



TABLE OF CONTENTS

EXECUTIVE SUMMARY

KEY TAKEAWAYS

GLOBAL XR REVENUES

DRILLING DOWN ON AR

AR REVENUE OVERVIEW

CONSUMER AR DRILL DOWN

ENTERPRISE AR DRILL DOWN

DEVICE FORECAST (SMARTPHONE & GLASSES)

DRILLING DOWN ON VR

VR REVENUE OVERVIEW

CONSUMER VR DRILL DOWN

ENTERPRISE VR DRILL DOWN

DEVICE FORECAST (HEADSETS)

RESOURCES & REFERENCES

NEXT STEPS

FORECAST METHODOLOGY

CONTACT & REFERENCE



EXECUTIVE SUMMARY



INTRODUCTION

Many AR and VR (a.k.a. XR) stakeholders claim that their market sizes will be massive. But how big are they, and how big will they realistically get? *ARtillery Intelligence* has quantified these sectors and all their moving parts in precise terms. The result is our latest XR revenue forecast.

Applying market sizing and forecast experience from 15 years of analyst work (see methodology section), *ARtillery Intelligence* has devised a disciplined and independent revenue forecast for AR & VR, segmented into their product areas. That includes sub-sectors like enterprise AR & VR.

The following pages provide market revenue projections, subdivisions of each product category, and bulleted insights all along the way. This is meant to qualify the revenue drivers and rationale behind the numbers. And we'll go deeper on specific data segments in future monthly reports.

Lastly, to characterize *ARtillery Intelligence's* overall position on XR revenue growth, we maintain a cautiously-optimistic view. Growth and scale will come but likely slower than some industry proponents believe, due partly to the pace of adoption and other signals *ARtillery* tracks.

ARtillery PRO subscribers are encouraged to spend time with the following pages, and to contact us with questions or requests for deeper analysis: <https://artillery.co/contact/>



WHAT'S COVERED IN FORECAST

The market sizing figures in this report include consumer and enterprise AR and VR segments. These are each subdivided by several variables, such as **hardware** and **software**, as well as revenue categories like **advertising** (social AR lenses) and **location-based VR** (admissions).

VR hardware includes headsets and bundled input or tracking devices, but does *not* include gaming consoles, smartphones and PCs required to run some headsets. Similarly with AR, smart glasses are included in revenue projections, but mobile devices (such iPhone sales) are not.

INCLUDED

AR & VR Hardware: e.g. Headsets, smart glasses

Bundled Hardware: e.g. Input or tracking devices

AR & VR Software: e.g. Consumer (apps, in-app purchases), Enterprise (AR productivity software, retail installations)

AR & VR Advertising: e.g. Display (Snapchat Lenses), and Search (Google Lens) ad placements

Location Based VR: (e.g. Admissions revenue)

NOT INCLUDED*

PC or Gaming Consoles: e.g. Playstation 4

Smartphones: e.g. iPhone to run ARkit apps

Network Data: e.g. Telco-delivered data usage for XR

Professional Services: e.g. Enterprise XR consulting

Game/app creation: e.g. Development costs, salaries

Advertising creation: Creative production costs

VR Cameras: e.g. 360 degree camera hardware

eCommerce: Value of goods bought through AR & VR interfaces (e.g. cost of a new couch bought or influenced through the IKEA Place app).



*We will expand category inclusions in future forecasts

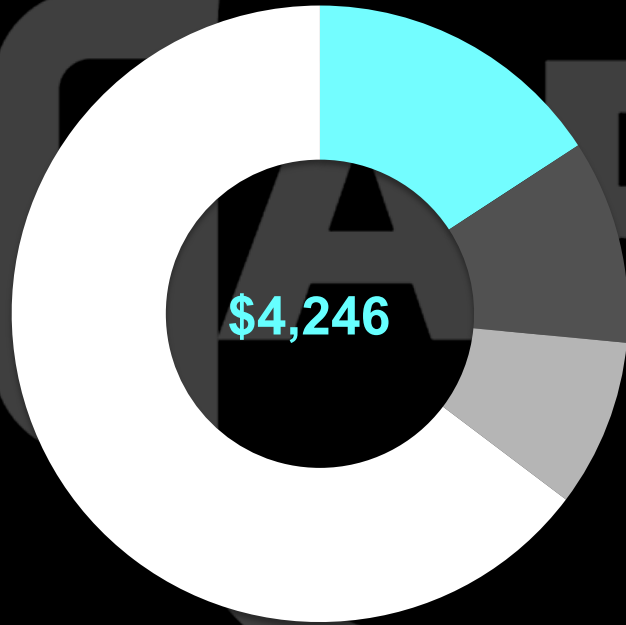
KEY TAKEAWAYS



GLOBAL REVENUE OVERVIEW

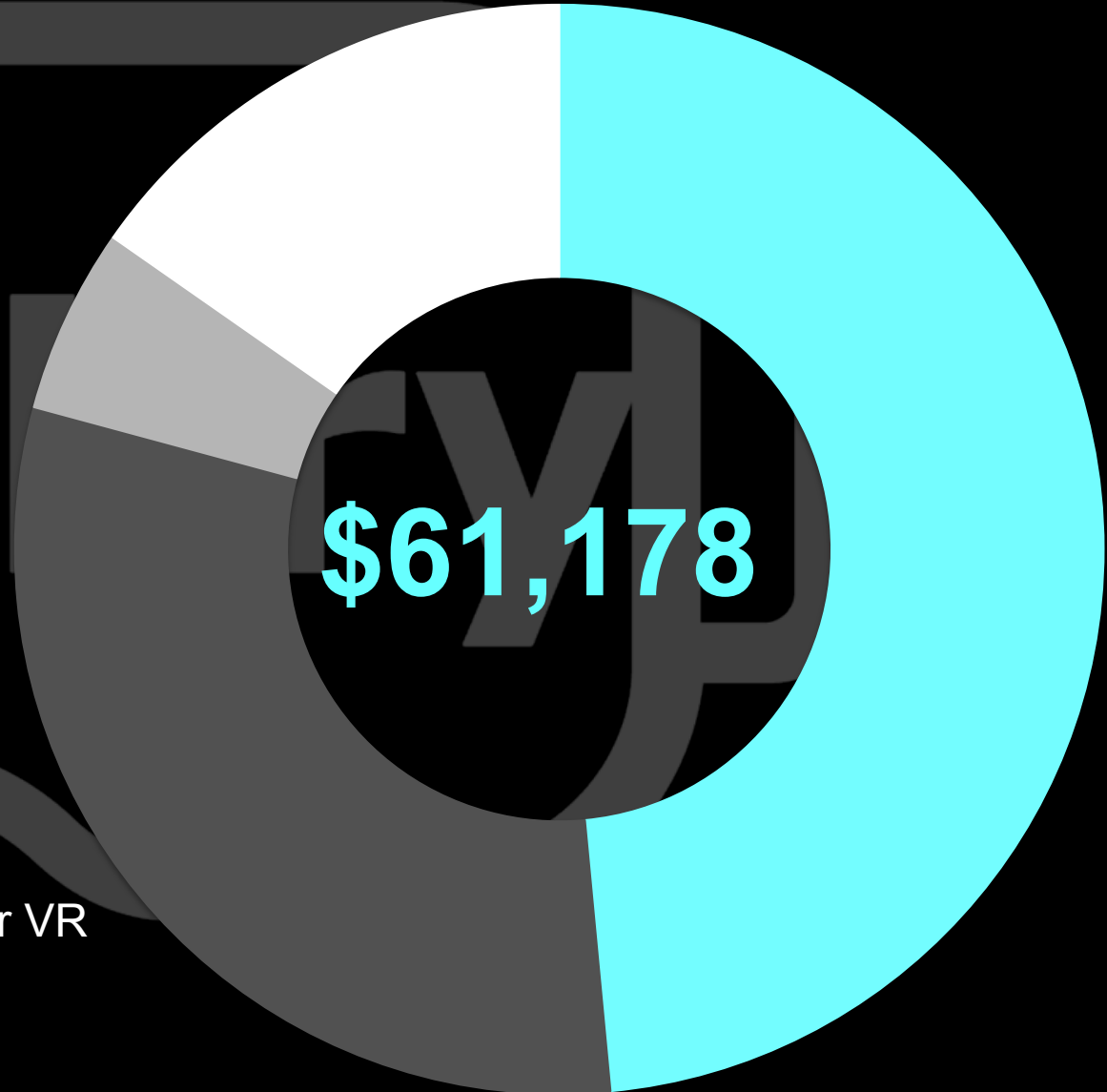
U.S. \$Millions

2017



\$4,246

2022



\$61,178

■ Enterprise AR ■ Consumer AR ■ Enterprise VR ■ Consumer VR



KEY TAKEAWAYS

Takeaways and growth dynamics for XR and its sub-sectors.

Enterprise AR will grow from \$*million in 2017 to \$*billion in 2022, a 113 percent compound annual growth rate (CAGR). This makes it the largest XR sub-sector in 2022. Scale will result from wide applicability across enterprise verticals; and a form factor that supports all-day use and clear ROI (e.g. manufacturing efficiencies). Adoption is currently dampened by typical organizational inertia, enterprise risk aversion and sales cycles. ARtillry Intelligence believes these factors will continue to stunt enterprise AR growth but will be outweighed eventually by the momentum, support and ROI realizations that are currently building. A tipping point will come in 2020, after which adoption accelerates in a sort of enterprise herd mentality. This will follow a similar pattern, though on a smaller scale, of enterprise smartphone adoption over the past decade. Near-term Enterprise AR revenues will be hardware-dominant as it's the first step in enterprise tech adoption. Hardware growth creates an installed base for software, which will dominate enterprise AR in outer years. Enterprise hardware will also mature as it's established in the enterprise, with replacement cycles outpaced by software refresh rates, likely packaged and sold in a SaaS manner.



***See full report for figures & breakdowns.**

KEY TAKEAWAYS

Takeaways and growth dynamics for XR and its sub-sectors.

Consumer AR will grow from \$*million in 2017 to \$*billion in 2022, a 110 percent compound annual growth rate (CAGR). Near term revenues will be dominated by the mobile form factor. Revenues will also be software-centric during that time (mobile device sales aren't counted in this forecast) and will include premium apps and in-app purchases. The latter will dominate software revenues in the near term, due to consumer hesitance to pay upfront for AR apps, as well as the in-app revenue model validated by Pokémon Go. Niantic will find success in its follow-up game to Pokémon Go, with a similar architecture and game mechanics re-skinned as Harry Potter-themed. These are both developing AR experiences will be built around in-app purchase models. A mobile AR killer app won't arrive until 2019, likely built on social networking and native AR functionality. Consumer AR revenues will begin to shift towards hardware starting in 2021 as smart glasses (possibly from Apple) finally reach tenable specs and standards for consumer markets. Software at that time will begin to shift to premium purchases (as opposed to in-app purchases) as it's a model conducive to dedicated AR hardware (similar to how apps/games are purchased in VR). Meanwhile, the development work put into mobile AR apps will be a training ground for an eventual glasses-dominant era beyond 2022.



***See full report for figures & breakdowns.**

KEY TAKEAWAYS

Takeaways and growth dynamics for XR and its sub-sectors.

Enterprise VR will grow from \$*million in 2017 to \$*billion in 2022, a 55 percent compound annual growth rate (CAGR). Though strong in its own right, it will hold the smallest share of XR revenues among the sub-sectors measured in this forecast. VR will be stronger as a consumer play (see next slide), while AR is stronger in the enterprise. These VR shortcomings (relatively speaking) in the enterprise stem from the medium's inherent isolation, which inhibits some job functions and share of time per working day. This is especially true in industrial functions where “heads up” awareness is inherent, and where AR will only closely mirror reality. VR will add value in collaborative and finance settings, such as employee training and data visualization among others (vertical spending breakdown provided in the report). Like AR, VR's near term enterprise revenue will be hardware-dominated as it's the first step to tech adoption. That installed base will pave the way for enterprise VR software revenues to grow and overtake enterprise VR hardware revenues by 2022. Unlike AR, which will have specialized hardware that's optimized for enterprise functions, VR will utilize common hardware (the same hardware used in consumer contexts). The availability, evolution and economics of that increasingly penetrated hardware will be an adoption accelerant, and an advantage for enterprise VR.



***See full report for figures & breakdowns.**

KEY TAKEAWAYS

Takeaways and growth dynamics for XR and its sub-sectors.

Consumer VR will grow from \$*billion in 2017 to \$* billion in 2022, a 28 percent compound annual growth rate (CAGR). Like enterprise VR, it will be hardware-dominant in early years as its installed base is established. Over time, software (in this case, games and apps) will eclipse hardware revenues with a faster refresh cycle. A greater installed base of hardware will also incentivize VR content creators to invest in long-form content, resulting in more robust VR content libraries and greater software spending per user (ARPU). Premium apps will dominate software revenues but in-app purchases will also contribute, especially in gaming. Installed software and apps will also dominate, but slowly give way to web VR as its capability evolves. Price competition among VR headset manufacturers (e.g. Oculus, Sony, Samsung) will accelerate consumer adoption. Oculus Go, at a \$199 price point, is a sweet spot for quality and affordability, and we project it to reach unit sales of 1.3 million this year. Oculus – with the advantage of Facebook-backing – has the flexibility to apply loss-leader pricing in order to trade margins for market share. That will give it a strong competitive position versus players that are dependent on hardware revenue (i.e. HTC, Samsung). Given a gift-able price point, the 2018 holiday quarter will be a “moment of truth” for Oculus Go.



***See full report for figures & breakdowns.**

VIDEO COMPANION

(CLICK LINK TO PLAY VIDEO)

<https://youtu.be/On6GStY430s>



THE XR TRANSFORMATION
BE EMPOWERED THROUGH KNOWLEDGE

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About ARtillry PRO

ARtillry Intelligence has launched an intelligence vault containing data, insights and analyst access. Known as *ARtillry PRO*, it equips subscribers in XR sectors to make informed business decisions.

FEATURES

Original Research: Monthly reports and weekly briefs on XR data, opportunities and dynamics.

Curated Research: ARtillry analysts collect, analyze and filter recommended reading and data.

Conference Talks: We watch, select and summarize video from XR events.

Slide Bank: We assemble charts for your presentations and knowledge building.

Data Concierge: We'll help you find what you're looking for.

UPCOMING EDITORIAL CALENDAR

June: VR Usage & Consumer Attitudes

July: The State of XR: Mid-year Review

August: AR & VR Advertising: Strategies & Outlook

September: Social XR: Finding the Killer App

October: Enterprise XR Strategies & Case Studies

November: XR Global Revenue Forecast

December: 2018 Lessons, 2019 Predictions

COST

Three tiers of service start at **\$49/month**. Standalone report = **\$699**

(CLICK LINK TO PLAY VIDEO)

https://youtu.be/dFZVGE_UA8A



NEXT STEPS

In addition to standalone status, this forecast lays the groundwork for *ARtillry Intelligence* future deliverables.

With the foundation of this data set, several subsequent narratives will be developed in the coming months that each drill down into XR sub-sectors, rationale, revenue-drivers and strategic implications.

We will also update this data set bi-annually, projecting a five year time horizon with each forecast. We will expand the scope of this forecast over time as well, to include more categories of AR & VR spending (see slide 5 for inclusions).

We encourage questions and coverage suggestions at <https://artillry.co/contact/>



ABOUT ARTILLRY INTELLIGENCE

ARtillery is a publication and intelligence firm that examines augmented reality (AR) and virtual reality (VR). Through writings, data and multimedia, it provides deep and analytical views into the industry's biggest players and opportunities. It's about insights, not cheerleading.

Run by career analyst and journalist Mike Boland, coverage is grounded in a disciplined and journalistic approach. It also maintains a business angle: Though fun and games permeate VR and AR (especially the former) long-term cultural, technological and financial implications are primary.

Learn more at <https://artillery.co/about/>



ABOUT INTELLIGENCE BRIEFINGS

ARtillery Intelligence Briefings are monthly installments of VR/AR data and analysis. They synthesize original and third-party data to reveal the dynamics of VR and AR sectors, and their opportunities.

In addition to data, a layer of insights is applied to translate market events and raw figures into prescriptive advice. This takes form in a narrative story arc, grounded in market figures.

Questions and requests for deeper analysis can be submitted at: <https://artillery.co/contact/>



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*, covering emerging tech.

Mike is a frequent speaker at industry conferences such as VRLA, ad:tech and LeadsCon. He has authored in-depth reports and market-sizing forecasts on the changing tech & media landscape. He contributes regularly to highly read online 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 found at <http://www.mikebo.land/>

METHODOLOGY

ARtillery Intelligence follows disciplined best practices in market sizing and forecasting, developed and reinforced through its principles' 15 years in research and intelligence in the tech sector. This includes the past 2.5 years covering AR & VR as a main focus.

This report focuses on AR and VR revenue projections in various sub-sectors and product areas. *ARtillery Intelligence* has built financial models that are customized to the specific dynamics and unit economics of each. These include variables like unit sales, company revenues, pricing trends, market trajectory and several other micro and macro factors that *ARtillery Intelligence* tracks.

This approach primarily applies a *bottom-up* forecasting methodology, which is secondarily vetted against a top-down analysis. Together, confidence is achieved through triangulating revenues and projections in a disciplined way. For more information on what's included and not included in the forecast (a key consideration when evaluating the figures) see slide 5.

More about *ARtillery Intelligence*'s market-sizing credentials can be found at <http://www.mikebo.land/forecasting>

DISCLOSURE AND ETHICS POLICY

ARtillery has no financial stake in the companies mentioned in this report, nor received payment for its production. With respect to market sizing, *ARtillery* remains independent of players and practitioners in the sectors it covers. It doesn't perform paid services or consulting for such companies, thus mitigating bias — real or perceived — in market sizing and industry revenue projections.

ARtillery's disclosure and ethics policy can be seen in full at <https://artillery.co/about/disclosure-and-ethics-policy/>

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