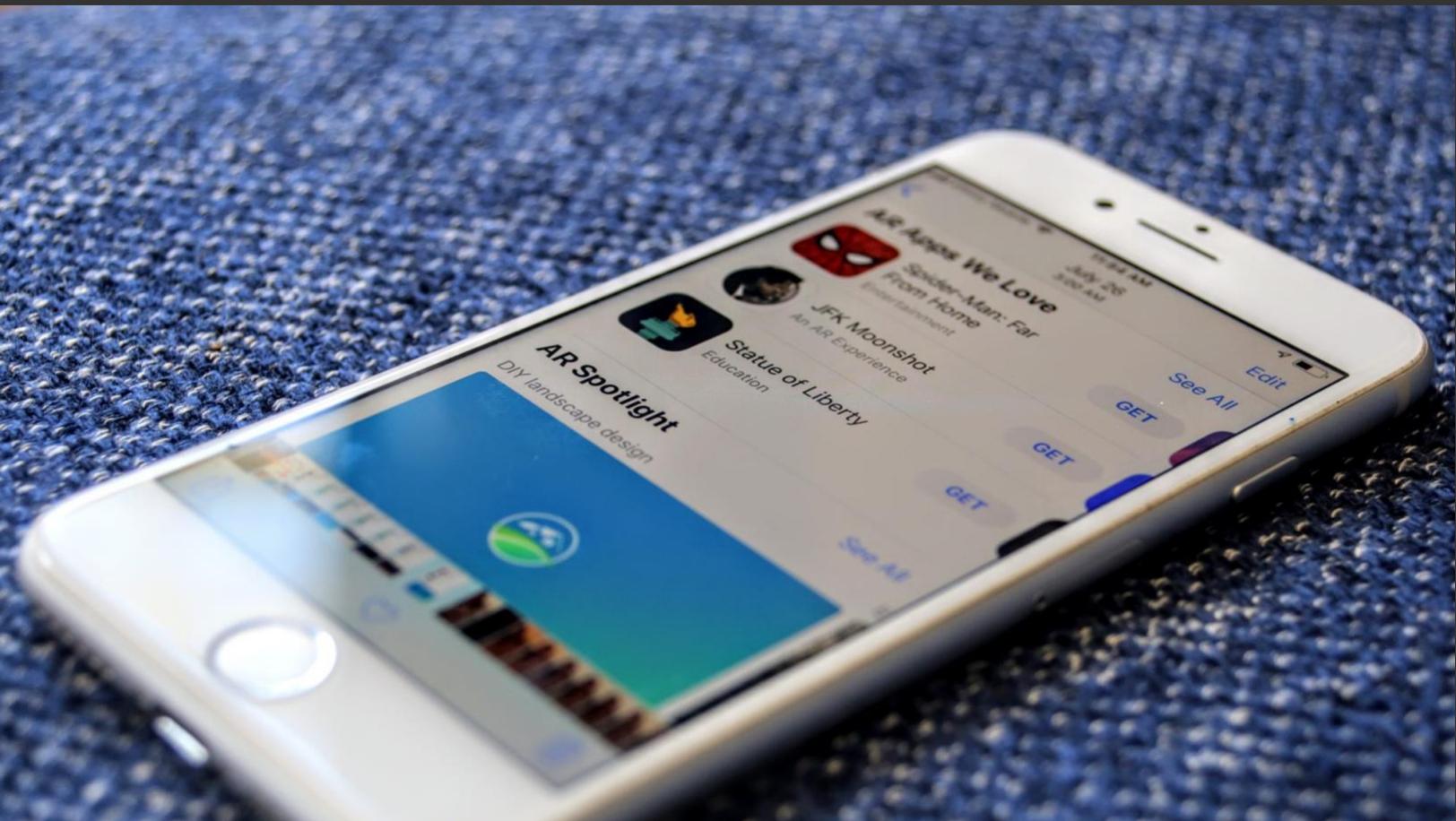


ARtillery Intelligence



ARtillery Client Inquiry Brief

AR Vertical Spending Analysis
10/09/19

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Introduction

ARtillery [Client Inquiry Briefs](#) are research deliverables that are assembled by our analysts in response to specific questions from clients and [ARtillery PRO Premium Subscribers](#).

Client: Removed under NDA

Inquiry

One of the biggest areas I'm focusing on right now is trying to nail down the top 3-5 industries or use cases for AR that present the largest market opportunity for developers. The idea being we would dive into those opportunities further to help us determine what features or products we need to build to enable Unity devs to build those experiences.

In all the preliminary research I've done, I'm trying to determine if we should focus on industries (Education, AEC, Brands/ agencies for example) or on use cases (sales and marketing, training, product visualization for example) that cross industries. I believe we'll come to that decision based on our Share of Market (SOM).

I've been looking through the 2019 ARtillery reports, the curated reports from 2019 and in the ARtillery slide bank. Your July 2019 report with the Global AR Forecast from 2018-2023 is very insightful. Seeing the charts for the 2019 Enterprise AR spend by vertical is super helpful. [Do you have a similar break down for Consumer AR verticals?](#) (Or maybe we just have a different definition of consumer/ enterprise?) [Also, do you have similar numbers of vertical spend on AR over the next 3-5 years?](#)

Lastly, [AR gaming-- should it be in our top 3 industries?](#) I previously thought the majority of mobile AR experiences were games because that's what developers were used to making, but that these would eventually give way to utility apps. [The market numbers on games seem so high, should I keep them in mind as we look at our AR priorities for the next couple of years?](#) Also, I noticed that "media, ads and gaming" are listed under "Enterprise" instead of "Consumer". Can you please share why that is?

And as one more question to add to my previous questions, [do the Enterprise AR numbers include the marketing, etc. \(if applicable\) of the experience or are the numbers strictly the cost of developing the experience \(and the hardware where noted in the report\)?](#)

Analysis

These are all good questions. We'll tackle them in random order through the narrative below. Follow-up questions are welcome!

1. Targeting Verticals Versus Functions

To address the question of targeting industries versus use cases, maximizing the market opportunity would seem to come more from a “horizontal” approach (use cases) that can span verticals. That also de-risks your strategy to some degree by diversifying capability across verticals, given that it's not fully clear which verticals will pull ahead (though we have confidence in our projections).

However, one downside of the “horizontal” approach is if there is competitive edge that can be gained from vertical focus/specialty. In other words, are your capabilities advantaged by vertical product focus, like having intimate knowledge of pain points endemic to a vertical like healthcare? Or are they more or less adaptable across verticals like healthcare, gaming, education, industrial?

That may sound like an obvious observation, but if you can answer that question, you're closer to an answer on vertical versus horizontal approach. There would seem to be some vertical specialization /knowledge already in gaming. But think about the de-risking concept... does a horizontal (use-case-centric) approach allow you to bet on many horses in terms of which verticals pull ahead?

The reason we say the horizontal approach may mitigate risk is that the *uncertainty* of picking target verticals would seem to be greater than the *uncertainty* of picking AR functionality and use cases that will be in demand. The latter approach seems to map your strong suits in democratizing AR creation in a broader sense. Focus can still be achieved on a set of use cases so it's not too broad.

Another point in support of the horizontal approach is a trend we're predicting based on historical evidence: Democratization tools will be well positioned for the next few years. That will happen as the addressable market for AR creation moves from tech savvy early adopters to places like ad agencies or in-house brand marketers (non-technical) who need tools like Foundation and M.A.R.S.

Based on that, I'd say the horizontal/capabilities route has the best chance to maximize the total addressable market across the many non-technical verticals where that will be the case. But that also hinges on a few variables that you know better than us!: such as the question above about “adaptability” across verticals and how your software holds up to that speculation on our part.

2. Vertical Analysis

But for the sake of argument, let's explore the vertical approach terms of picking the right horse based on projected TAM.

Top verticals:

To level set and reiterate the pieces you already saw in the forecast, (charts below) we're bullish on consumer-facing enterprise verticals such as Media, Advertising & Gaming as well as retail and commerce. As we discussed over email, we're calling these "enterprise" due to the buying/adopting entity being enterprise (as opposed to user-pay), but consumers are the end user (so it's B2B2C).

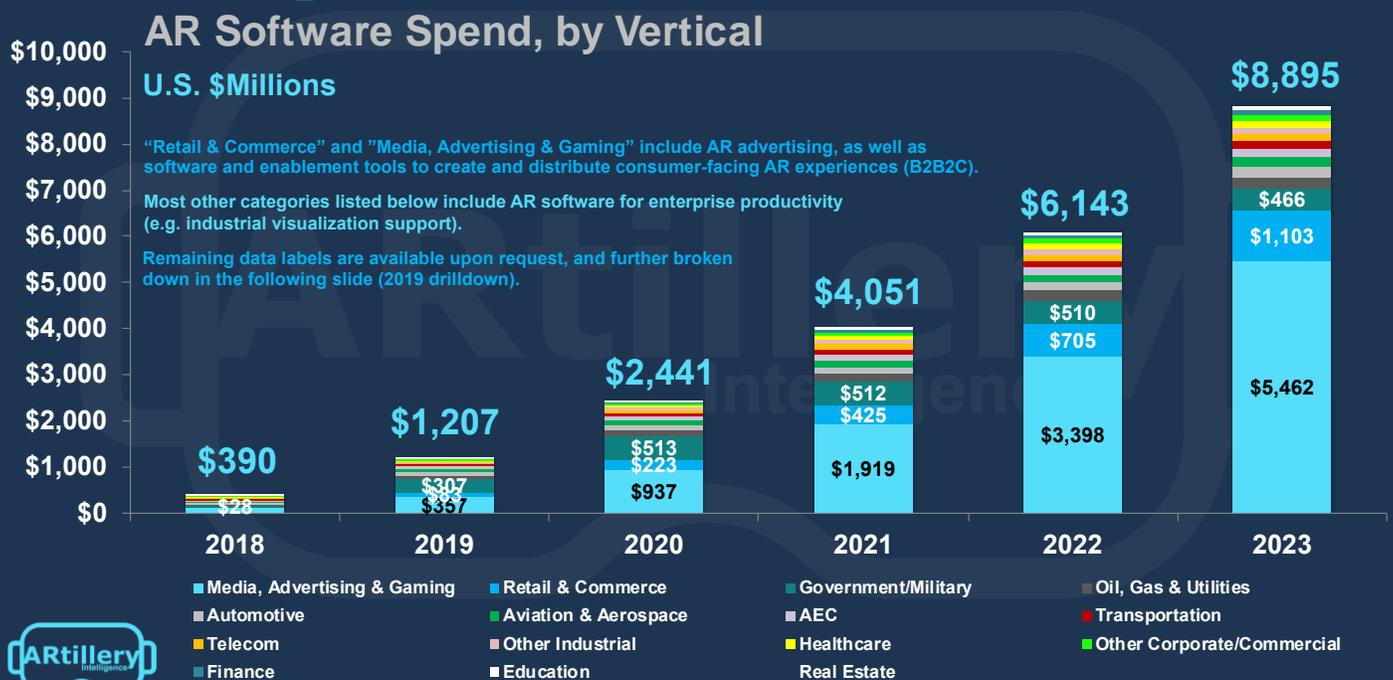
This begs the question about why we're so bullish on these verticals for AR software adoption, relative to industrial AR. One reason is signals we're seeing today. Advertisers and agencies are showing strong early interest in AR and we believe there will be a tipping point – driven by competitive pressure – for mass adoption. That includes brands, agencies and ad-tech players.

The second reason is relative scale of these markets. Industrial AR is opportune (military, AEC, etc.). But it isn't big as consumer markets (7 billion people on the planet) There are also industrial adoption barriers despite all the theoretical ROI advantages (see our report on *Industrial AR Benefits & Barriers*). Adoption barriers are lower in mobile B2B2C, and not gated by headset penetration.

Consumer-based enterprises are a larger TAM given the spending that these entities will make to reach massive mobile consumer populations. The same goes for retail AR enablement for in-store experiences (or retailer apps that enable in-store AR shopping features). Based on today's demand signals and mobile penetration, these consumer-facing enterprise buyers will eclipse industrial AR.

To answer another question you had, what's being measured below is the cost of AR software (e.g. development tools) that these enterprises are buying or licensing. It doesn't include distribution or marketing of those experiences. *We do however* count that distribution elsewhere in our separate AR advertising estimates. See that in the 3rd chart below (so chart 1 is creation... chart 3 is distribution)

Enterprise AR Software



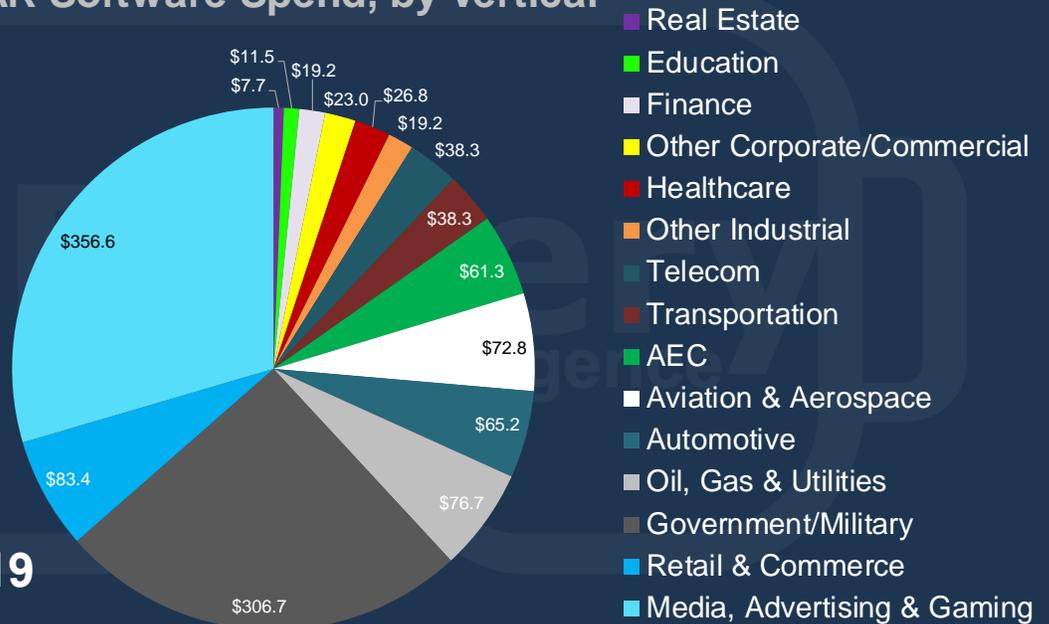
Enterprise AR Software

2019 Enterprise AR Software Spend, by Vertical

U.S. \$Millions

“Retail & Commerce” and “Media, Advertising & Gaming” include AR advertising, as well as software and enablement tools to create and distribute consumer-facing AR experiences (B2B2C).

Most other categories listed include AR software for enterprise productivity (e.g. industrial “see what I see” support).



2019



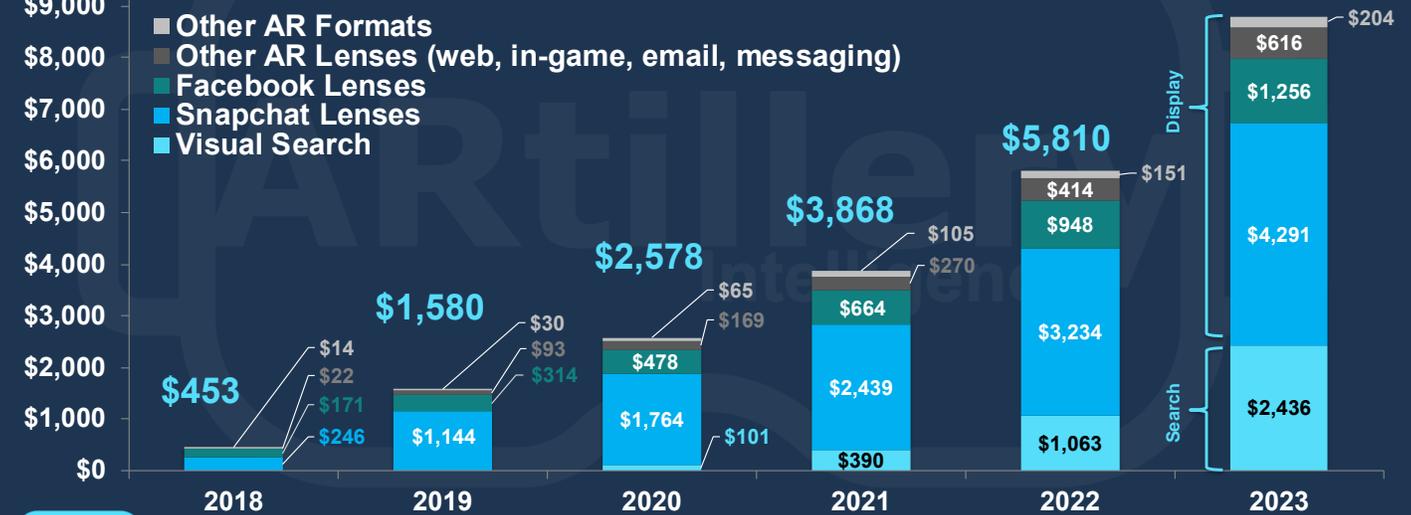
© ARtillery Intelligence, 2019

Ad revenue = ad buys to place and distribute campaigns (not campaign creation which is covered above)

AR Advertising Revenue

Ad Revenue, by Source*

U.S. \$Millions



*Does not include hearables (see separate drilldown)

© ARtillery Intelligence, 2019

Further Segmentation

You also asked about how the above charts play out for the next few years. The first chart has year-by-year analysis but not the data labels for vertical segmentation, due to how compressed some of the bar chart is. The second pie chart has vertical segmentation but just 2019.

Below is the best of both worlds with the full detail of years and verticals. Again this is spending for enterprises to get equipped with AR enablement software (hardware is a different set of figures). That includes AR creation tools in consumer-facing verticals like media, advertising, gaming, and commerce. It includes automation/productivity (and some authoring) tools in industrial verticals.

The other thing about industrial verticals is that your value proposition would seem to be less pronounced. We say that because AR authoring involves assets that are imported from CAD files as opposed to the creative process endemic to gaming, entertainment and media. That doesn't rule out your involvement but probably makes it less valued in those verticals.

Lastly, to answer your question about gaming, we believe it will be a top category for AR spend for enablement and creation tools. Some of that will go to narrow-use platforms like Niantic's real-world platform, but low friction authoring tools will always be valuable across the board. Also see some of the third-party data we've assembled in the next section which has unanimous gaming support

You're right that utilities will grow in prevalence (navigation, visual search, etc.), but gaming will remain strong, especially mobile casual gaming. That goes beyond AR and taps into broader mobile behavior trends where gaming's prevalence grows. Also, based on your domain expertise and strong positioning in the gaming world in general, it would seem to be a natural place to double down.

	2018	2019	2020	2021	2022	2023
Real Estate	\$1,575,000	\$7,666,667	\$12,818,182	\$34,153,846	\$51,000,000	\$69,882,353
Education	\$7,875,000	\$11,500,000	\$19,227,273	\$42,692,308	\$61,200,000	\$81,529,412
Finance	\$5,250,000	\$19,166,667	\$32,045,455	\$51,230,769	\$81,600,000	\$116,470,588
Other Corporate/Commercial	\$14,437,500	\$23,000,000	\$38,454,545	\$68,307,692	\$102,000,000	\$128,117,647
Healthcare	\$15,750,000	\$26,833,333	\$51,272,727	\$102,461,538	\$122,400,000	\$139,764,706
Other Industrial	\$18,375,000	\$19,166,667	\$51,272,727	\$85,384,615	\$122,400,000	\$139,764,706
Telecom	\$21,000,000	\$38,333,333	\$64,090,909	\$111,000,000	\$132,600,000	\$151,411,765
Transportation	\$22,312,500	\$38,333,333	\$64,090,909	\$119,538,462	\$142,800,000	\$163,058,824
AEC	\$23,625,000	\$61,333,333	\$96,136,364	\$128,076,923	\$153,000,000	\$186,352,941
Aviation & Aerospace	\$34,125,000	\$72,833,333	\$102,545,455	\$136,615,385	\$163,200,000	\$209,647,059
Automotive	\$35,437,500	\$65,166,667	\$108,954,545	\$145,153,846	\$173,400,000	\$221,294,118
Oil, Gas & Utilities	\$35,175,000	\$76,666,667	\$128,181,818	\$170,769,231	\$224,400,000	\$256,235,294
Government/Military	\$27,562,500	\$306,666,667	\$512,727,273	\$512,307,692	\$510,000,000	\$465,882,353
Retail & Commerce	\$14,962,829	\$83,437,418	\$222,752,075	\$424,605,863	\$705,199,842	\$1,103,024,234
Media, Advertising & Gaming	\$112,500,000	\$356,550,000	\$936,900,000	\$1,918,800,000	\$3,397,500,000	\$5,462,100,000
Total	\$389,962,829	\$1,206,654,084	\$2,441,470,257	\$4,051,098,171	\$6,142,699,842	\$8,894,535,999

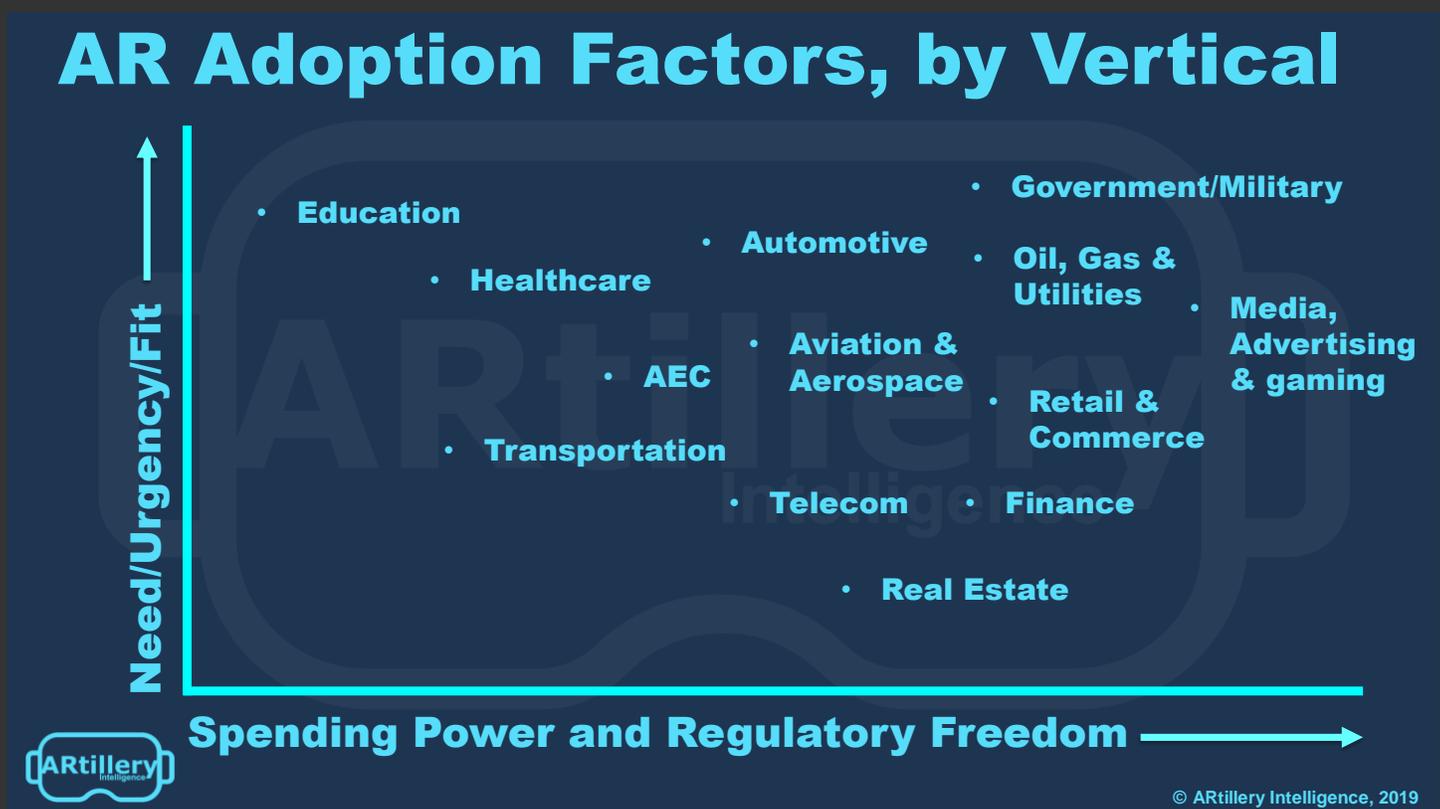
Qualitative Signals

To support the above and provide more color on our considerations when projecting spending share (especially hardware), here is more analysis. In addition to industry spending levels and historical data, there are dynamics that will impact buying behavior across verticals and industries.

At a high-level, adoption is impacted by three main factors:

1. Product/market fit (how well does AR solve problems in the vertical)
2. Necessity/demand (how big can AR's impact be and how motivated are buyers to adopt)
3. Spending Power and other barriers (such as regulatory)

Chart 3: AR Adoption Factors by Vertical



How verticals map to these factors can be telling in projecting their share of AR spending. For example, AR has strong product/market fit and demand in education, but spending power is low. There is also strong fit and demand in healthcare, but regulatory scrutiny is high.

Demand is high and price resistance is low when selling technologies into sales organizations or departments (Salesforce built an empire on this principle). As a revenue center, they have lots of political capital and budget for things that make them more effective in bringing in business.

There's a similar dynamic in high finance:

“In financial markets people are literally competing based on who has the best information... giving them an edge is an extremely high value proposition,” said Virtual Cove CEO Bob Levy at the ARiA conference. “So you can envision a rank-ordered list of segments to go after based on the value of the problem that you’re solving.”

There's also industry size. The classic example there is Strivr. It started as a VR training tool in sports, spun out of work done at Stanford with its football team. But after discovering that there are only so many football teams, it pivoted to retail and works with companies like Walmart.

That's a VR example but the principle applies to AR. Similarly, some of the above examples (which reflect our high-level construct) apply differently to various areas of the stack. But it could be a worthwhile construct to keep in mind when strategizing verticals that are opportune.

3. Additional Data

Below are several data points from various sources to supplement the above. Some are survey data and some are market sizing projections, and we've listed them in the order of importance and relevance to your question.

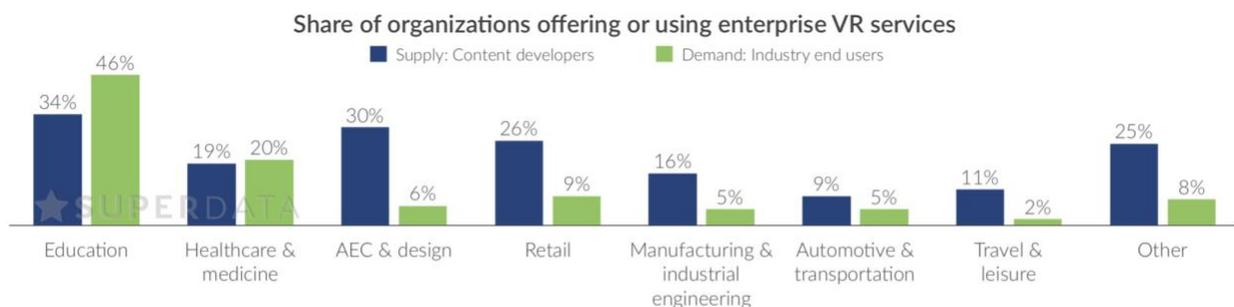
Supply/demand Gap

Superdata has revealed an important supply/demand gap in VR, the principle of which applies to AR. Through survey data, it uncovered supply and demand levels across target verticals in VR. Healthcare has the biggest deficiency in supply, followed by education.

Developers are focusing most on fields like design, retail and manufacturing despite an overwhelming demand for education and healthcare solutions

Organizations are most interested in VR for education and healthcare as supply in those fields rises to meet demand.

As interest in education solutions grow, many schools and hospitals are using VR. However, these institutions can have limited spending power compared to major conglomerates. On the other hand, large retail corporations like Walmart and Lowe's are willing to invest in applications that make training safer and cheaper.



*Supply share measures the percentage of all developers in the VR industry who are focused on each segment. Supply percentages do not add up to 100% due to overlap of suppliers who work on multiple segments. Demand share measures the percentages of all organizations looking for VR solutions who are focused on each segment.

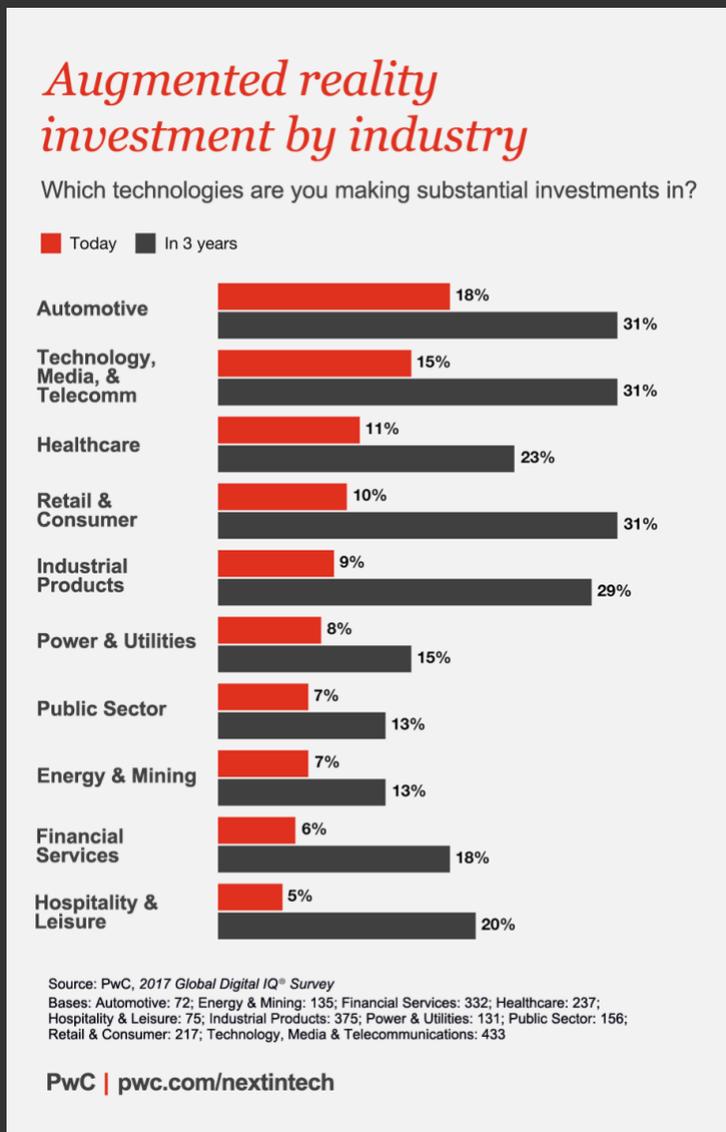
STATE OF THE XR MARKET, FEBRUARY 2018 | © 2018 SuperData Research Holdings, Inc. All rights reserved.

But beyond this opportunity signal, there are other factors to consider.

For example, there could be a supply shortage in these verticals for a reason. There could be challenges that have erstwhile deterred would-be entrants. Those include capital intensiveness, technological complexity, or relatively small addressable markets (think: heart surgeons).

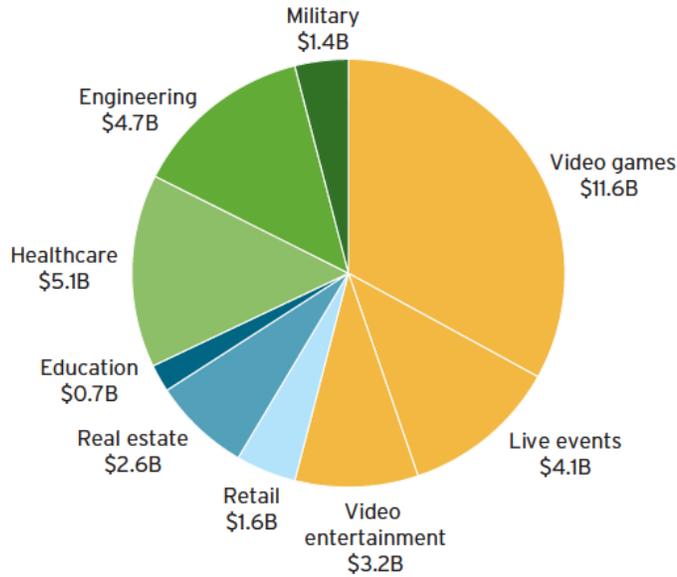
Some challenges we've observed in these two verticals specifically include the fact that the barriers to entry are high. In healthcare for example, it's a highly regulated environment where the potential buyers (doctors and health group administrators) aren't always "tech-forward."

In education, the demand is high as examined above, but the opportunity is gated to some degree by spending power, especially in elementary and lower education environments. The story is different in higher education contexts with well-funded research or endowments.



Goldman Sachs Revenue Projections

Projected Revenue Prediction for VR & AR by Sector

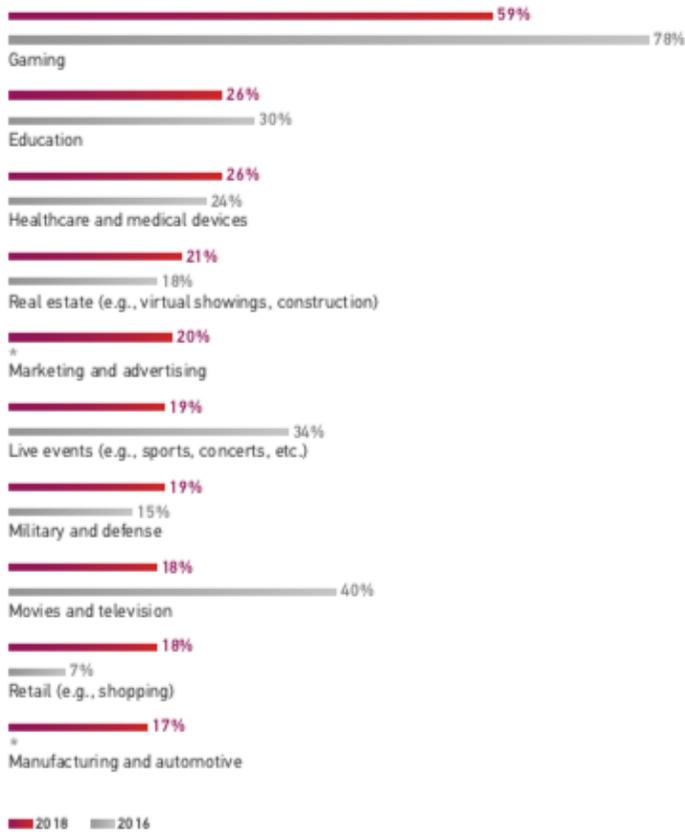


Source: Goldman Sachs Global Investment Research
Figure 3

Note: Includes AR & VR (use for directional perspective)

Perkins Coie XR Executive Survey

> In which sectors do you expect to see the most investment directed to the development of AR or VR technology or content in the next 12 months? [select up to 3 options]



"Business customers need to know that VR/AR can solve specific problems in ways that are better, faster, cheaper or more effective than traditional methods."
 – VR startup founder

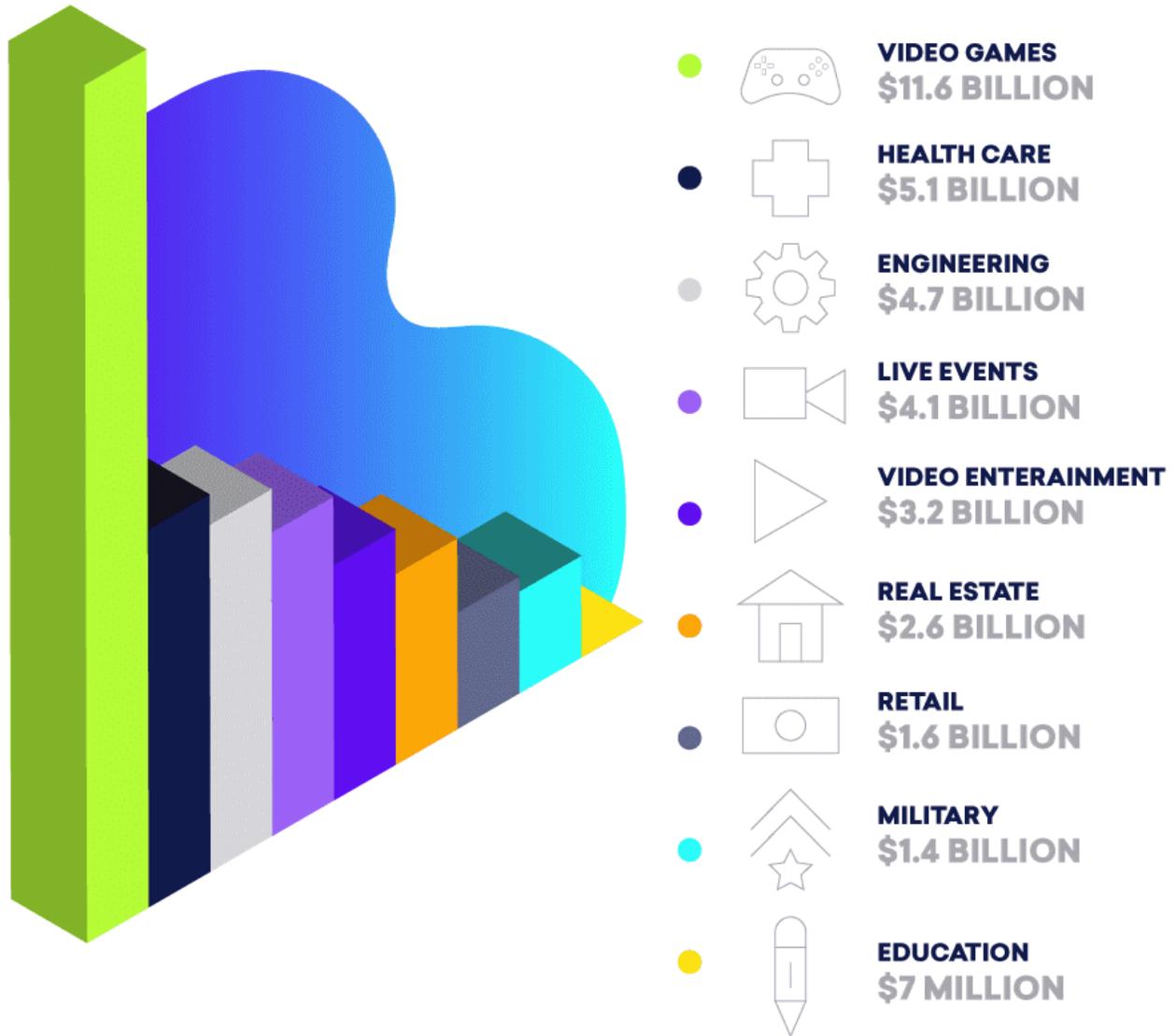
* This answer choice was not provided for the 2016 survey

Note: Includes AR & VR (use for directional perspective)

Lumus AR and VR industry projections

BIGGEST INDUSTRIES

for augmented and virtual reality, by potential 2025 revenue

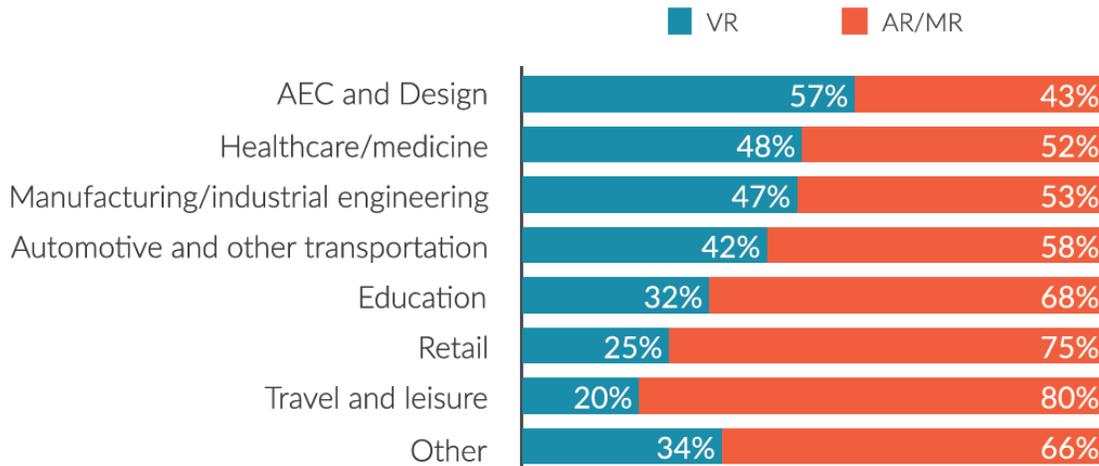


Note: Includes AR & VR (use for directional perspective)

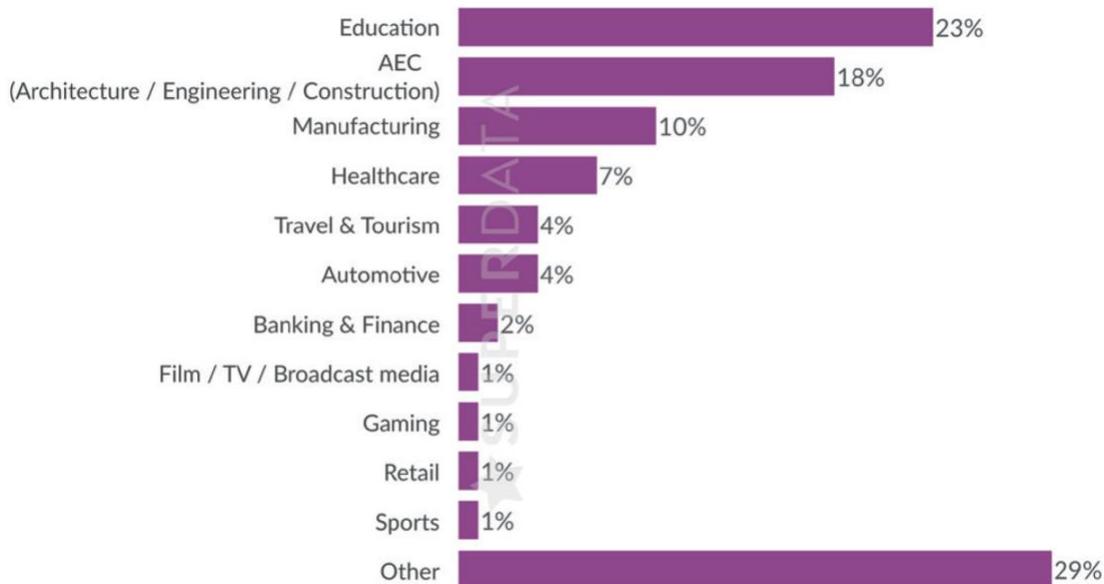
Superdata survey of XR industry executives

[Full report here](#)

Projected share of 2020 enterprise investment and spending



Businesses already using XR technologies



Graph: Industries of current and prospective XR end-users

Note: Includes AR & VR (use for directional perspective)

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 Inquiry Briefs

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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

This report highlights *ARtillery Intelligence* viewpoints, gathered from its daily in-depth coverage of spatial computing. To support narratives, data are cited throughout the report. These include *ARtillery Intelligence* original data, as well as that of third parties. Data sources are attributed in each case.

For market sizing and forecasting, *ARtillery Intelligence* follows disciplined best practices, developed and reinforced through its principles' 15 years in tech-sector research and intelligence. This includes the past 3 years covering AR & VR exclusively, as seen in research reports and daily reporting.

Furthermore, devising these figures involves the “bottom-up” market-sizing methodology, which involves granular revenue dynamics such as unit penetration, pricing and growth patterns. More on *ARtillery Intelligence* market-sizing research and methodologies 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](#).



References (clickable)

- i Picks & Shovels Will Accelerate AR
- ii Industrial AR Benefits & Barriers