



**ABRIDGED VERSION
FOR PREVIEW**

ARTILLY INTELLIGENCE BRIEFING
AR & VR GLOBAL REVENUE FORECAST, 2016-2021
NOVEMBER 2017

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EXECUTIVE SUMMARY

Many AR and VR stakeholders claim that their market sizes will be massive. But how big are they and how big will they realistically get? *ARtillery Intelligence* ventured to quantify these sectors in more precise terms. The result is our latest industry revenue forecast.

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

The following pages provide overall 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. A long-form narrative report will also be produced in Q1 2018.

Lastly, to characterize *ARtillery Intelligence's* overall position on AR & VR revenue growth, we maintain a cautiously-optimistic view. Growth and scale will come but slower than most analyst firms project, due partly to the pace of consumer adoption and other signals *ARtillery* tracks.

ARtillery Insights 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 THIS FORECAST

This forecast quantifies revenues for AR and VR products. Its main categories are **enterprise AR**, **consumer AR**, **enterprise VR** and **consumer VR**. These are each subdivided by hardware and software. Altogether there are several combinations of factors examined in the following pages.

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 (Headsets, smart glasses)
- AR & VR Software (Enterprise productivity software, games, apps, in-app purchases)
- Bundled Hardware (Input or tracking devices)
- All VR Hardware & Software *sales*: (Consumer, enterprise, VR Arcades)

NOT INCLUDED*

- PC or Gaming Consoles (e.g. PSVR)
- Smartphones (e.g. iPhone to run ARkit apps)
- VR Arcade *Admissions* (Time or session-based fees for VR experiences)
- AR & VR Services: (e.g. Enterprise consulting)
- VR Cameras (e.g. 360 degree camera hardware)
- AR & VR Advertising (e.g. Immersive in-game ads)



KEY TAKEAWAYS

Takeaways and growth dynamics for AR & VR sectors covered in this report.

Total global AR & VR revenues will grow from \$4.1 billion in 2016 to \$79 billion by 2021.

Enterprise AR will grow from \$829 million in 2016 to \$47.7 billion in 2021. It's the fastest growing segment of AR & VR revenues and the largest revenue segment in 2021. 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). Near-term revenues will be hardware-dominant as it's usually 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 adoption will also mature as it's established in the enterprise, with replacement cycles outpaced by software refresh rates.

Consumer AR will grow from \$975 million in 2016 to \$15.8 billion in 2021. Until the 2020 introduction of Apple's smart glasses, it will be dominated by the mobile form factor. Revenues will be software-dominant during that time (mobile devices aren't counted in this forecast), and include app revenues such as in-app purchases. Much of this will evolve from the business model validated by Pokémon Go. Niantic will also find success in its follow-up game to Pokémon Go, with architecture and game mechanics re-skinned to a Harry Potter theme. Consumer AR will hit an inflection point – and shift share towards hardware revenue – starting in 2020 as consumer-gear smart glasses finally arrive. Meanwhile, the development work put into mobile AR apps will be a training ground for an eventual glasses-dominant era.

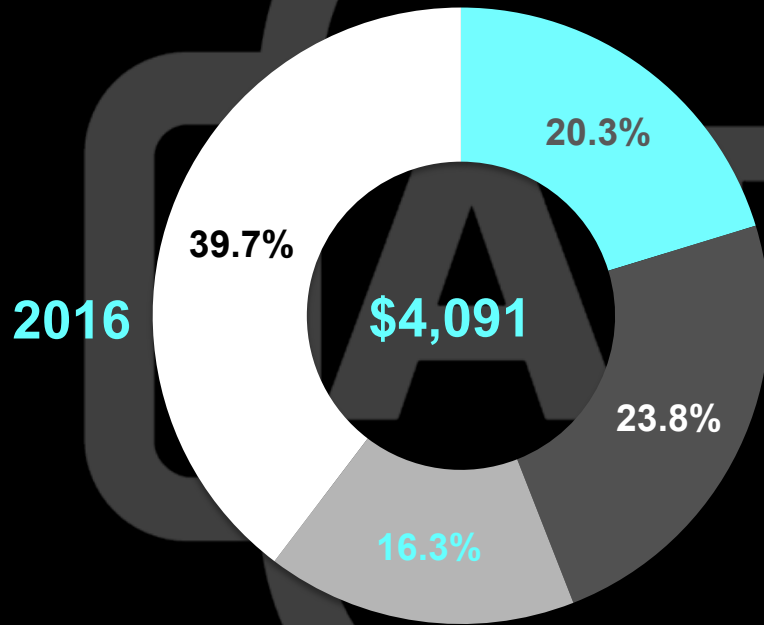
KEY TAKEAWAYS (CONT')

Enterprise VR will grow from \$665 million in 2016 to \$4.4 billion in 2021. Though strong in its own right (46% CAGR), it will hold the smallest share of AR & VR revenues among the sub-sectors measured in this forecast. VR will be stronger as a consumer play (see below), while AR is stronger in the enterprise (see previous slide). The latter dynamic stems from VR's inherent isolation, which inhibits some job functions and share of time per working day. Like AR, VR's near term enterprise revenue will be hardware-dominant 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 2019.

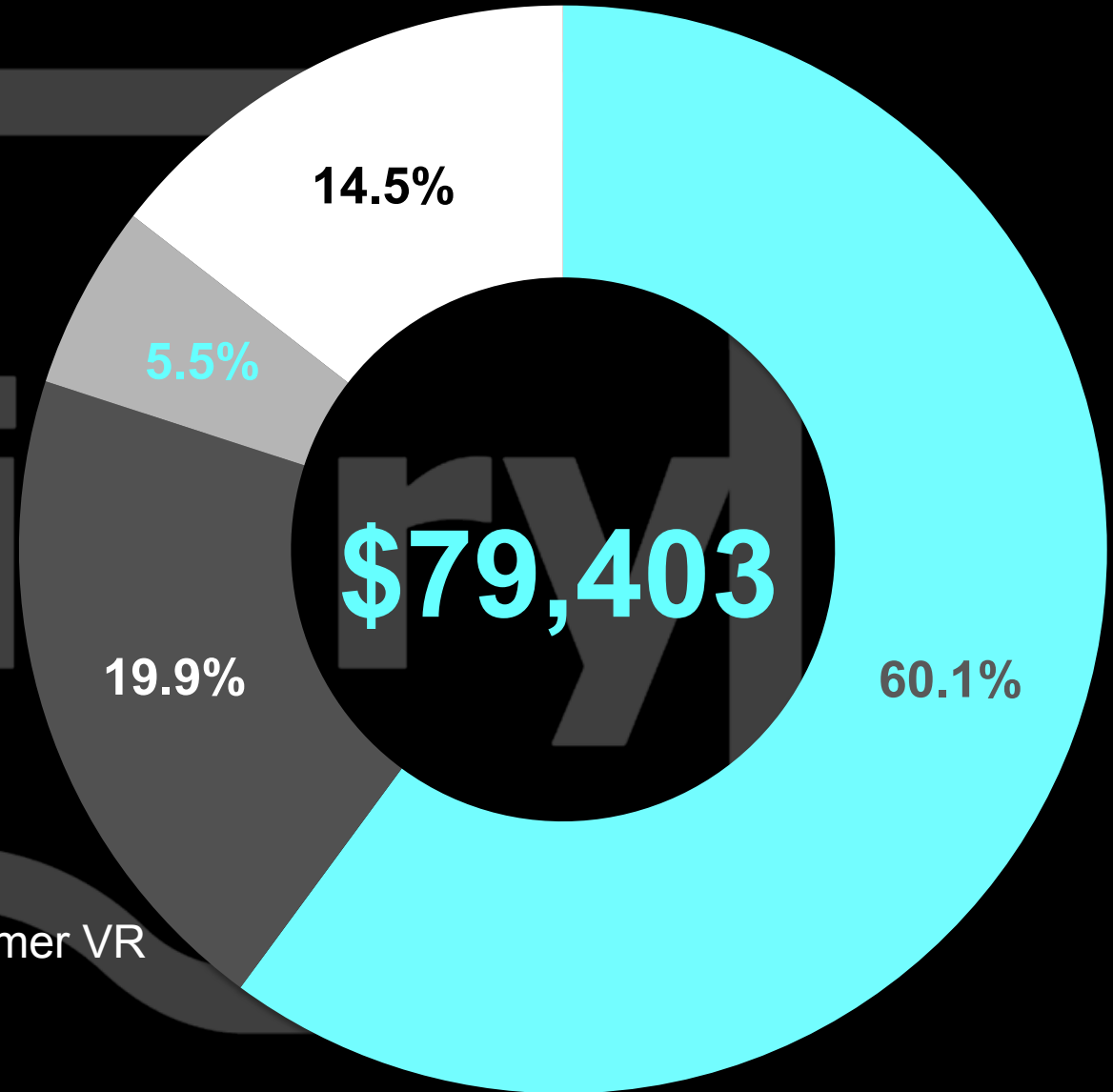
Consumer VR will grow from \$1.6 billion in 2016 to \$11.5 billion in 2021. Like enterprise VR, it will be hardware-dominant in early years as its installed base is established. Over time, software (in this case, games and apps) will eclipse hardware revenues with a faster refresh cycle. A greater installed 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). Price competition among VR headset manufacturers (e.g. Oculus, Sony, Samsung) will also be a big consumer adoption driver. Oculus Go, at a \$199 price point, will hit a sweet spot for quality and affordability, and will drive mainstream VR adoption and education starting in 2018. 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).

GLOBAL AR & VR REVENUES

U.S. \$Millions



2021

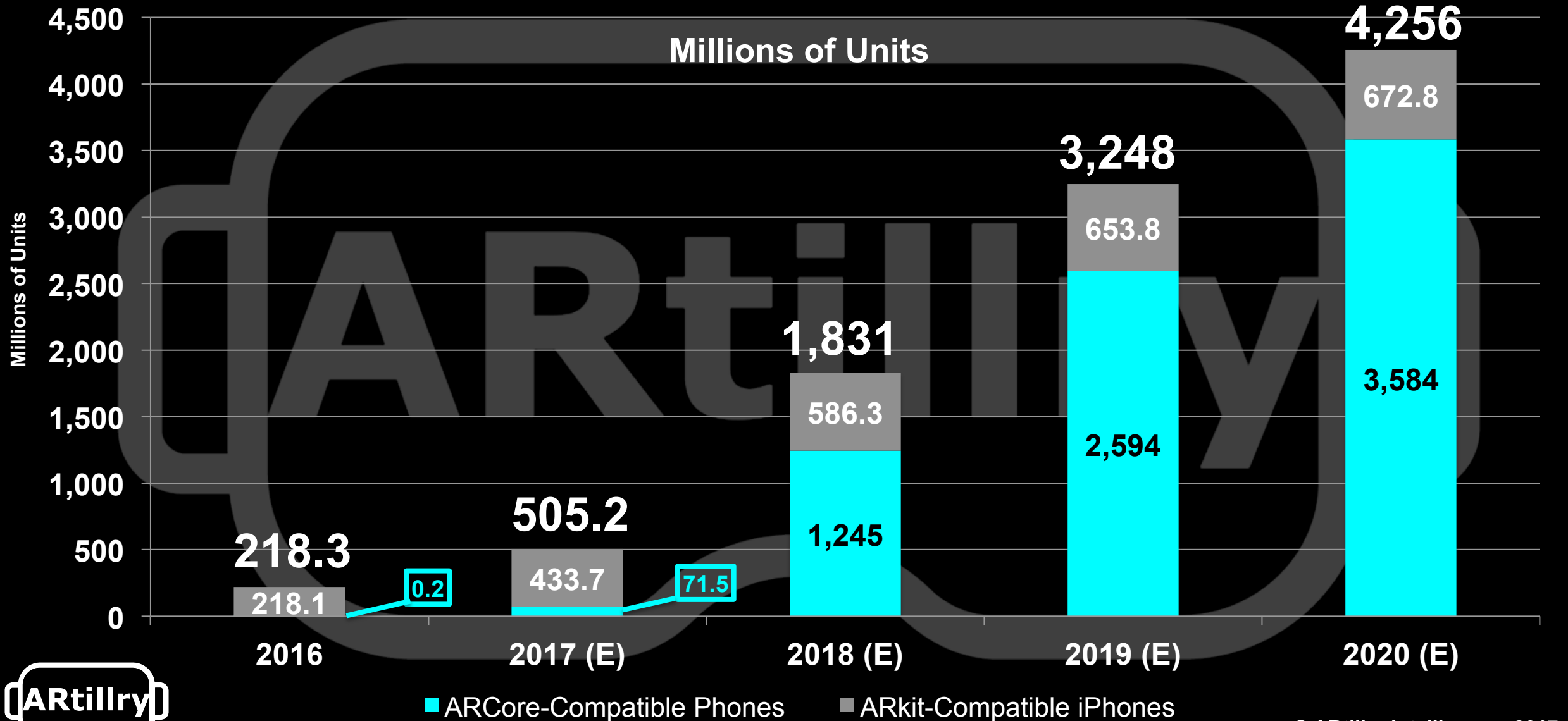


■ Enterprise AR ■ Consumer AR ■ Enterprise VR ■ Consumer VR

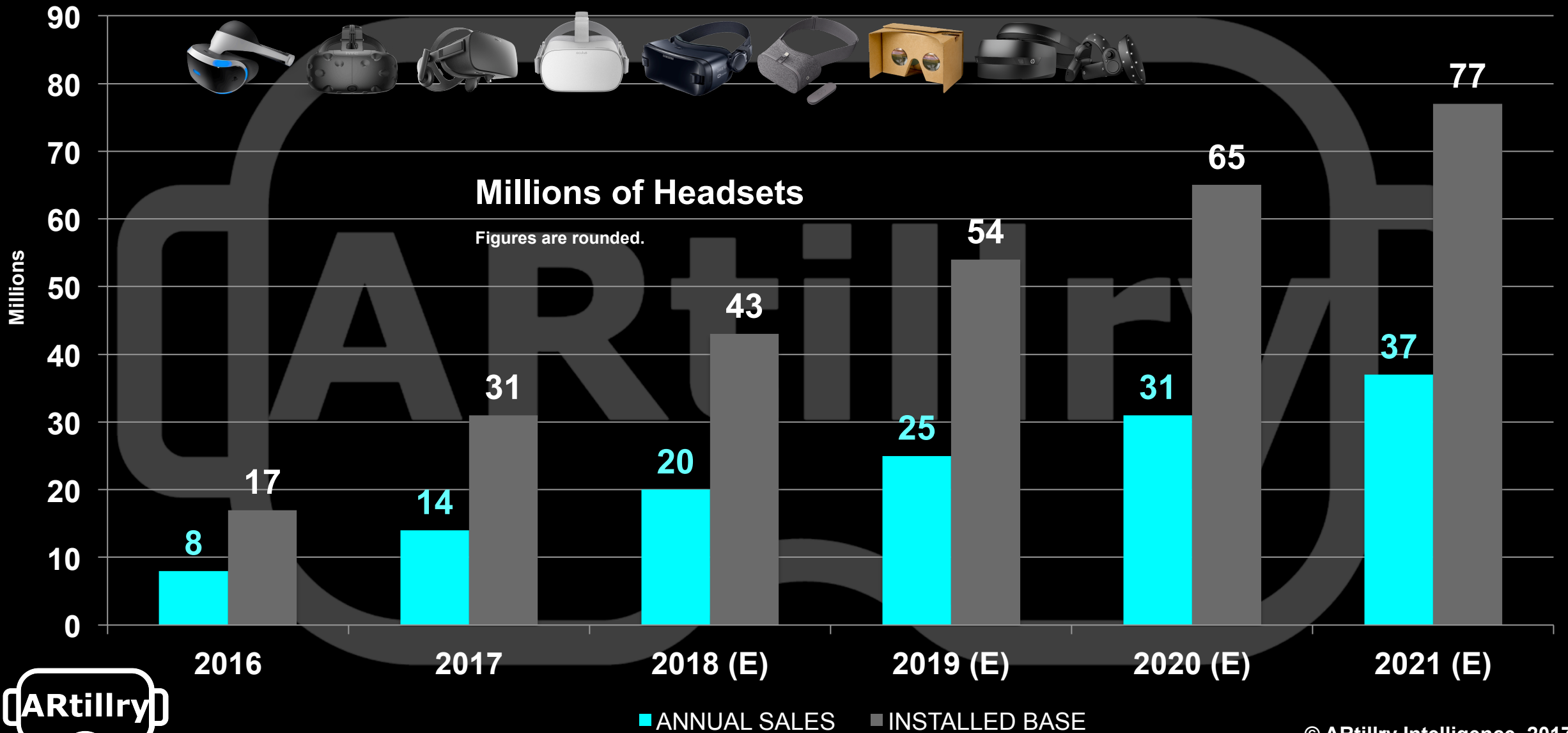


MOBILE AR INSTALLED BASE

Global Handsets Compatible with ARCore or ARkit



GLOBAL VR HEADSET INSTALLED BASE



VIDEO COMPANION

(CLICK LINK TO PLAY VIDEO)

<https://youtu.be/pLLLZyvFD2k>



ARTILLERY BRIEFS, EPISODE 9
AR & VR'S ROAD TO \$80 BILLION

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About ARtillery Insights

ARtillery Intelligence partners with the VR/AR Association to deliver a research package. Known as *ARtillery Insights*, it will equip subscribers in AR and VR sectors to make informed business decisions.

FEATURES

Original Research: Monthly original reports examining opportunities and dynamics of VR and AR.

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

Indexed Intelligence: Archived reports and multimedia assets, all in one place.

(CLICK LINK TO PLAY VIDEO)

<https://youtu.be/WTruV4arTl0>

2017 EDITORIAL CALENDAR

June: The State of Virtual Reality (published)

July: Tech Giants Tackle AR (published)

August: VR Usage & Consumer Attitudes (published)

September: ARCore & ARKit: The Acceleration of Mobile AR (published)

October: Discussions & Takeaways from AR & VR Investors (published)

November: AR & VR Global Revenue Forecast (this report)

December: 2017 Lessons, 2018 Outlook

COST

VR/AR Association Members: **\$39/month**

Non-VR/AR Association Members: **\$89/month**



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 two 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, pricing trends, market trajectory and several other micro and macro factors that *ARtillery Intelligence* tracks.

This is known as the *top-down* forecasting methodology. It is further vetted against a *bottom-up* approach which involves tallying aggregate venues and growth rates of industry players. Together, confidence is achieved through triangulating revenues and projections in a disciplined way.

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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