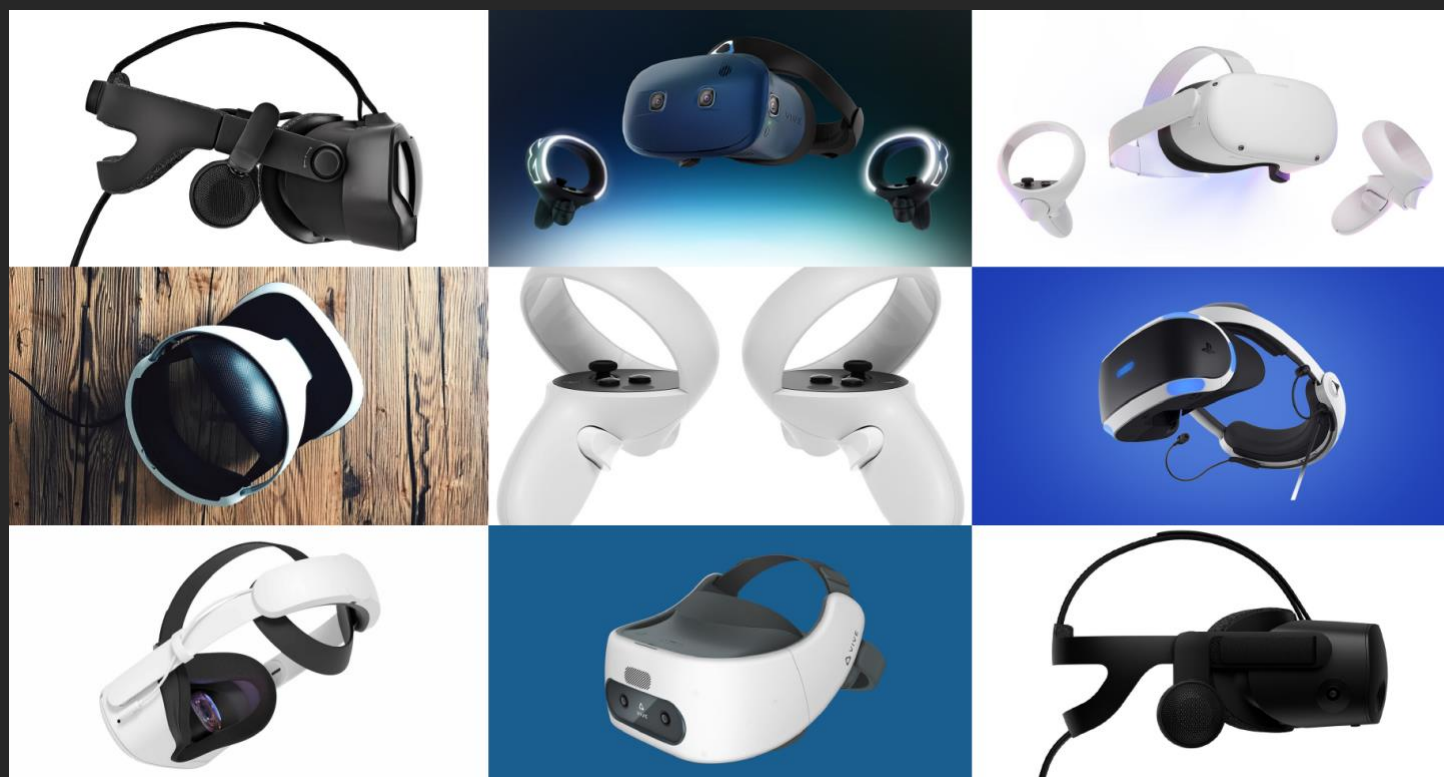
🌈 About the Survey

Before going deeper into survey results, we'll pause here to add context to the findings and methodology. A key question is *how many* and *what* individuals answered the survey?

Starting with sample size, this survey wave includes more than **46,000** U.S. adults. Segments of this sample are represented, depending on the question, as dictated by the survey logic. For example, with questions posed just to VR users, they represent a sample segment that exceeds **6,500** U.S. adults (non-VR users are more populous).

Going deeper into demographics and psychographics, respondents break down in population-representative ways. Specifically, the survey sample spans a wide range of U.S. adult consumers with distribution of key variables like gender, age, and income.

This is all a function of **Thrive Analytics'** longstanding position and competency in consumer survey research. Its time-tested methodology and survey network comply with industry standards and best practices.

"AR and VR are still in early-adoption phases," said **Thrive Analytics** managing partner **Jason Peaslee**. "There are still technology challenges, but we think AR & VR have the ability to transform the way people work, connect, and learn. We're excited about the prospects, and committed to measuring them."

🟥 Part I: VR Users

To organize strategic takeaways in this report, we've delineated the sentiments of VR *users* and *non-users*. Both can provide telling signals for VR product development and strategy refinement. Starting with current users, what are they saying and doing with respect to VR adoption and behavior? The following sections dive in.

🟥 VR Penetration

Starting at the very top, what's VR's overall penetration and adoption among consumers? Survey results peg it at **23 percent** of U.S. adults. This is up from **19 percent** in Wave IV of the study, indicating positive movement. It also counters claims in the tech press that VR adoption has flatlined.

In fact, adoption in the **low-twenty percent** ranges – including steady year-over-year growth – signals a combination of healthy traction and headroom to grow. VR is still in early stages of its industry lifecycle, and we expect usage to accelerate in future survey waves as consumer comfort levels – as well as VR itself – advance.

Meanwhile, usage levels can also be seen in the figures below, indicating frequency of engagement. We'll dive into these frequency distinctions and their implications later in this report.

VR Users vs. Non-Users

3% 1%
5%
7%
7%
77%

- Non-Users
- Daily Users
- Weekly Users
- Monthly Users
- Semi-Annual Users
- One-Time Users

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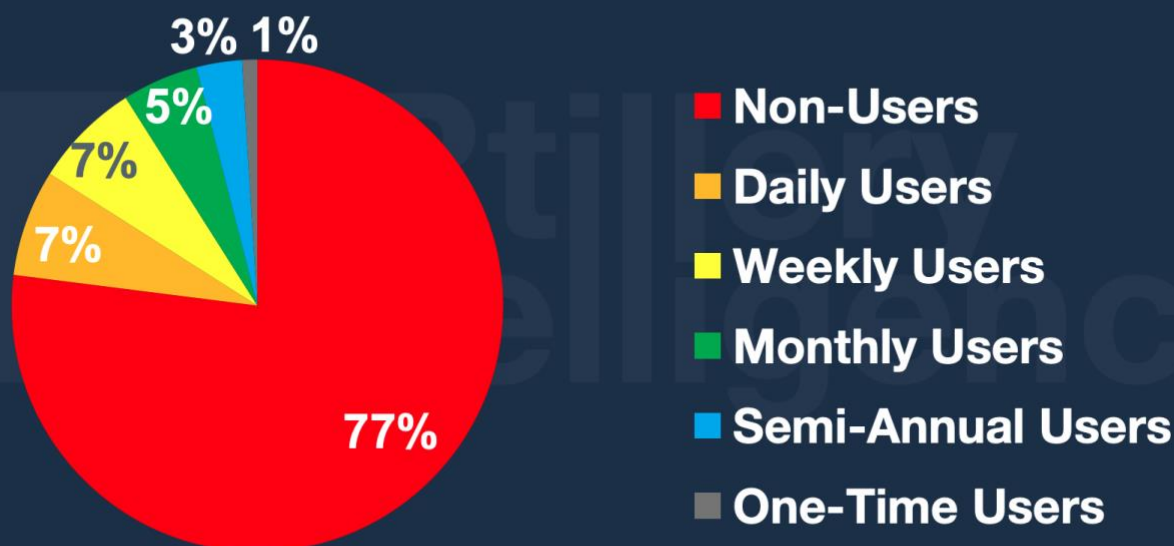
🌈 VR Market Size

Given VR's usage share among U.S. adults, how does this translate to overall market size? Applying the above figure to the U.S. adult population indicates that there are roughly **65.3 million** adults who have tried VR, up from **54.4 million** last year.

To pause for definitions, these totals measure U.S. adults who have used VR at least once. This broad definition lets us start with a larger population, then drill down for insights. For example, we'll explore soon how this overall market size breaks down by usage frequency.

U.S. VR Users 2019-2024

U.S. VR Users (Millions)

Survey validated | Projections

- 2019: 45.4
- 2020: 54.4
- 2021: 65.3
- 2022E: 75.1
- 2023E: 82.7
- 2024E: 89.3

U.S. Penetration

Survey validated | Projections

% of Internet Users: 16%, 19%, 23%, 26%, 28%, 29%
% of Population: 14%, 17%, 20%, 23%, 25%, 26%

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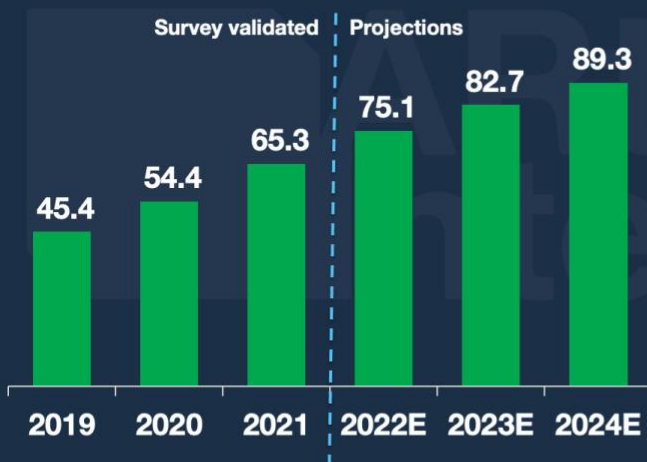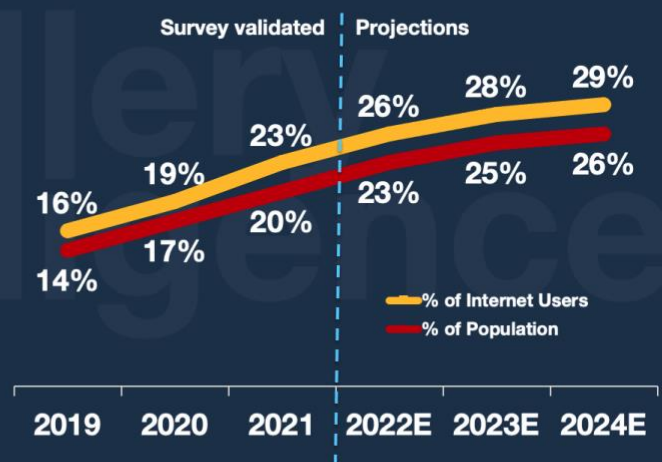
🌈 VR User Profiles

As for *who* these users are, they skew male, and younger. Specifically, **35 percent** of male respondents reported using VR versus **19 percent** of female respondents. Meanwhile, **45 percent** of Gen-Z and **43 percent** of Gen-Y, report VR usage, versus **17 percent** of Gen-X and **10 percent** of baby boomers.

If we compare this to previous waves, growth is apparent. For example, looking back to Wave II in 2018 indicates that VR usage is growing among key demographics. Specifically, Gen-Z is up from **32 percent** to **45 percent** and Gen-Y is up from **34 percent** to **43 percent**, as illustrated on the next page.

U.S. VR Penetration

VR Usage **Within Each Demographic Segment**

Age

Demographic	Percentage
Gen-Z	45%
Gen-Y	43%
Gen-X	17%
Boomers	10%
Silent Gen	4%

Gender

- Female: 19%
- Male: 35%

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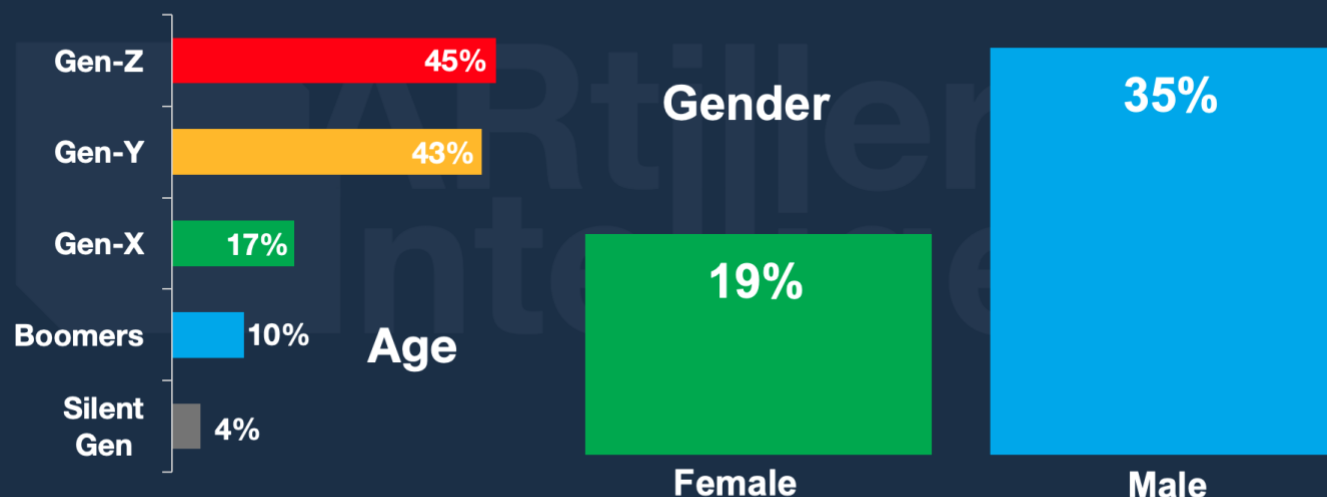
VR User Growth

Growth in VR Users, **by Demographic**

Figures represent percentages of survey respondents.

Growth is greatest among Gen Y and Z...

Legend: 2018 (green) · 2021 (blue)

Demographic	2018	2021
Male	19	35
Female	13	19
Gen Z	32	45
Gen Y	34	43
Gen X	17	17
Boomers	6	10
Silent Gen	4	4

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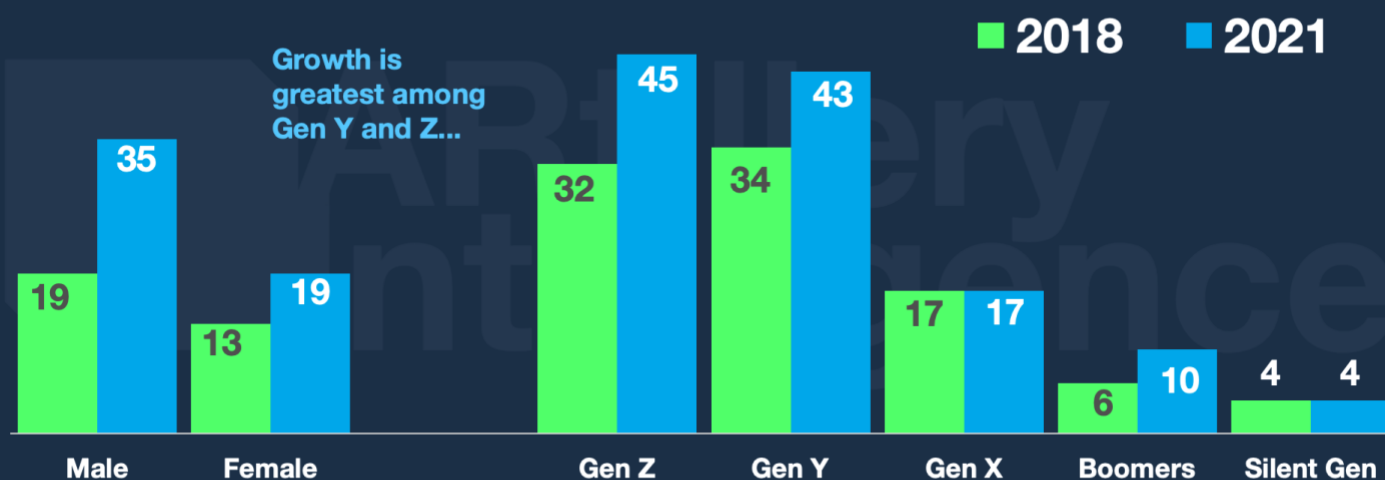
🌈 VR Usage Frequency

Perhaps more important than the *number* of users, a key variable in tracking success in any digital media is *how often* it's being used. Because VR adoption barriers can be high (tracking system set up, technological invasiveness, etc.), the name of the game is to design for ease of use and replayability.

This challenge is being addressed with the advent of standalone headsets like **Oculus Quest 2.** Given their ease of use and growing penetration, we believe that frequency metrics will improve over time. Meanwhile, VR frequency already shows positive momentum.

Specifically, most VR users engage daily (**32 percent**) followed by weekly (**31 percent**) and monthly (**20 percent**). This means that **83 percent** of VR users engage monthly or more, while **17 percent** do so monthly or less. This is

a strong signal for VR engagement levels, compared to other consumer tech like mobile apps.

As for year-over-year trending, daily usage is up **12 percentage points**, while monthly use is down **11 percentage points**. This is a strong signal that users are engaging more often. It's possibly due to more standalone headsets in the market this year, per the continued penetration of **Oculus Quest** and **Quest 2.**

As noted earlier, standalone VR headsets such as **Quest 2** reduce VR friction. Among other things, this should naturally increase usage frequency, as is evident in this survey wave. Meanwhile, the positive momentum shown here is likely impacted by **Oculus Quest 2's** relatively limited market tenure, and will only improve over time.

VR Usage Frequency — How often do you use VR? High-frequency usage is increasing… Figures represent percentages of survey respondents. Legend: 2018, 2019, 2020, 2021.

	2018	2019	2020	2021
Daily	15	18	20	32
Weekly	20	25	27	31
Monthly	38	35	31	20
A few times per year	17	16	17	11
At Least Once	10	6	5	6

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🌈 Cross Check: Frequency + User Base

Sticking with the theme of VR frequency, what do the above data tell us about the size of the U.S. VR *active* user base? Earlier we stated that top-level VR adoption numbers included users who have engaged at least once – a useful starting point, but it compels more granularity.

With that goal, we cross-referenced the frequency data on the previous page with VR's total U.S. user base quantified earlier. By performing this cross-check, we see **20.9 million** daily VR users, **41.1 million** weekly+ users, and **54.2 million** monthly+ users.

To qualify this further, frequency groupings don't collectively add up to the total (**65.3 million**), due to overlap. In other words,

"monthly or more" users include respondents who also indicated daily or weekly use. Monthly active user (MAU) metrics typically tally one or more uses in a 30-day period.

Furthermore, these active-usage groupings should be prioritized over top-level calculations for the U.S. user base, as they provide a more granular indication of usage. Put another way, the top-level figures provided earlier measure *users* in a binary manner, while layering in frequency better quantifies *usage*.

It should also be noted that these user figures are different than the quantity of VR headsets in the market. Due to households that share hardware, the latter figure is far less, per the sales estimates in ARtillery's VR Forecast.[iii]

VR Usage Frequency
How does frequency map to the U.S. VR user base?

■ Daily ■ Weekly or More ■ Monthly or More ■ Semi-Annual or More ■ At Least Once

Millions of U.S. AR Users, Per Engagement Frequency

2021

Daily	Weekly or More	Monthly or More	Semi-Annual or More	At Least Once
20.9	41.1	54.2	61.4	65.3

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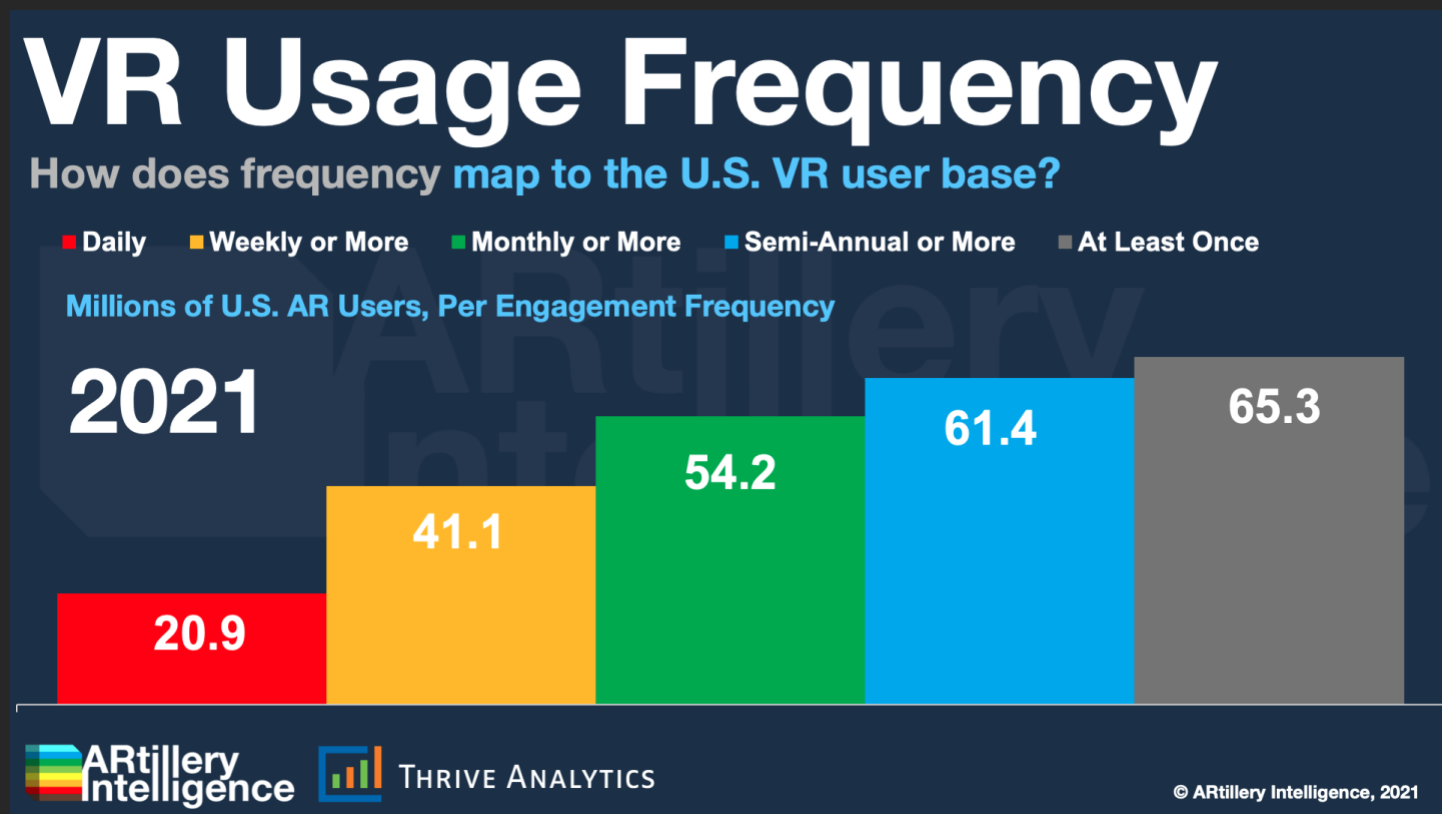
🌈 VR's Competitive Landscape

Going one level deeper, what devices are gaining the most traction? **Playstation VR** (PSVR) scored highest at **39 percent**. This isn't surprising, given an installed base of **100+ million** compatible **PSVR** consoles, and the signals evident in our separate headset sales tracking and market share estimates.[iv]

This was followed by **Oculus Quest** (including Quest 1 & 2) at **24 percent** of respondents. This likewise isn't unsurprising due to its appeal, momentum and aggressive price competition. This compares to **13 percent** of respondents in Wave IV – a significant jump, and one that we projected in last year's report. We'll double down on that projection this year.

Oculus Quest's current momentum is based largely on the launch of **Quest 2** in October 2020. That means it was only in the market for about three months when this survey was fielded in January 2021. Based on our separate market sizing[v], we believe it could reach **high-thirty-percentages** in Wave VI in terms of its share of VR usage tracked below.

Meanwhile, **Oculus Rift** and **HTC Vive** – the previous VR hardware leaders – show relatively flat growth. (Rift is being discontinued). We're bullish on **HTC's** multi-device play and its pivot to target enterprises as **Oculus** takes a bigger bite of the consumer market. We also expect continued strength for **PSVR** as its second version rolls out for **PS5**.

We also believe that **Valve Index** will have a healthy niche market among gaming enthusiasts, and is one of the highest quality headsets available today. **Windows Mixed Reality** could continue to be relatively flat.

VR Usage by Headset

Which VR headset(s) **have you used?**

*Includes all variants

■ 2017 ■ 2018 ■ 2019 ■ 2020 ■ 2021

Figures represent percentages of survey respondents.

Oculus Quest has a disproportionate usage share given limited time in market

Headset	2017	2018	2019	2020	2021
Other		6	12	7	8
Valve Index					5
HTC Vive Cosmos*				6	7
HTC Vive Focus*			7		8
Windows Mixed Reality*		5	16	12	12
Oculus Go			13	12	12
HTC Vive Pro				12	12
HTC Vive	16	14	14	15	16
Oculus Rift*	22	20	17	19	19
Oculus Quest*				13	24
Playstation VR	42	36	33	38	39

2021 Base = 6,586 U.S. online adults

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VR Usage by Brand

Breakdown of Oculus Headsets

Quest 2 already rivals other models, despite relatively young age

Survey was fielded in January 2021, just three months into Quest 2's market tenure

Quest 2	Go	Quest	Rift (all variants)
10%	12%	14%	19%

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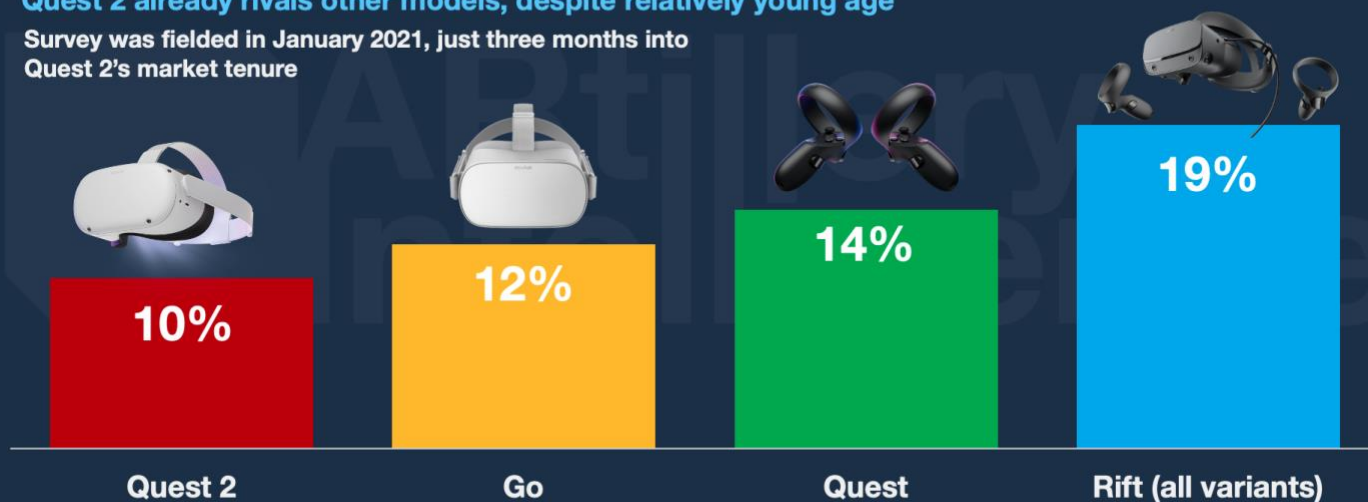
VR Usage by Brand

Figures represent share of overall sample of VR users

Breakdown of HTC Headsets
(includes all model variants)

Cosmos	Focus	Vive PRO	Vive
7%	8%	12%	16%

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📊 VR User Experience Levels

As indicated in the above analysis on the VR hardware competitive landscape, we continue to see expansion and contraction. Some headsets are discontinued – (e.g. **Oculus Go**, **Rift S**) while others are launched (e.g. **Quest 2**, **Vive Cosmos**). This will continue as VR players test the waters for optimal product strategies in the market's still-early stages.

But as all of this unfolds, consumer experience with the technology continues to advance. Specifically, the average number of headsets that users have tried continues to ratchet up in each survey wave. That number now stands at **3.3**, up from **2.3** in Wave IV. The full trend over five years can be seen below. The question is if this figure will keep growing or plateau.

The likely answer is "both." The average number of headsets that users have tried will continue to grow as the VR market – and users' experience levels – likewise grow. But that growth will decelerate over time and could level-off when it hits a natural ceiling. In other words, there are only so many VR headsets available to consumers, which will continue to be a limiting factor to this metric.

In fact, we believe that in the longer term, there could be industry consolidation that standardizes the competitive field into a few players (similar to the smartphone market). This outcome would impact the quantity and variety of devices that users engage or have access to.

Average Number of Devices
How Many VR headset models have you used?

Varied device usage continues to grow...

2017	2018	2019	2020	2021
1.00	1.40	1.75	2.3	3.3

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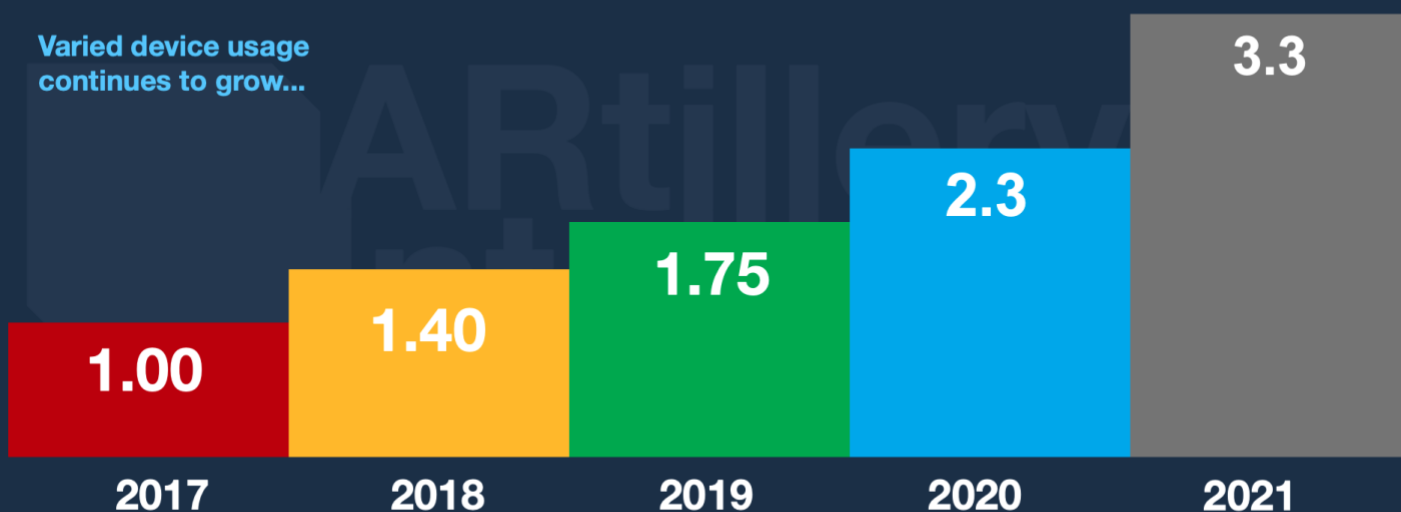
🟧 VR User Satisfaction

Drilling down from usage, how are consumers satisfied with VR? Before getting into per-headset sentiments, it's worth noting that overall VR satisfaction is mostly favorable. This continues a trend we've seen over four waves of survey data, though there are some deviations.

Specifically, **70 percent** of users are either *very satisfied* (**40 percent**) or *satisfied* (**30 percent**). This contrasts the opposite end of the satisfaction spectrum where only **16 percent** of users are either *very dissatisfied* (**4 percent**) or *dissatisfied* (**12 percent**).

These are strong quality signals. In fact, there are few consumer products that show such high satisfaction. More importantly, the highest satisfaction level is trending up. As shown below, *very-satisfied* VR users jumped from **33 percent** to **40 percent** of respondents in Wave

V. This was counterbalanced to some degree by an **eight-percentage point** decline in "satisfied" users. But the tradeoff is positive, given the greater comparative impact and value of very-satisfied users.

The growth in "very-satisfied" users also aligns with data shown elsewhere in the survey. For example, recall the considerable uptick in high-frequency VR users examined earlier: It stands to reason that there's a correlation between satisfaction and frequency. **Oculus Quest 2's** growth examined earlier likewise correlates to high-satisfaction ratings.

Put another way, **Oculus Quest 2** continues to demonstrate its value when it comes to its user experience, design, and expanding library of content. The live market evidence we've observed to this effect could be one cause for the satisfaction results shown here.

VR Satisfaction (Overall) — How satisfied are you with VR? 2021 Base = 6,586 U.S. online adults. Figures represent percentages of survey respondents. © ARtillery Intelligence, 2021
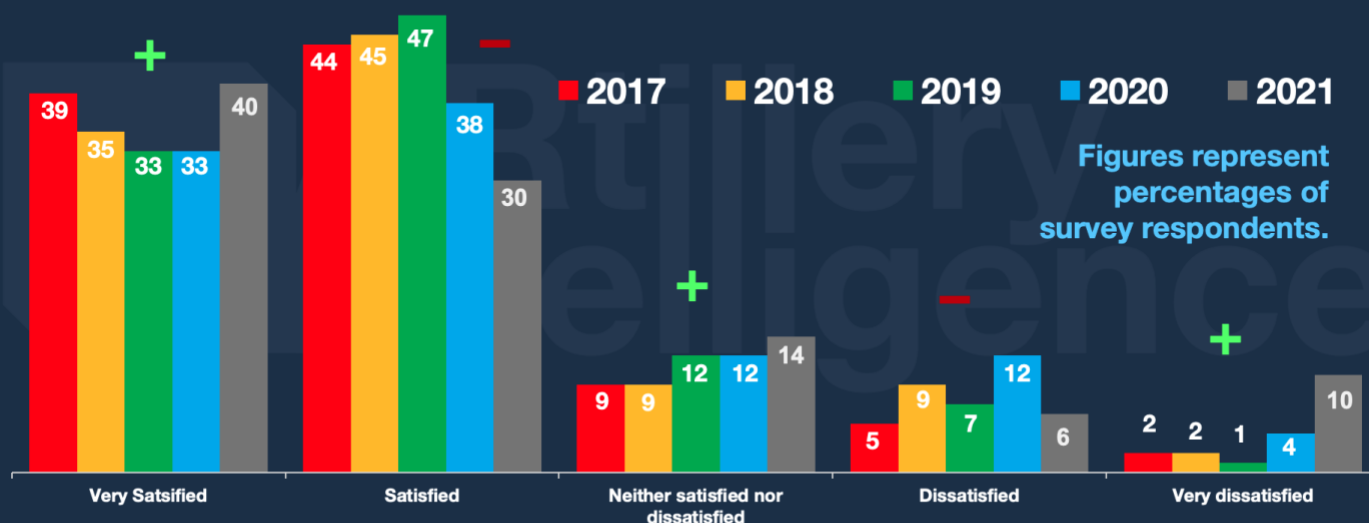
🟦 Naming Names

To validate some of the claims made on the previous page about **Oculus Quest 2's** quality levels, how do users rate the device in terms of their satisfaction levels? More broadly speaking, how does the full competitive field stack up on this metric? Answering that question can indicate the VR features and formats that resonate most with consumers, which can in turn offer strategic guidance in devising features or product road maps.

To do this, **Thrive Analytics** has introduced a new metric for the first time in Wave V: The CX Index. This is a **100-scale** scoring system that factors in VR users' net satisfaction response and ease of use (tracked elsewhere in the survey). The average score for the competitive field of VR headsets was **62.5**. This can serve as a benchmark for VR hardware quality.

Drilling down into individual scores, **Quest 2** led the pack – for many of the reasons discussed so far in this report – with a **78.2** CX Index score. That's followed by **PSVR** (**75.7**), **Windows Mixed Reality** (**69.7**), **HTC Vive Cosmos** (**68.7**), and the rest of the pack which can be seen below. **Oculus Quest 1** scored relatively low (**51**), validating the quality delta that **Oculus** has achieved with **Quest 2**.

One factor that jumps out from these CX scores is the product positioning of the top scorers. Specifically, **Quest 2** and **PSVR** are rated highest, despite technical specs that are inferior to PC VR. They've accomplished this by eschewing specs and instead focusing on an overall "experience sell" that is fun and approachable. They also have competitive pricing, which we'll examine later in the report.

The VR Headset CX Index

How do headsets stack up by user experience

CX Index is based on net satisfaction responses and ease of use

2021 CX Index Benchmark (average score) = 62.6

HTC Vive	Oculus Quest	HTC Vive PRO	HTC Vive Focus	Oculus Rift & Rift S	Oculus Go	Other	HTC Vive Cosmos	Windows Mixed Reality	Playstation VR	Oculus Quest 2
29.8	51.0	54.5	61.7	63.8	67.4	67.9	68.7	69.7	75.7	78.2

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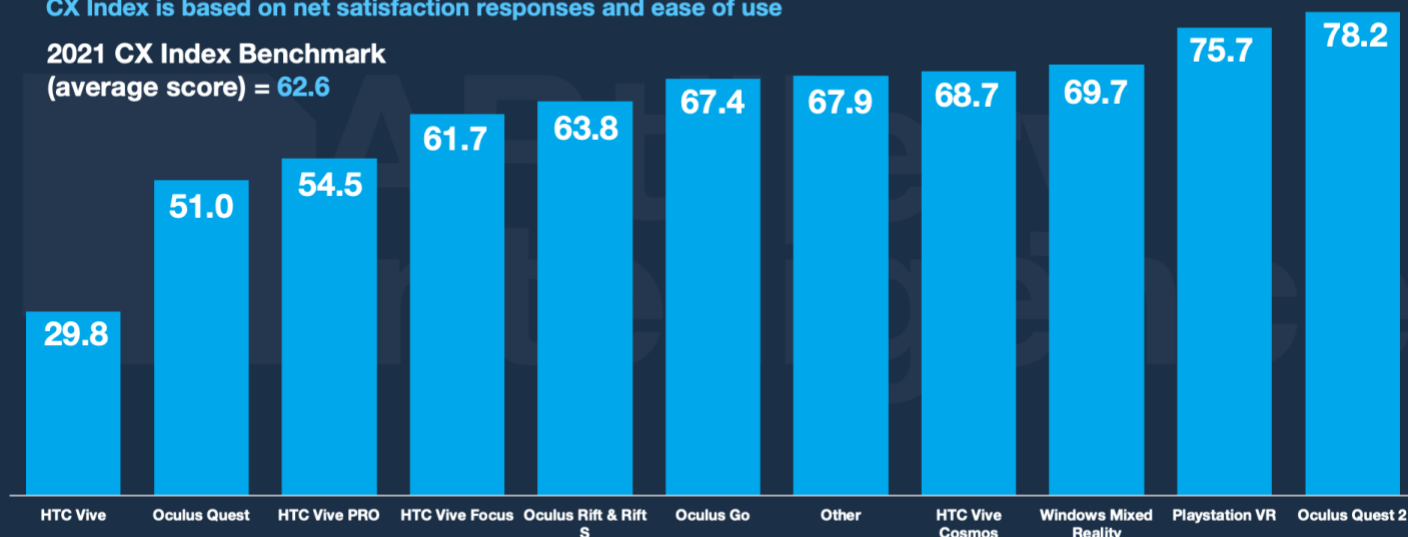
🌈 VR Improvement Areas

Stemming from satisfaction is a related factor: desired improvement. What do VR users want to see improved? These areas are split between content-related factors and feature-related factors, both of which are illustrated on the next page and summarized below.

Starting with features, overall product functionality leads, (**56 percent**), followed by battery life (**45 percent**), mobility, and optical quality (**40 percent**). These sentiments are driven by the rise of standalone headsets, where untethered orientation makes battery life a bigger factor. Optical quality will be an ongoing area of improvement.

As for content-related factors, the top area for improvement is *quality of content*. This leading factor has been somewhat consistent over time. However, having *more content* is a

survey sentiment that has declined – one signal that content quantity is improving.

This expansion of VR content libraries is supported by live market evidence. There are also growing numbers of hit games such as **Beat Saber** and **Rec Room**. In fact, **Oculus** recently reported that more than **60 Quest** games have exceeded **$1 million** in revenue[vi] – a figure that continues to trend upward.

There are also continued investments by **Facebook** to stimulate the VR ecosystem, including the incentive and exit potential it signals from game studio acquisitions like **Beat Games**. This, plus a growing installed base of VR users, has incentivized game developers and helped VR push past its early stage "chicken & egg" dilemma (more on that soon).

Image Source: Valve

VR Areas of Improvement

Where do you most want to see VR features improve?

Figures represent percentages of survey respondents.

■ 2019 ■ 2020 ■ 2021

Product functionality	Battery life (standalone VR)	Mobility (tethered VR)	Optical quality (resolution, FOV)
50 / 54 / 56	41 / 40 / 45	28 / 33 / 36	28 / 32 / 40

2021 Base = 6,586 U.S. online adults

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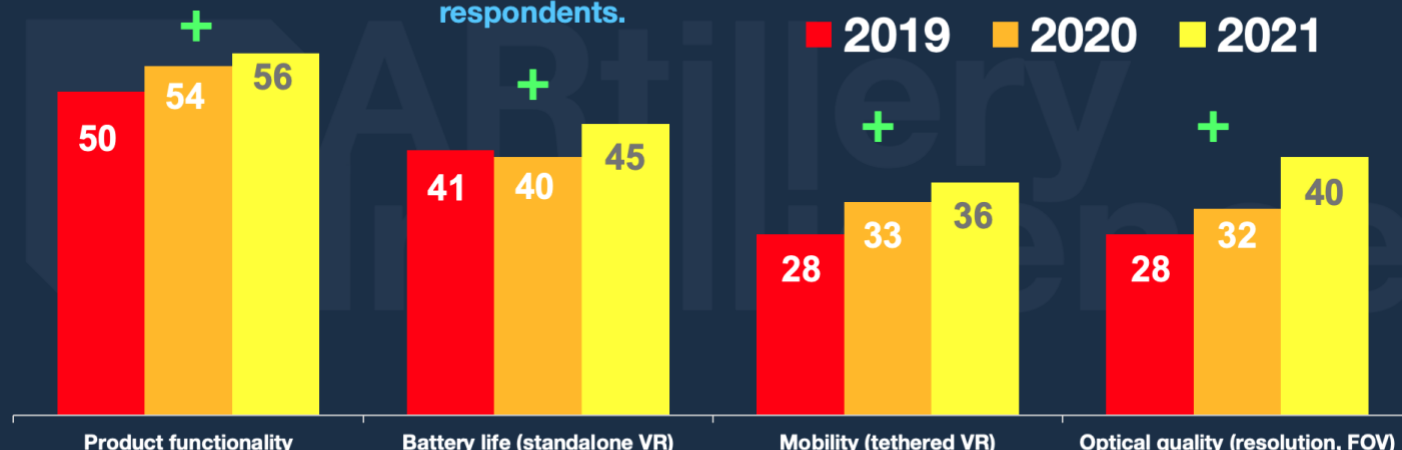
VR Areas of Improvement

Where do you most want to see VR content improve?

Figures represent percentages of survey respondents.

■ 2017 ■ 2018 ■ 2019 ■ 2020 ■ 2021

Quality of content	More content	Lower-priced content	Cross-platform content
45 / 50 / 45 / 38 / 43	55 / 56 / 40 / 37 / 31	30 / 30 / 39 / 34 / 31	35 / 36 / 20 / 22 / 17

2021 Base = 6,586 U.S. online adults

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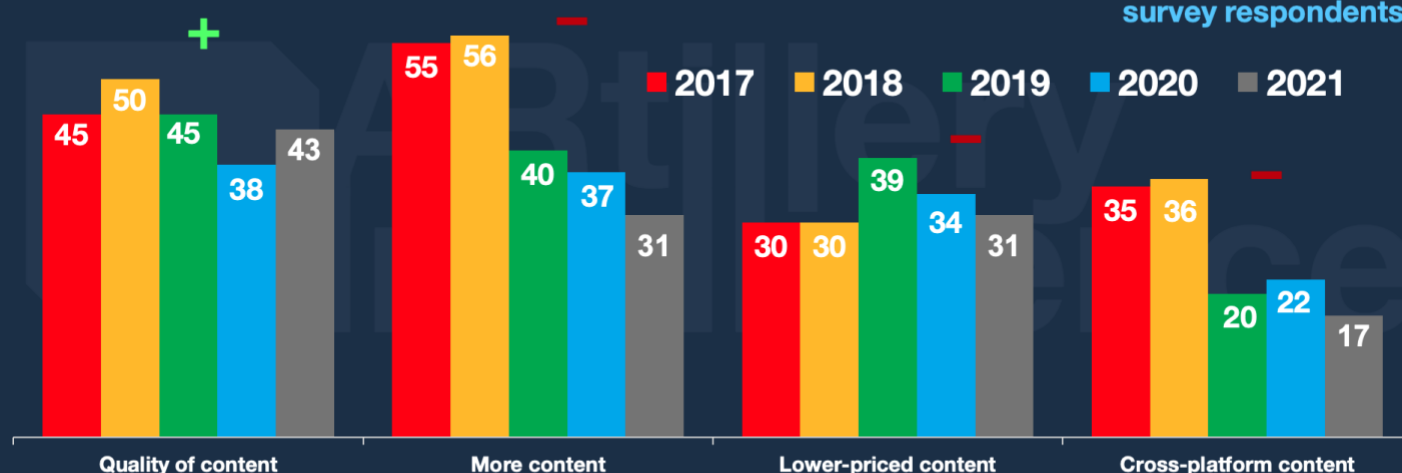
🌈 VR Desired Content

Building from VR user content sentiments in the previous section, what *types* of content are they most interested in?

Cinematic content leads (**63 percent**), such as watching 2D movies in a 3D environment. That's followed by gaming (**55 percent**), travel & tourism (**54 percent**), education (**48 percent**), and social (**41 percent**). These figures are similar to Wave IV results.

These responses aren't surprising but it's notable that users are most interested in what they know: cinematic content. Though 2D movies and TV don't harness VR's benefits and immersion, they're still what consumers want. This will evolve over time but is meanwhile a key finding for VR players.

Similarly, these results are a mix of native VR activities (fully immersive 3D) and standard 2D content that has been brought into VR (e.g., watching movies). The fact that the latter represents the most popular activity is telling of the early stage in which VR lingers.

As we've examined in past reports, eventual VR successes will design native experiences. In other words, they can *only* exist in VR. They'll apply unique capabilities to immerse users in 3D sensory experiences. This will be a learning curve for developers, just like we saw with native smartphone app design.

In the meantime, consumers need time to wrap their heads around this revolutionary jump in content formats. Their desired VR activities will continue to be conceptualized in the activities they already know (such as watching movies). This will continue to be the case until new/native experiences effectively reframe their thinking and their interests.

VR Content Areas of Interest

What types of VR content are you most interested in?

Figures represent percentages of survey respondents.

■ 2019 ■ 2020 ■ 2021

Category	2019	2020	2021
Cinematic	67	64	63
Gaming	53	54	55
Travel & Tourism	49	53	54
Education	38	45	48
Social Networking	39	45	41
Automotive	35	32	28
Retail	27	30	29
Healthcare	26	28	35
Real Estate	26	24	30
Training	*	23	28
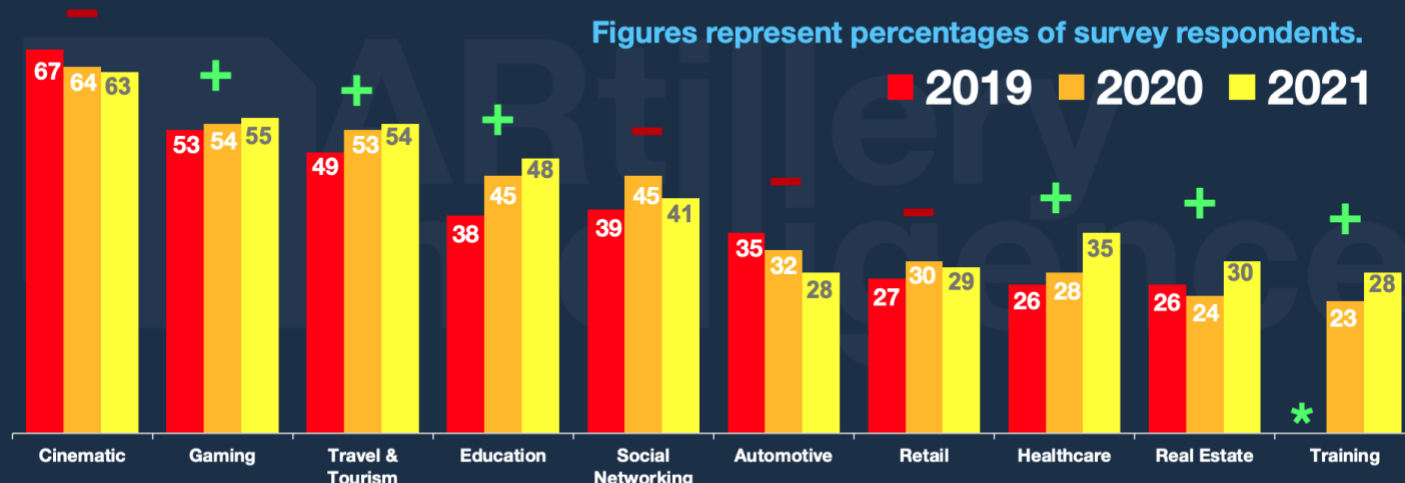
*Training measured for the first time in Wave IV

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🔖 VR Desired Content (cont'd)

While the above VR acclimation process plays out, activities that ARtillery Intelligence believes are worth watching include social interaction and immersive shopping. These are areas we're examining and project strong long-term use cases, and user engagement that exceeds these categories' scores above.

Either way, the above consumer sentiments should be considered when evaluating VR's points of intersection with existing business. For example, online travel, retail, and sports broadcasting should examine these sentiments when designing product road maps and long-term evolution.
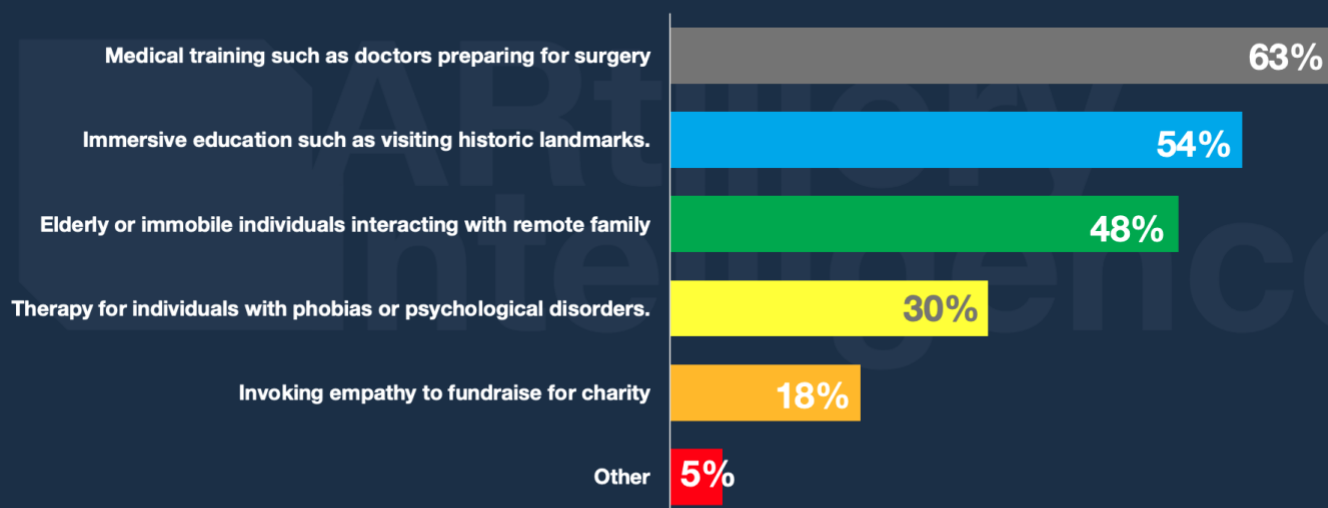
🔖 VR For Good

As for altruistic VR applications – those that serve a greater good rather than personal needs – respondents rated medical training as the top use case (**63 percent**). That was followed by education, (**54 percent**), communications for the elderly (**48 percent**), and mental health therapy (**30 percent**).

These results weren't surprising, nor do they have immediate business takeaways for consumer-focused VR companies. But it's still telling of consumers' view of the technology and the role it will play in several aspects of our lives. VR will have societal impact, just as most technologies do.

VR's Altruistic Benefits

In what areas will VR provide the most humanitarian benefit?

Medical training such as doctors preparing for surgery	63%
Immersive education such as visiting historic landmarks.	54%
Elderly or immobile individuals interacting with remote family	48%
Therapy for individuals with phobias or psychological disorders.	30%
Invoking empathy to fundraise for charity	18%
Other	5%

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🌈 VR Price Sensitivity

As with most products, price is an important factor in VR. But what are the specific ways that price is an influential factor in the technology's adoption? More importantly, what price points represent triggers for consumer interest – or disinterest – in VR ownership?

To begin, the greatest interest in VR exists at the **$200 - $400** price point (**33 percent**), and the lowest interest occurs between **$800-$1000** (**4 percent**). These results aren't terribly surprising, as higher-end PC-based headsets have declined in demand. Demand also tends to recede as prices increase for any product.

But one exception to that common pattern emerged in this year's results. Specifically, **$200-$400** is a more popular price point than **$100-$200**. Though initially counterintuitive, there's a good reason for this shift in Wave V.
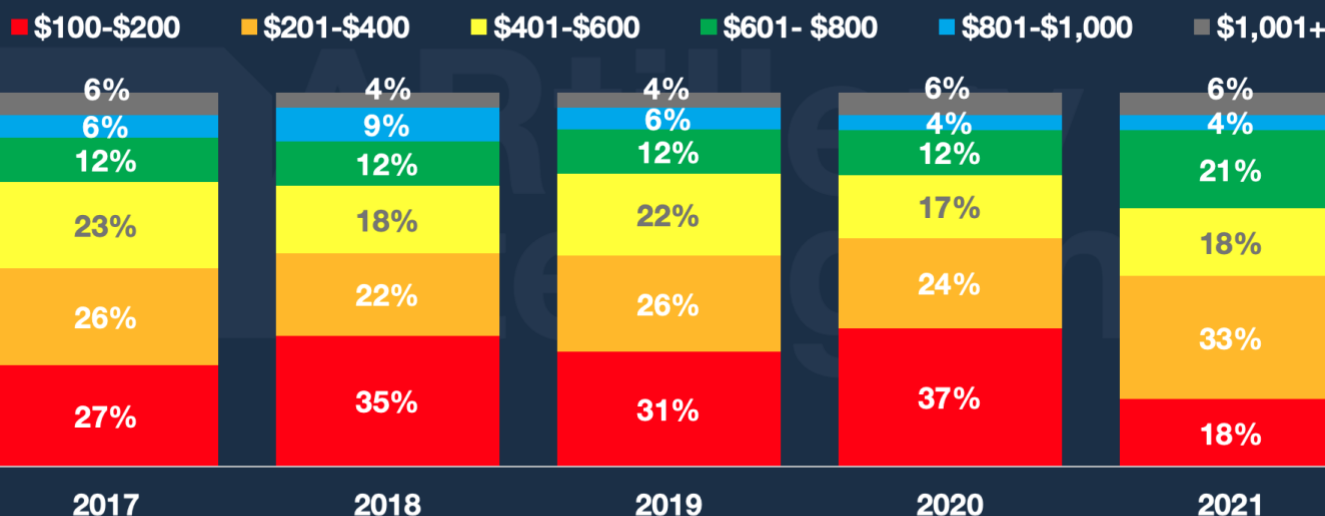
And like many other market dynamics explored so far in this report, it has to do with **Quest 2**.

Specifically, **$200-$400** aligns with **Oculus Quest 2** pricing. As noted earlier, the device has proven to be a compelling consumer purchase. It's also known for being a strong value which has in turn boosted its demand. **Quest 2's** value traces back to **Oculus'** ongoing investments to jumpstart VR adoption.

One of those investments is in lowering the price of its hardware to the point of diminishing its own margins. That makes **Facebook's** VR hardware a sort of loss leader for its larger VR ambitions to connect the world in immersive ways. A byproduct of this strategy is that consumers win by gaining access to a device that's cheaper than it should be. We'll go deeper on this pricing strategy a bit later.

VR Price Sensitivity (Users)

What's the most you'd pay for a VR headset?

Legend: ■ $100-$200 ■ $201-$400 ■ $401-$600 ■ $601- $800 ■ $801-$1,000 ■ $1,001+

	2017	2018	2019	2020	2021
$1,001+	6%	4%	4%	6%	6%
$801-$1,000	6%	9%	6%	4%	4%
$601-$800	12%	12%	12%	12%	21%
$401-$600	23%	18%	22%	17%	18%
$201-$400	26%	22%	26%	24%	33%
$100-$200	27%	35%	31%	37%	18%

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🔲 Part II: Non-User Attitudes

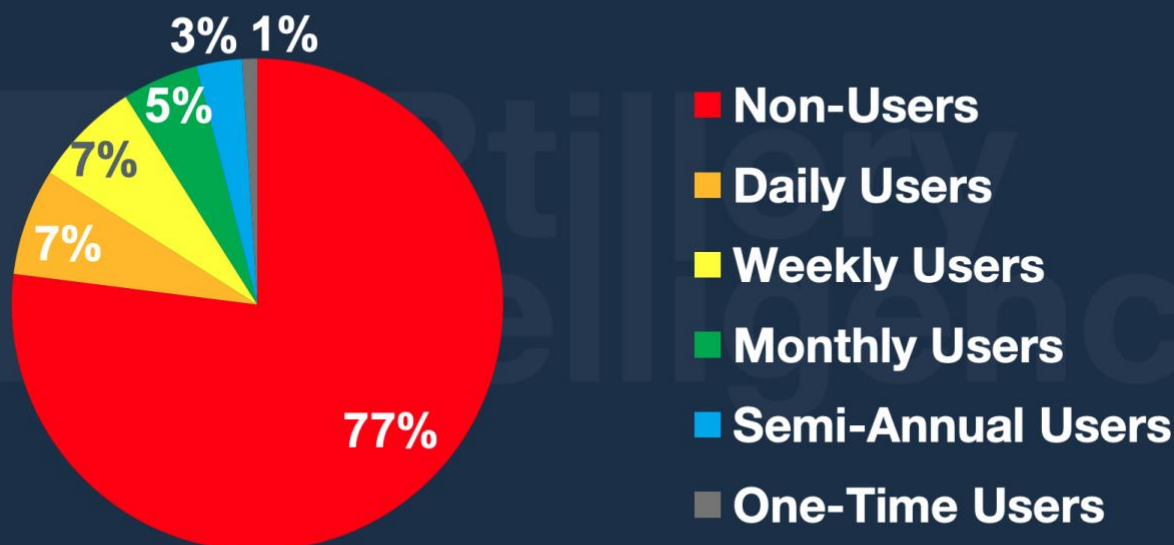Perhaps more important than current VR users, what are non-users saying? Because they're much larger in number at this early stage, appealing to them is a strategic imperative. And that requires knowing what they like and don't like. The following sections examine these non-user attitudes.

🔲 Non-User Market Size

Starting at the top, how do VR *non-users* stack up to users. To back up the above claim that non-users outnumber users, the former's share currently stands at **77 percent**. That makes VR users correspondingly represent **23 percent** of U.S. adults, as noted earlier.

Like the previous several sections on VR users, we'll drill down into more precise sentiments from this non-user segment, starting with the all-important question of *if* users will adopt VR anytime soon. And for those who aren't interested, *why not?*

VR Users vs. Non-Users

3% 1%
5%
7%
7%
77%

- 🟥 Non-Users
- 🟧 Daily Users
- 🟨 Weekly Users
- 🟩 Monthly Users
- 🟦 Semi-Annual Users
- ⬜ One-Time Users

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🌈 Non-Users Adoption Likelihood

Among VR non-users quantified above, are any of them interested in owning a VR headset in the next 12 months? **20 percent** report interest while **56 percent** aren't interested, and **24 percent** aren't sure.

But more interesting than these results are their year-over-year trending. Specifically, non-user interest is down significantly from Wave IV. Over the past year, it declined **nine percentage points** from **29 percent** to **20 percent.** Not-interested sentiments correspondingly gained **7 points** while "not sure" responses made up the slight difference.
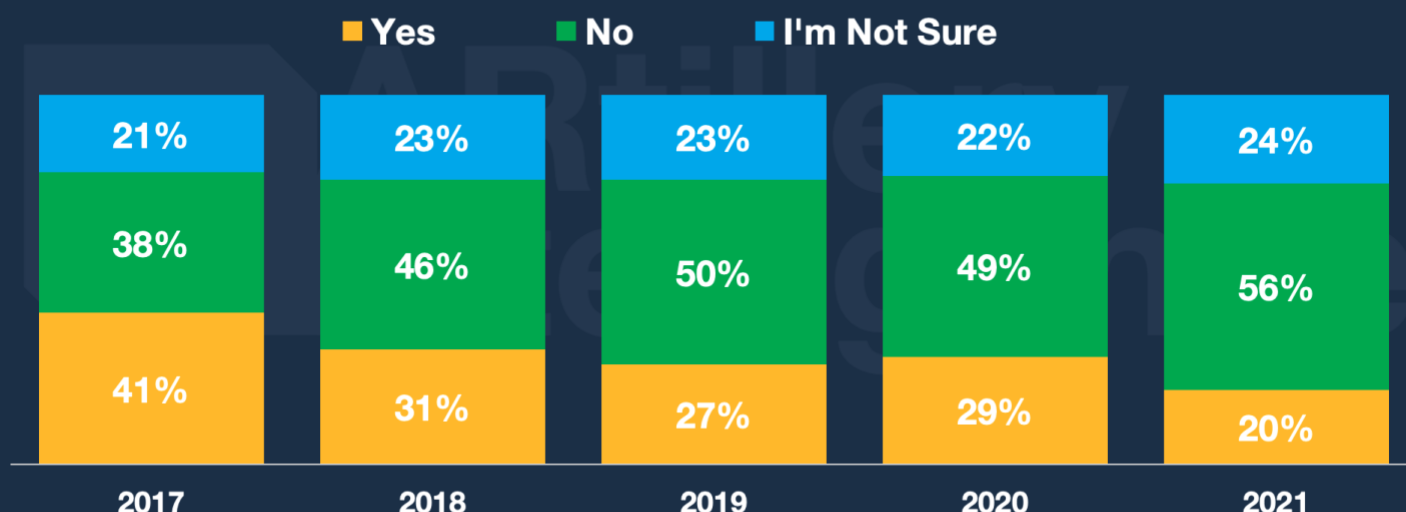
The big question this raises is why such a dramatic dip in VR interest among non-users?

Panning back, this represents a gradual decline over time in non-user interest, starting at **41 percent** back in 2017. We believe this decline is due to the ongoing backlash to VR's circa-2017 hype cycle. Excitement and anticipation levels were high back then, but have since dropped.

Despite this trend, we believe that VR interest will eventually rebound... but it could take a few years. We liken this pattern to the early 2000's eCommerce bubble. After the bust period, consumer activity and tech sector revenue eventually returned to, and even exceeded, the levels forecasted at the height of the boom. But that didn't happen until several years later.

VR Ownership Interest
Are you interested in **owning a VR headset?**

■ Yes ■ No ■ I'm Not Sure

	2017	2018	2019	2020	2021
I'm Not Sure	21%	23%	23%	22%	24%
No	38%	46%	50%	49%	56%
Yes	41%	31%	27%	29%	20%

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📚 Non-User Reasons for Disinterest

More important than adoption and interest levels, what are consumers' stated *reasons*? This can shed light on non-users' objections to VR and therefore what features and components can be altered or optimized to attract more consumers. Their objections can be a telling indication of what's missing.
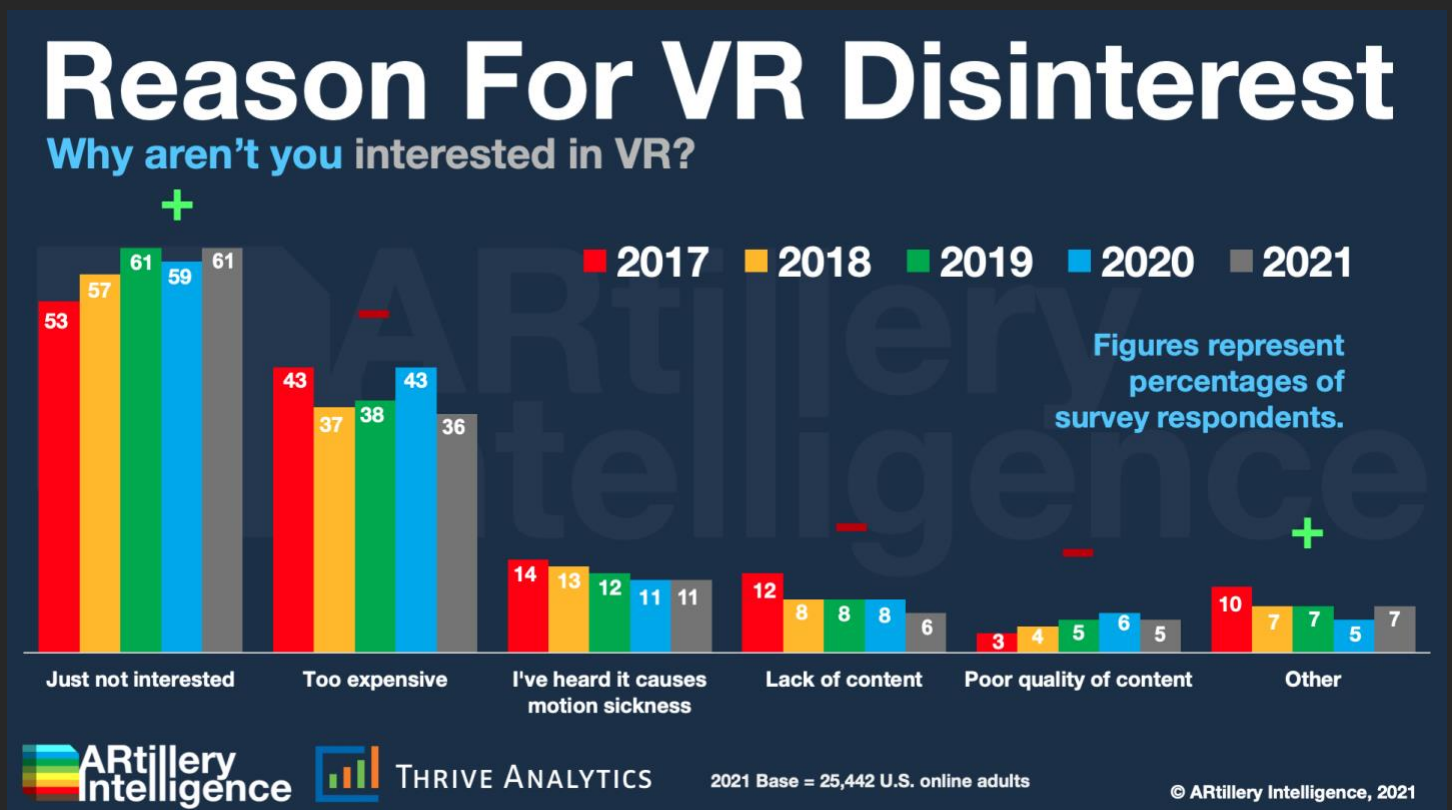
Not surprisingly, price was a factor at **36 percent** (price is further explored on the next page). But the biggest reason for disinterest was the rather discouraging response, "just not interested" at **61 percent**. This non-user ambivalence is up from **59 percent** in Wave IV, and stands in stark contrast to users' high satisfaction levels quantified earlier.

This divergence between users and non-users underscores VR's fundamental marketing challenge. Its immersion is its greatest strength

in captivating users. But it's also the greatest weakness in that the experience can't be captured through traditional marketing. As we like to say, it's like "selling TVs on the radio."

This challenge is exacerbated by VR's set-up friction and technological invasiveness. Getting people to try it – after which they're often converted – is made more difficult given all that activation energy. This includes things like setting up tracking systems, expensive hardware, and several moving parts.

This is yet another reason we're bullish on standalone VR. Its lack of friction will bring that "first taste" to more users. And its lower price tag – especially with **Oculus Quest 2** as explored earlier – will appeal to more consumers. For these reasons, **Quest 2** will continue to be VR's greatest hope.

Reason For VR Disinterest
Why aren't you interested in VR?

Legend: ■ 2017 ■ 2018 ■ 2019 ■ 2020 ■ 2021

Figures represent percentages of survey respondents.

	2017	2018	2019	2020	2021
Just not interested	53	57	61	59	61
Too expensive	43	37	38	43	36
I've heard it causes motion sickness	14	13	12	11	11
Lack of content	12	8	8	8	6
Poor quality of content	3	4	5	6	5
Other	10	7	7	5	7

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🌈 Non-User Price Sensitivity

Just like we examined pricing sentiments earlier for *VR users*, what about *non-users.* Given their ambivalence towards VR explored on the previous page, price sensitivity is not-surprisingly greater than that of VR users. The most popular pricing tier among this group was by far the lowest: **<$100** (**60 percent**).

As background to qualify these results, the survey asked about this **sub-$100** price point for the first time in Wave V, as shown in the chart on the next page. As such, it attracted a significant share of responses. This procedural survey shift in itself revealed a notable demand signal for non-users: they're most likely to choose the cheapest option they are given.

When looking towards higher price points, such as anything greater than **$400**, only **eight**

percent of non-users reported willingness to buy. As for trending, these higher-priced non-user sentiments remain mostly flat from Wave IV with only slight deviations. These data can be seen in greater detail on the next page.

Meanwhile, to tease to the next section that examines "potential buyers" (a subset of non-users), they indicated greater interest in paying **$200-$400** (**33 percent**). That compares with the below full sample of non-users, **14 percent** of whom would pay that much. This indicates hope within a subset of non-users.

In other words, "potential buyers" (non-users who indicated interest in VR) are more willing to pay **Quest 2's** price point. This is yet another strong signal for **Quest 2**, or other headsets in this price range, such as **PSVR**.
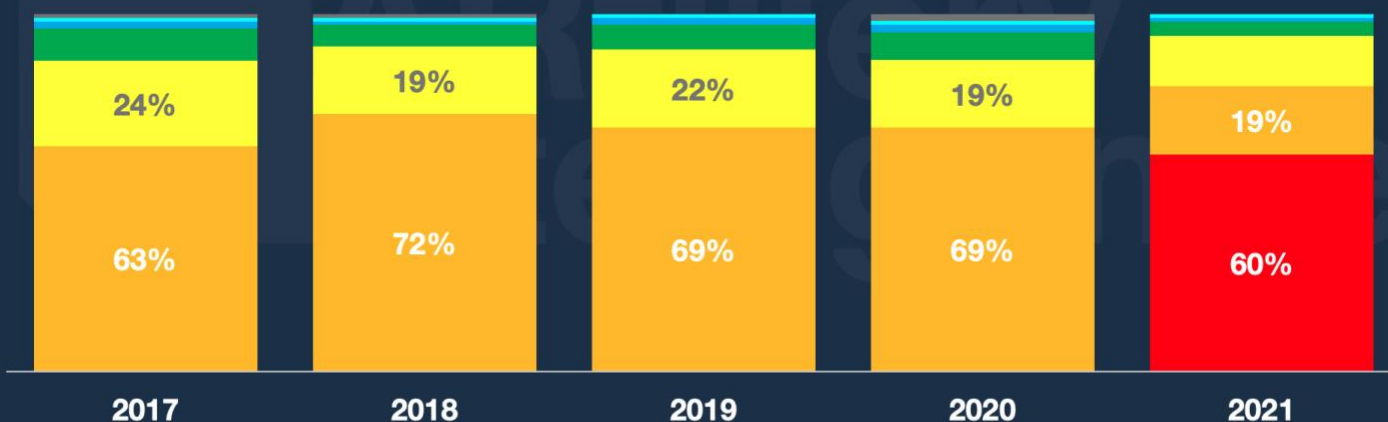
Image Source: HTC

VR Price Sensitivity (Non-users)
What's the most you'd pay for a VR headset?

See next slide for more detail

■ <$100 ■ $100-$200 ■ $201-$400 ■ $401-$600 ■ $601- $800 ■ $801-$1,000 ■ $1,001+

	2017	2018	2019	2020	2021
$201-$400	24%	19%	22%	19%	19%
$100-$200 / <$100	63%	72%	69%	69%	60%

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VR Price Sensitivity (Non-users)
What's the most you'd pay for a VR headset?

(table format)

	<$100	$100-$200	$201-$400	$401-$600	$601- $800	$801-$1,000	$1,001+
2017	Option not Offered	63%	24%	9%	2%	1%	1%
2018	Option not Offered	72%	19%	6%	1%	1%	1%
2019	Option not Offered	69%	22%	7%	2%	1%	0%
2020	Option not Offered	69%	19%	8%	2%	1%	2%
2021	60%	19%	14%	6%	1%	1%	0%

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🔖 Profiling Likely VR Converts

Based on the factors outlined in the previous section – and several others we've synthesized – who are the non-VR users that are most likely to adopt. Pinpointing those buyer personas can help VR companies appeal to their interests. That goes for product planning as well as targeted marketing.

Thrive Analytics uncovered several factors to identify this "potential buyer" group of non-VR owners that are most likely to convert – a function of how they answered various survey questions. And for those individuals, there are characteristics that could represent targeting parameters for VR players.

For example, **56 percent** of non-VR owners who are likely to convert have children in the home. This stands to reason as one of VR's most prevalent use cases today is gaming. There is also greater likelihood of adoption for individuals that are 25-34 years old. This demographic segment exhibits gaming affinities, while also entering life stages with greater purchasing power – a good combination for VR.

As explored in the previous section, price sensitivity among potential buyers is a key signal. They're more willing to pay **$200-$400** for a VR headset (**33 percent**) than **<$100** (**11 percent**). This finding can be used in VR product pricing strategies and marketing.

Bringing it all together, VR companies interested in non-users who are most likely to convert should target people **aged 25-34** or those who have children in the household. And they're most likely to buy a headset up to **$400** in price, which is the price point for **PSVR** and **Oculus Quest 2**. Other findings can be seen in the table below, including highlighted points.

VR Potential Buyer Profile

DEMOGRAPHIC DATA	SAMPLE	POTENTIAL BUYERS*	INDEX
Total	100%	100%	100
Gender			
Male	44%	56%	128
Female	56%	44%	78
Age			
18-24	11%	15%	133
25-34	16%	26%	158
35-44	14%	18%	1129
45-54	17%	15%	91
55-64	18%	17%	96
65 and older	24%	9%	37
Household Income			
Less than $25K	29%	27%	93
$25K to less than $50K	31%	32%	105
$50K to less than $75K	19%	17%	93
$75K to less than $100K	9%	11%	118
$100K or more	12%	12%	101
Ethnicity			
White/Caucasian	72%	68%	94
Black/African American	13%	17%	128
Hispanic/Latino	7%	10%	144
Presence of Children in Home			
No	69%	56%	81
Yes	28%	39%	133

DEMOGRAPHIC DATA	SAMPLE	POTENTIAL BUYERS*	INDEX
Total	100%	100%	100
Technology Adoption Segment**			
Innovators	3%	7%	212
Early Adopters	10%	15%	154
Early Majority	35%	46%	130
Late Majority	40%	29%	73
Laggards	12%	3%	28
Currently own a Video Game Console			
Yes	31%	47%	150
No	69%	53%	77
Most you would pay for a VR System			
Less than $100	55%	11%	20
$100 to $200	18%	32%	179
$201 to $400	15%	33%	220
$401 to $600	7%	14%	200
$601 to $800	3%	7%	233
$801 to $1,000	2%	2%	100
More than $1,000	1%	2%	200

*Potential Buyers are respondents stating likelihood of future VR purchase
**Technology adoption segment is assigned to each individual based on their responses to a series of questions about how they view and utilize new technology.
Source: Thrive Analytics, Virtual Reality Monitor

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🗂️ Part III: Strategic Takeaways

One of the themes seen throughout this report is the stark difference in sentiment between VR users and non-users. For example, VR users report notably-high satisfaction and engagement. Non-users conversely show explicit disinterest and price sensitivity.

These findings hold important lessons for VR players. Once again, it's a double-edged sword: VR's highly immersive and visceral interface captivates users. But that same orientation makes it so that these advantages can't be communicated adequately by traditional methods of product marketing.

Users need to experience VR before they convert, which presents logistical challenges in pushing that "first taste" at scale. Our sister report on mobile AR[vii] had similar findings, but its adoption barriers are lower due to "zero cost hardware" (existing smartphone) and less bulky/invasive devices.

This is where standalone VR will accelerate adoption by lessening cost and usage friction. The category is represented best by **Oculus Quest 2**, as repeated throughout this report and as validated through survey results. Its success is also due to its cost-advantage.

Image Source: Facebook

🌈 The Price is Right

Going deeper on **Oculus Quest 2's** cost advantage, the device's launch headline was its price tag. At **$299** with notable upgrades, its quality/price ratio is almost too good to be true. This came after rumors of either a "pro" or a "lite" Quest. The market ended up with the former at the price of the latter.

This is all part of **Facebook's** loss-leader approach for VR. It wants to seed a network effect by stimulating usage, which in turn boosts developer incentive. This all starts with motivating adoption through compelling hardware and aggressive pricing. That's **Quest 2** in a nutshell.

One question is how **Facebook** landed on **$299** for the entry-level 64 GB unit and **$399** for the 256 GB unit. This walks a fine line between demand-stimulating goals, and offsetting per-unit costs. **$299** is also a market-validated price point considering the entry-levels **PS4**, **Xbox 360**, and **Nintendo Switch**.

Lastly, we can also see how **$299** and **$399** stack up to consumer sentiments in this report. If we look at current VR users, **33 percent** would pay either price point for a VR headset. And if we consider that higher-priced demand sentiment **($400+)** would also pay these levels, the figure grows to **82 percent**.

Another notable point about **Quest 2's** positioning is how its advanced spec sheet will signal value in future-proofing. In other words, the value out of the box is immediately clear… but sizable spec bumps also mean that the device will have a longer shelf life and replacement cycle.

Along the same lines, **Facebook** has cleverly priced **Quest 2's** device tiers. The entry-level unit is attractive for all the reasons noted. But **$100** more gets you **4x** the storage — a much greater dollar-per-byte upgrade than traditionally seen in computing hardware tiers.

This is classic behavioral economics, and will appeal to heavy VR users or anyone inclined to future-proof their purchase. The other "evil genius" aspect of this move is that 256 GB makes it easier to buy more games — an anticipated revenue center as **Quest 2's** installed base and apps-per-user grow.

Image Source: Facebook

🌈 Simple Wins

Another key lesson we've observed in these survey results, and in other marketplace evidence, is the need for simplicity in all aspects of VR product marketing. This includes reducing hardware setup requirements and trading specs for an overall "experience sell."

Oculus Quest 2 and **PSVR** are exemplars of this strategy. Despite the analysis on the previous page, their specs are inferior to PC-based VR devices. So they've taken a Nintendo-like approach (a la **Wii** and **Switch**) that highlights a fun persona. Their marketing materials rarely mention hardware specs.

If it's any validation for this approach, **PSVR** is the market share leader with more than **5 million** units sold to date. This is partly owed to the advantage it has with the installed base of **100 million+** **PlayStation4** consoles. But its straightforward product marketing is also responsible for this success.

This simple value proposition, product design and marketing will be a key VR success factor. But we should qualify that there will also be a market for higher-end PC VR experiences for gaming enthusiasts, and corresponding high-spec'd devices, such as **Valve Index**.

Image Source: Sony

🌈 The Magic Number

In closing, VR needs more compelling adoption drivers. Though there are popular use cases, there's no killer app, nor one solid answer to the question: w*hy should I buy a VR headset?* There are several little answers, but that fragmented set of reasons isn't going to sway mainstream consumers en masse.

Until that killer app is marketed, there are smaller milestones such as *Beat Saber* and *Half-Life: Alyx*. These games exist at the casual/welcoming and advanced/enthusiast ends of the VR spectrum, respectively. Both endpoints need to be cultivated, along with social VR like **Rec Room**.

The latter could represent one of VR's looming killer apps. As examined earlier, VR needs more use cases that utilize its native capabilities such as immersive presence. Social VR experiences like **VR Chat** and AltspaceVR accomplish this, and that value has been elevated during a pandemic.

On the hardware side, **Oculus Quest 2** could meanwhile be what VR needs at this stage to appeal to the masses. High-end PC VR will still be popular among subsets of gaming enthusiasts, as noted. But a simpler and friendlier approach will be needed for adoption scale. Both tracks will co-exist in VR.

As for quantity and timing, Mark Zuckerberg is fond of saying that **10 million** VR headsets will be required to meaningfully attract developers, which can in turn attract more users – a classic flywheel effect. This importantly requires **10 million** headsets on *one platform*, rather than the collective market.

At **Quest 2's** current momentum – including an estimated **one million** units[viii] sold in Q4 alone – it could reach this **10-million**-unit milestone in 6-8 quarters, or late 2022. This will be a gradual climb for VR, rather than a sudden revolution. We'll keep watching and analyzing the signposts along that journey.

Image Source: HP

🟥 **Video Companion**

Click to Play

ARtillery Briefs, Episode 45
VR Revenue Outlook

ARtillery Intelligence

🌈 Key Takeaways

23 percent of consumers own or have tried VR, up from 19 percent last year.
This equals roughly 65 million U.S. VR users, up from 54 million last year.
This is different than headset sales or installed base, given multiple users per headset.
Of these users, 20% engage VR monthly, 31% weekly, and 32% daily.

PSVR had the greatest usage (39%), followed by Oculus Quest 1 & 2 (24%) and Oculus Rift (19%).
PSVR is in a strong position due to an installed base of 100-million PlayStation4 consoles and a low price.
Though PSVR has inferior specs, its success is due to a more approachable "experience sell."
There will be healthy, though niche, traction for high-end PC VR such as Valve Index and HP Reverb.

Standalone headsets show the most momentum, taking share from PC and console VR incumbents.
Quest 2 demonstrates the greatest year-over-year growth in these survey results (and in-market sales).
The device's quality/price ratio is unmatched, and it's the current leading seller among VR headsets.
Much of this stems from Facebook's investments in VR quality and aggressive pricing.

70% of VR users are *satisfied* (30%) or *very satisfied* (40%) with the experience.
This contrasts 16% of users that are either *dissatisfied* (6%) or *very dissatisfied* (10%).
These are strong quality signals: there are few consumer products that show such high satisfaction.
The bad news is that this satisfaction stands in stark contrast to non-user sentiments (explored below).

56% of VR users want more functionality; 43% want higher quality content; 31% want more content.
Content volume was the biggest desire in past waves but has been satisfied to some degree.
This has evolved with more available content and broader libraries of highly-rated VR experiences.
Oculus Quest and PSVR – the most popular headsets – have expanding and compelling curated libraries.
Oculus' App Lab will expand this volume even further, as will PSVR 2's evolution on the PS5 console.

VR users are most interested in cinematic experiences (63%), gaming (55%), and travel apps (54%).
Cinema's lead is surprising in that it's not "native" to VR (viewing 2D movies in an immersive environment).
Though 2D cinema doesn't embody VR's true potential, users want what they're most comfortable with.
Eventual VR successes will design native and immersive experiences that can *only* exist in VR.
VR will be conceptualized in activities that consumers know until native experiences reframe their thinking.

20% of non-VR users are interested in owning or trying VR, down from 29% in Wave IV.
This is discouraging for VR, and part of an ongoing downward trend from its circa-2016 hype cycle.
VR could return to or exceed those hyped interest levels, but it could take several years.

The biggest reason for disinterest among non-VR users was "just not interested."
This definitive sentiment represents VR's biggest challenge and deviates from the user sentiments above.
Getting more users to *try VR* is therefore the name of the game, partly through lower-friction standalone VR.
Compelling content and VR killer apps will likewise be needed to attract more users to VR.

33% of VR users will pay up to $400, and 19% of non-users would pay up to $200 for a headset.
These demand-inflecting price points should be price targets for VR hardware manufacturers.
VR user price sensitivity aligns well with Oculus Quest 2 and PSVR in the $299-$399 range.

Simplicity in design and marketing, versus a hardware-specs arms race, is a success factor.
This "Nintendo-like" approach is showing results for VR market-share leaders like PSVR and Quest 2.

🌈 About ARtillery Intelligence

ARtillery Intelligence chronicles the evolution of spatial computing. Through writings and multimedia, it provides deep and analytical views into the industry's biggest players, opportunities and strategies.

Run by analysts and former journalists, coverage is grounded in a disciplined and journalistic approach. It also maintains a business angle: Though there are lots of fun and games in spatial computing, cultural, technological and financial implications are the primary focus.

Products include the **AR Insider** publication and the **ARtillery PRO** research subscription, which together engender a circular flow of knowledge. Research includes monthly narrative reports, market-sizing forecasts consumer survey data and multi-media, all housed in a robust intelligence vault.

Learn more **here**.

About Thrive Analytics

Thrive Analytics is a leading digital marketing research and customer engagement consulting firm. With clients spanning leading national brands as well as publishers and agencies serving the small business community, it pairs proprietary market research services and data analytical tools with time-tested business insights and methodologies to help organizations measurably improve customer experience, loyalty and sales. Its mission is to provide superior research and support services that inspire clients to make smarter decisions. For more information or to contact, visit **here**.

About Virtual Reality Monitor

Virtual Reality Monitor™ is Thrive Analytics' proprietary survey of virtual reality/augmented reality technology users. These surveys, conducted semiannually, track the adoption rates, usage, satisfaction levels, profiles and many other areas related to VR/AR users. Each wave has a customizable section for client specific inquiries. Results & key insights are communicated in advisory reports & presentations, charts & infographics, newsletters & articles and custom data views. Information from these studies is used by marketers, product managers, consultants and other people working in the technology space.

📑 About Intelligence Briefings

ARtillery Intelligence Briefings are monthly installments of spatial computing analysis. They synthesize original data to reveal opportunities and dynamics of spatial computing sectors. A layer of insights is applied to translate market events and raw figures into prescriptive advice.

More information, past reports and editorial calendar can be seen **here.**

📑 About the Author

Mike Boland was one of Silicon Valley's first tech reporters of the Internet age, as a staff reporter for *Forbes* (print) starting in 2000. He has been an industry analyst covering mobile and social media since 2005 and is now Chief Analyst of ARtillery Intelligence and Editor-in-Chief of *AR Insider.*

Mike is a frequent speaker at industry conferences such as AWE, VRLA and XRDC. He has authored more than 120 reports and market-sizing forecasts on the tech & media landscape. He contributes regularly to news sources such as *TechCrunch*, *Business Insider* and the *Huffington Post*.

A trusted source for tech journalists, his comments have appeared in A-list publications, including *The New Yorker*, *The Wall Street Journal* and *The New York Times*.

Further background, history and credentials can be read **here.**

📄 Methodology

ARtillery Intelligence has partnered with Thrive Analytics by writing the questions for the Virtual Reality Monitor consumer survey. These questions were fielded to more than 46,000 U.S. Adults. ARtillery Intelligence wrote this report, containing its insights and viewpoints on the survey results.

For market sizing and analysis, ARtillery Intelligence follows disciplined best practices, developed and reinforced through its principles' 15 years in research and intelligence in the tech sector. This includes the past 5 years covering AR & VR exclusively, as seen in research reports and daily reporting.

Thrive Analytics likewise follows best practices in consumer research, developed over its long tenure as a consumer research firm. More details about the survey sample can be seen in this report's introduction and more on ARtillery Intelligence research and methodology can be read **here.**

📄 Disclosure and Ethics Policy

ARtillery Intelligence has no financial stake in the companies mentioned in this report, nor was it commissioned to produce it. With respect to market sizing, ARtillery Intelligence remains independent of players and practitioners in the sectors it covers, thus mitigating bias in industry revenue calculations and projections.

ARtillery Intelligence's disclosure and ethics policy can be seen in full **here.**

📄 Contact

Questions and requests for deeper analysis can be submitted **here.**

🟫 Reference

Click to View

[i] ARtillery Intelligence Report, **AR Usage & Consumer Attitudes, Wave IV** (sign-in required)

[ii] ARtillery Intelligence Report, **Global VR Revenue Forecast, 2019-2024** (sign-in required)

[iii] ARtillery Intelligence Report, **Global VR Revenue Forecast, 2019-2024** (sign-in required)

[iv] ARtillery Intelligence Report, **Global VR Revenue Forecast, 2019-2024** (sign-in required)

[v] ARtillery Intelligence Report, **Global VR Revenue Forecast, 2019-2024** (sign-in required)

[vi] ARtillery Intelligence Article, **VR Finishes Q1 Strong** (sign-in required)

[vii] ARtillery Intelligence Report, **AR Usage & Consumer Attitudes, Wave IV** (sign-in required)

[viii] ARtillery Intelligence Article, **Did Facebook Sell One-Million Quest 2s in Q4?** (sign-in required)