ARTILLRY INTELLIGENCE BRIEFING

VR USAGE & CONSUMER ATTITUDES

SEPTEMBER 2017

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Executive Summary

Who's using virtual reality (VR) today? What are their motivations? What are the VR use cases and content categories that resonate most, and least? And for those who are uninterested in VR, what are their biggest reasons?

A lot can be learned about VR's market opportunity by answering questions like these, and uncovering sentiments of the consumer public. And in VR's early days, such data is scarce yet critical to positioning strategies.

So we set out for answers. Working closely with Thrive Analytics, ARtillry authored questions to be fielded through its established survey engine. The result is the first wave of Thrive's *Virtual Reality Monitor™* (VRM).

Tapping a considerable sample of almost 2000 adults, the data returned telling consumer behavior patterns, useful in ongoing VR strategy refinement. That includes content, hardware and other components.

In addition to data, this report applies a layer of insights from ARtillry analysts to translate raw figures into prescriptive advice for VR/AR players. This takes form in a narrative story arc, grounded in Thrive's original data.

Questions and requests for deeper analysis can be submitted at **https://artillry.co/contact/**.

Key Takeaways

- Samsung's Gear VR is VRM's most popular headset, followed by Playstation VR (PSVR)
  - Gear VR's success is due to its relatively low price ($129), and longer tenure in the marketplace relative to the comparable Google Daydream View.
  - PSVR's success is due partly to its compatibility with 60 million PlayStation 4 consoles.

- VR owners will pay for quality… to a point. PSVRs tier-1 benefits resonate with consumers but are also "good enough" for most, versus the more capable and expensive Rift & Vive.

- VR satisfaction is favorable across headsets, invoking cautious optimism for VR's future.
  - Because VR is so immersive and visceral, it incites a strong positive response.
  - This is a blessing and a curse: Though it results in high satisfaction levels, it requires direct experience that can't be replicated in commentary or marketing.
  - The industry's challenge is to bring technologically invasive experiences to the masses.

- Among those uninterested in VR, the biggest reason was "just not interested."
  - This contrasts with owners' satisfaction, validating that you have to try VR to "get it."
  - This indicates two key areas of improvement for VR players: education and distribution.
  - Getting that "first taste" to the masses should be a key business objective for the industry.
  - Adoption accelerants include retail installations, VR arcades and Mobile VR.

- Among the things that VR users desire, more and better content top the list.
  - This validates that content is king in VR, just like other mediums (see enclosed video).
  - Content is currently a gap in VR's value chain, and a business opportunity for entrants.

- VR affinity correlates to youth, due to natural technology interest among digital natives.
  - Willingness to spend $400+ on VR equipment shows a reverse correlation to age, with one exception: Ages 25-34 are more willing than ages 18-24, likely due to spending power.

- $400 is a significant price point, validated by Oculus' recent pricing adjustment for Rift.
  - We'll see more price competition: emerging sectors often trade margins for market share.

- Top VR activities include watching movies, exploring the world, gaming and watching sports.
  - These areas are ripe for business opportunity, or synergies with existing businesses.

- The most successful VR apps will apply native thinking: building specifically for the form factor.
  - Just like with smartphones, apps that utilize unique aspects (i.e 3D immersion) will outperform those that shoehorn legacy 2D media it into a VR experience.

Takeaways are also highlighted throughout this report's main narrative.

Introduction: Demographic Snapshot

The adoption patterns examined in this report tell an overall story of where opportunity lies throughout VR's value chain (content, hardware, use cases etc.). But before breaking all of that down, a few high-level results characterize demographic and psychographic profiles of VR adopters.

8% of households with Internet access own a VR headset.

89% of VR headset owners have a video game console.

67% have household incomes greater than $50,000.

80% are under the age of 44.

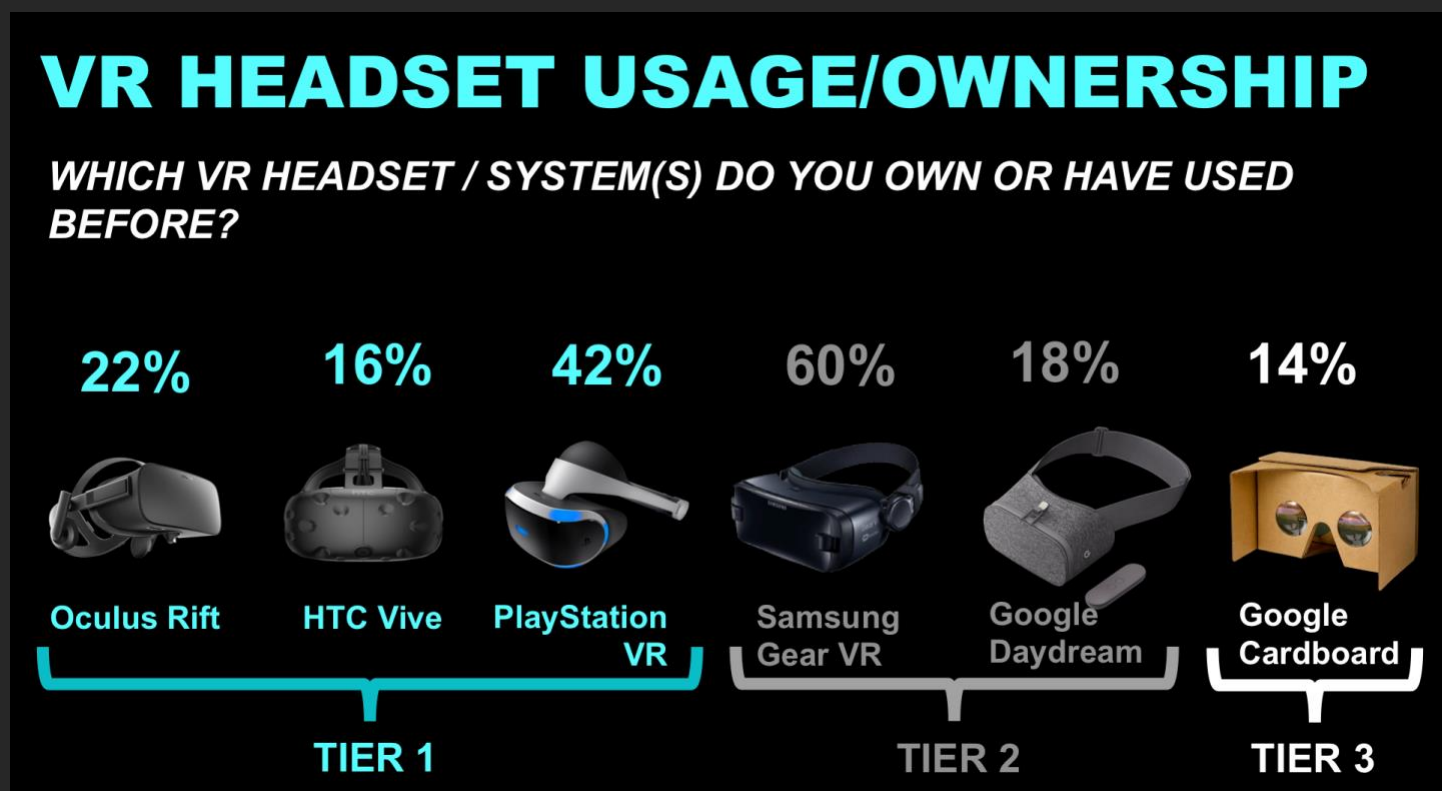**97%** have children.

60% are male.

Part I. VR Ownership Sentiments

A good place to start examining VR usage is the breakdown of current ownership. The array of available devices and their relative adoption rates can be telling of features and attributes that resonate with consumers. That includes things like price, features and specifications.[1]

With that backdrop, Samsung's Gear VR headset showed the most prevalent ownership among *Virtual Reality Monitor* (VRM) respondents. This isn't entirely surprising, due to its relatively low price ($129), and longer tenure in the marketplace relative to the comparable Google Daydream View.

Both devices are in Tier 2 of the VR headset spectrum, in terms of ARtillry's market segmentation. The second highest ownership in VRM was Playstation VR (PSVR). This also comes as no surprise, given its compatibility with a large installed base (60 million) of PlayStation 4 (PS4) consoles.

VR HEADSET USAGE/OWNERSHIP

WHICH VR HEADSET / SYSTEM(S) DO YOU OWN OR HAVE USED BEFORE?

22%	16%	42%	60%	18%	14%
Oculus Rift	HTC Vive	PlayStation VR	Samsung Gear VR	Google Daydream	Google Cardboard
TIER 1			TIER 2		TIER 3

Source: Thrive Analytics, ARtillry | N=268

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[1] *See appendix for deeper analysis of each headset*

PSVR sits in Tier 1, along with HTC Vive and Oculus Rift. The latter devices scored lower than PSVR for reported ownership, likely due to the need for a dedicated PC with high-end graphical processing. Though PSVR is inferior in specs like resolution, its "all-in" price is lower for existing PS4 owners.

Google Cardboard scored lowest in overall reported ownership, which *does* come as a surprise. The pricing barrier for the device is lowest of the pack, and in some cases non-existent due to promotional giveaways. Therefore, low reported ownership is likely due to a less compelling user experience.

Altogether, one lesson is that VR owners are willing to pay for quality… but only to a point. Cardboard is cheapest, yet it has the lowest penetration. Meanwhile, PSVR's higher-end Tier-1 experience is attractive, but also "good enough," versus the more capable and expensive Rift and Vive.

Another conclusion is that marketplace standards and expectation for VR are optimized at the PSVR's level. That's the sweet spot in terms of price and features. As a mental exercise, if one were to overlay prices[2] on these adoption rates, the greatest revenue would be achieved by PSVR.

Satisfaction

Drilling down from ownership, how are consumers *satisfied* with their headsets? Satisfaction levels from VRM align with some of the conclusions made above, but with a few surprises. Overall, the takeaway is that satisfaction levels are favorable across the board, indicating a strong future for VR.

These satisfaction levels also align with another key principle ARtillry has observed. After receiving a VR demo — say a gaming or productivity app — new users will grasp it right away, then enthusiastically ideate other prospective VR applications that could apply to their lives or work.

"I've been working in tech for many years, and have never seen a new technology that people understand so quickly when you give them a demo," Strata CEO John Wright told ARtillry recently. "And their minds will immediately go to other VR applications that make sense."

One reason for this cognitive leap is VR's visual intensity. It strikes users to such an immersive degree that they understand it on deeply visceral levels. But because it's so visceral, it can't be explained in words. So people have to try it in person to get excited about it and really "get it."

This is all to say that it's no surprise that the satisfaction levels are so high for VR *owners*. And that stands in stark contrast to the low interest levels of those who have not yet tried VR (explored in later sections). This underscores that one of the VR industry's biggest challenges is getting people to try it.

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[2] *See Part IV and/or appendix for pricing details.*

VR HEADSET SATISFACTION

HOW SATISFIED ARE YOU WITH YOUR VR HEADSET / SYSTEM?

(MODERATELY TO EXTREMELY SATISFIED)

70%	84%	85%	74%	79%	69%
Oculus Rift	HTC Vive	PlayStation VR	Samsung Gear VR	Google Daydream	Google Cardboard
TIER 1			TIER 2		TIER 3

Source: Thrive Analytics, ARtillry

Drilling down to per-device satisfaction levels, PSVR was once again the winner, but this time with a lesser margin of victory. PSVR's highest rating on this measurement comes at somewhat of a surprise, given the above premise that its tier-1 counterparts offer a superior VR experience.

Its satisfaction level could result from a few factors: One, consumers' perception of value (lower cost) could boost an overall sense of satisfaction. But more likely, high satisfaction comes from ease of use (plug & play with PS4) and social features, such as friends' participation in VR games (see appendix).

Nonetheless, HTC Vive only scored one percentage point lower, making it essentially a tie. As explored further in the appendix, HTC Vive has received accolades from consumers and developers for its more open platform and content availability, compared to other tier-1 headsets.

Oculus Rift's significantly lower satisfaction score conversely stems from a combination of a closed system with less available content, and some organizational missteps. The latter refers to initial pricing miscalculations and some shipping delays for its highly rated touch controllers last year.

Moving on to Tier 2, satisfaction levels are at parity between the two contenders. GearVR has the edge in smartphone compatibility and available content. But Daydream view could pull ahead due to its open platform approach (analogous to Android OS) that works with more devices in the long run.

Lastly, there's the humble cardboard. Though it scored lowest in satisfaction (not surprising), it's still a high score. For the latter point, we attribute the pricing/value psychology examined above in light of PSVR. But moreover, it goes back to the overall satisfaction levels for VR as a novel experience.
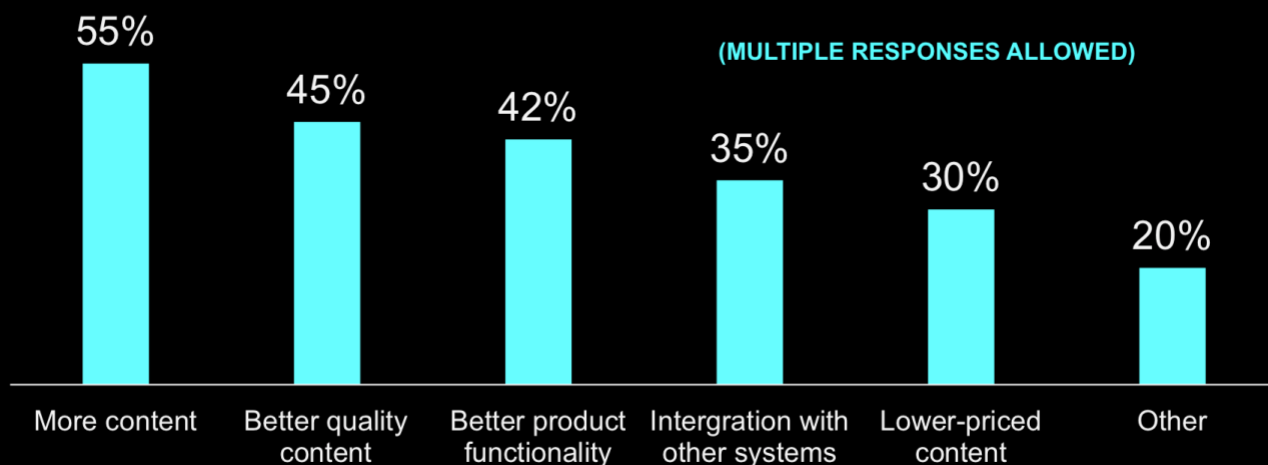
Areas of Improvement

Among the things that VR users desire, more available content tops the list. 55 percent said they want more content, and 45 percent want better quality content – the top two responses. This confirms what ARtillry has examined (see video below): Content is king in VR just like most other mediums.

But the challenge today is a classic "chicken & egg" dilemma for devices and content. Put briefly, there isn't enough content to compel mass adoption of VR hardware; and there isn't enough of an installed hardware base to compel content creators to invest time and money.

We'll see this dilemma naturally alleviate over time, as more content is created and more devices are sold, in a sort of slow-moving step function. Meanwhile there's a clear hunger for content. This should signal a gap in VR's value chain, and a business opportunity for potential entrants.

VR AREAS OF IMPROVEMENT

IN WHAT AREAS WOULD YOU LIKE TO SEE IMPROVEMENTS FOR YOUR CURRENT DEVICE?

(MULTIPLE RESPONSES ALLOWED)

Area	Percentage
More content	55%
Better quality content	45%
Better product functionality	42%
Intergration with other systems	35%
Lower-priced content	30%
Other	20%

Source: Thrive Analytics, ARtillry | N=268

Related Viewing: Content is King
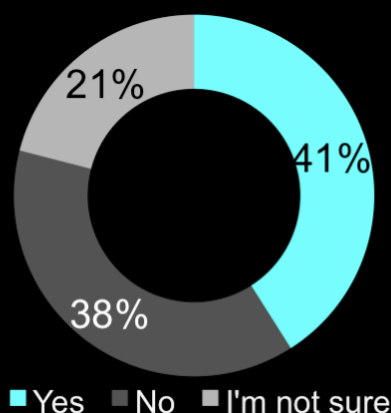(Click URL)

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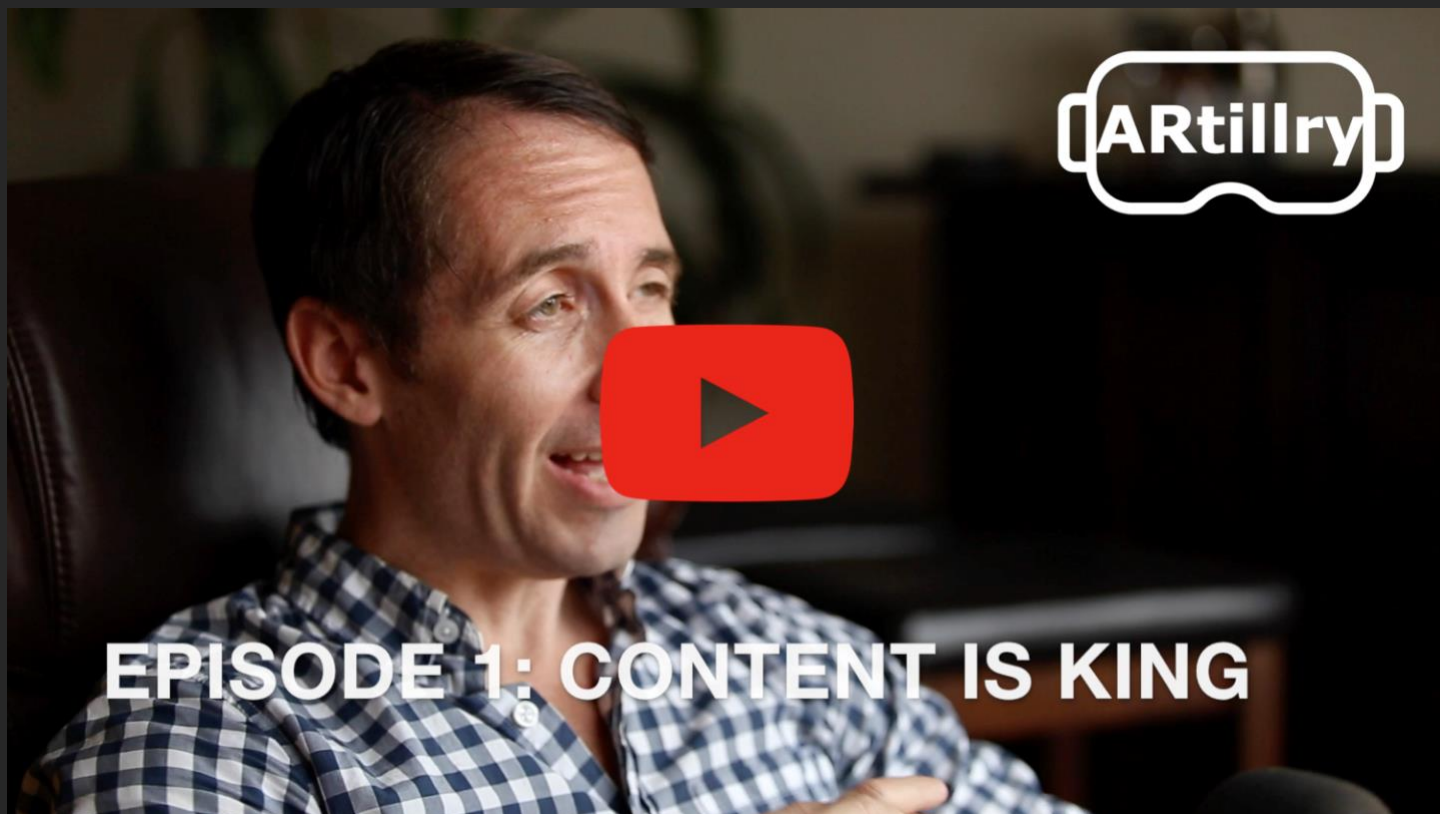
Part II. Non-Ownership Sentiments

VR OWNERSHIP INTEREST (BY AGE)

DO YOU HAVE ANY INTEREST IN OWNING A VR HEADSET OR SYSTEM?

All Ages

- 41% Yes
- 38% No
- 21% I'm not sure

By Age

	18-24	25-34	35-44	45-54	55-64	65 or older
I'm not sure	12%	22%	23%	19%	27%	21%
No	33%	23%	29%	38%	43%	63%
Yes	55%	55%	48%	43%	30%	16%

■ Yes ■ No ■ I'm not sure
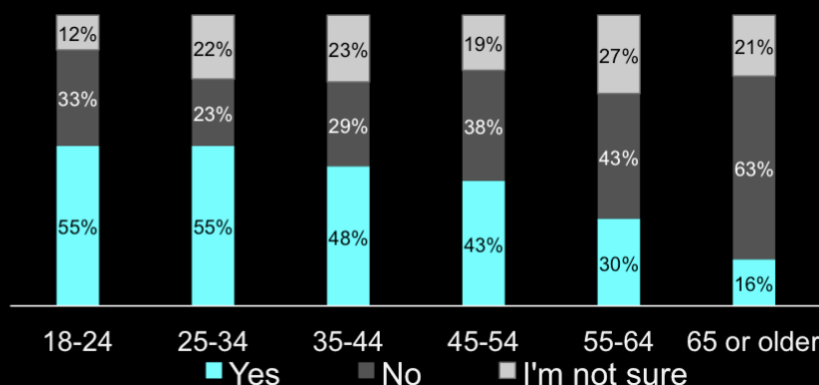
Source: Thrive Analytics, ARtillry | N=1610

Moving on from VR owners, sentiments of non-owners can be a leading indicator for VR's future growth. The results show moderate strength for near-term VR hardware growth, with 41 percent of respondents reporting interest. But that still leaves 38 percent uninterested and 21 percent unsure.

When looking at age breakdowns, interest levels unsurprisingly index higher for younger generations. There is in fact a clear correlation between youth and interest. ARtillry believes this is due to younger digital natives' savvy, comfort and natural interest to experience emerging technology products.

Drilling down one level, more insight can be gleaned from the reasons for disinterest. Among those who said "no" to the above question, a more telling question perhaps is "why not?" Price and content were factors (price is explored more later), but the biggest reason was "just not interested."

REASONS FOR DISINTEREST (BY AGE)

WHY ARE YOU UNINTERESTED IN OWNING A VR DEVICE / SYSTEM?

	All Ages	18-24	25-34	35-44	45-54	55-64	65 or older
Too expensive.	43%	65%	52%	46%	51%	32%	32%
I've heard it causes motion sickness.	14%	22%	19%	20%	14%	8%	11%
Just not interested.	53%	43%	39%	53%	54%	51%	67%
Lack of content.	12%	22%	19%	14%	12%	9%	6%
Poor quality of content.	3%	5%	5%	4%	3%	2%	3%
Other (please specify)	10%	3%	8%	5%	5%	20%	12%

Source: Thrive Analytics, ARtillry | N=926

This stark and definitive sentiment about disinterest was the largest single answer (53 percent) amongst the entire sample of all ages. ARtillry believes that this indicates two key challenges and areas of improvement for VR products/providers: education and distribution.

This goes back to the quote from Strata's John Wright: Those who try VR for the first time are often hooked on the new experience and "blown away." But the flip side to that coin is that the medium's level of immersion dictates that you have to see it to believe it. And few people get that chance.

This is simply because friction involved in trying VR – or at least Tier 1 VR --- is high. That includes not only cost, but technological invasiveness such as set up, rearranging furniture, etc.. This means that getting that "first taste" to the masses should be a key business objective for the VR industry.

There are a few adoption accelerants ARtillry has identified to accomplish that consumer acclimation:

1. **Retail installations (such as product demos at Best Buy)**
2. **VR arcades and theme park rides**
3. **Mobile VR (tiers 1 & 2)**

Retail installations are somewhat straightforward, and mobile VR is a topic explored in previous ARtillry Reports.[3] VR Arcades and theme parks are worth examining briefly. Examples include large VR installations (see The Void) where customers experience VR-centric team competitions.

Also known as "location based VR," it essentially lets people "rent versus buy" in terms of temporal experiences. In other words, it replaces VR's ownership barriers with a more digestible experiential commitment – in both time and cost. Moreover, it accomplishes that "first taste," on a larger scale.

And there's an important historical parallel at play here. In the 70s and 80s, arcades were prevalent before home gaming console ownership became ubiquitous. VR Arcades could fill that same gap – albeit temporarily – for VR. This can help model a trajectory for VR's directions and opportunities.

VR PURCHASE LIKELIHOOD

52%
7%
10%
17%
14%

- Extremely Likely
- Neutral
- Extremely Unlikely
- Likely
- Unlikely
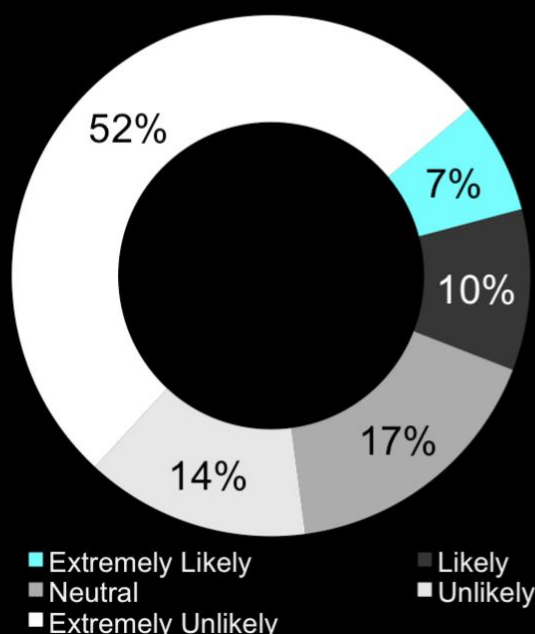
OVER THE NEXT 12 MONTHS, HOW LIKELY ARE YOU TO PURCHASE A VR HEADSET / SYSTEM?

60% of those extremely likely or likely to purchase a VR system in the next 12 months are male.

Source: Thrive Analytics, ARtillry | N=1735

Taking all of the above into consideration, VRM respondents were asked about the likelihood of VR ownership in the next year. This is perhaps a more telling sentiment than their interest levels – involving all relevant factors to pinpoint their actual probability of a near-term purchase.

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[3] See ARtillry Insight Briefing: *Tech Giants Tackle AR*, July 2017

Interestingly, these results painted a less favorable picture for VR's growth compared to ownership interest. Specifically, 17 percent of respondents reported "likely" or "extremely likely" probability of VR ownership over the next year. The largest response (52 percent) was "extremely unlikely."

This more sobering indication of near-term consumer VR growth further validates the above "adoption accelerants." VR Arcades and theme parks will accomplish this to some degree as will mobile VR, which ARtillry refers to as VR's "gateway drugs." Business opportunities will be found in these areas.

ARtillry also believes VR adoption and penetration will start slow, then hit a tipping point and suddenly accelerate. That will happen when a critical mass of consumers gets that initial "wow" experience. Interest levels will grow among those consumers… and influence others in their social graphs.

That will happen in tandem with an in increase in the volume of content available (explored above), as well as the lowering of another major barrier to adoption we'll explore next: *Price.*

Related Viewing: Historical Lessons for VR
(Click URL)
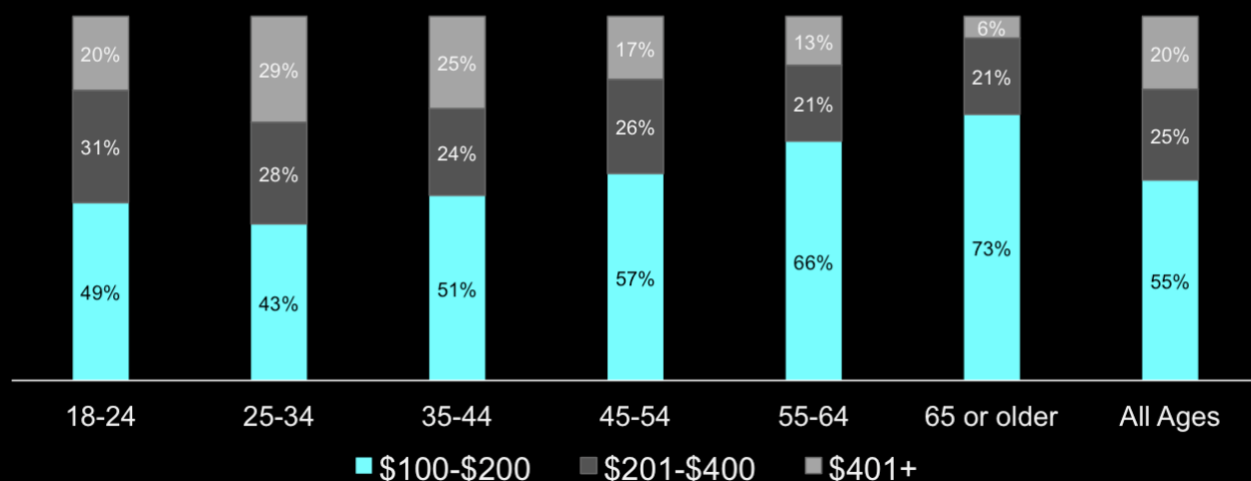
https://youtu.be/Sk1cCxiUHXw

Part III. Price

As examined above, price is an important factor in VR adoption, just as it is with most products. But what are the specific ways that price is currently a barrier to VR adoption? And more importantly, what price points represent triggers for consumer interest – or disinterest – in VR ownership.

To begin, the greatest interest in VR not surprisingly exists at lower price points ($100 - $200). And the least interest lies with more expensive purchases (greater than $400). Given that tier-1 headsets primarily exist at those higher price points, they are most susceptible to price sensitivity.

VR PRICE SENSITIVITY (BY AGE)

WHAT IS THE MOST YOU WOULD PAY FOR A VR HEADSET / SYSTEM?

Age	$100-$200	$201-$400	$401+
18-24	49%	31%	20%
25-34	43%	28%	29%
35-44	51%	24%	25%
45-54	57%	26%	17%
55-64	66%	21%	13%
65 or older	73%	21%	6%
All Ages	55%	25%	20%

Source: Thrive Analytics, ARtillry | N=1865

Broken down further, there is a clear correlation between price sensitivity and age. Younger consumers are more willing to pay greater sums for VR headsets. This is likely due to the same reasons (digital savvy, interest) that make them more attracted to VR in general, as explored above.
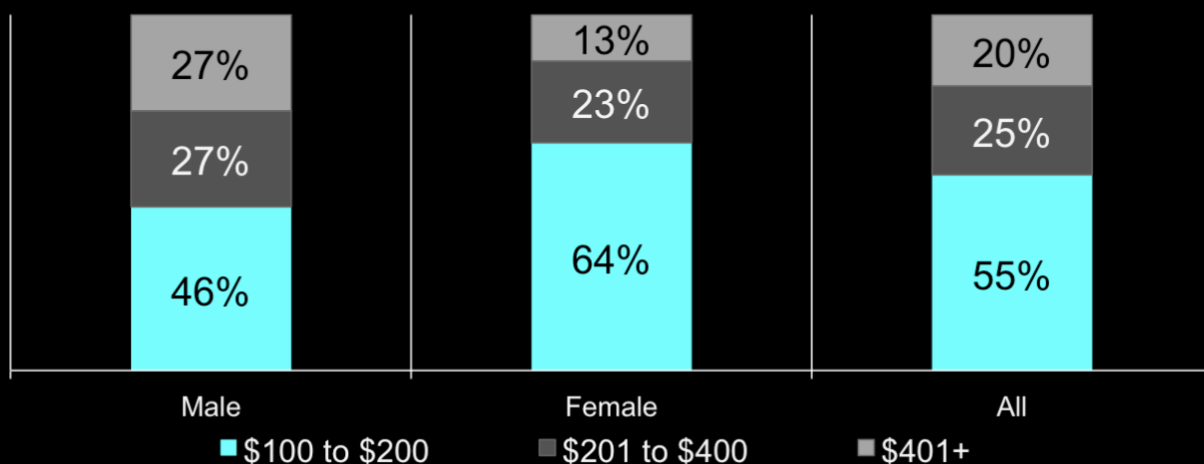
There is one exception however: The 25-34 age group showed greater willingness to spend than its 18-24 counterpart. This is likely due to the age group's spending power, given post-graduate and pre-parenthood life stages. It could therefore represent an important target demographic for VR.

As for gender segmentation, male respondents (27 percent) outnumbered female respondents (13 percent) in willingness to spend $400 or more on a VR headset. This stands to reason, generally mapping to gender-specific affinities for video games, which are VR's largest current use case.

VR PRICE SENSITIVITY (BY GENDER)

WHAT IS THE MOST YOU WOULD PAY FOR A VR HEADSET / SYSTEM?

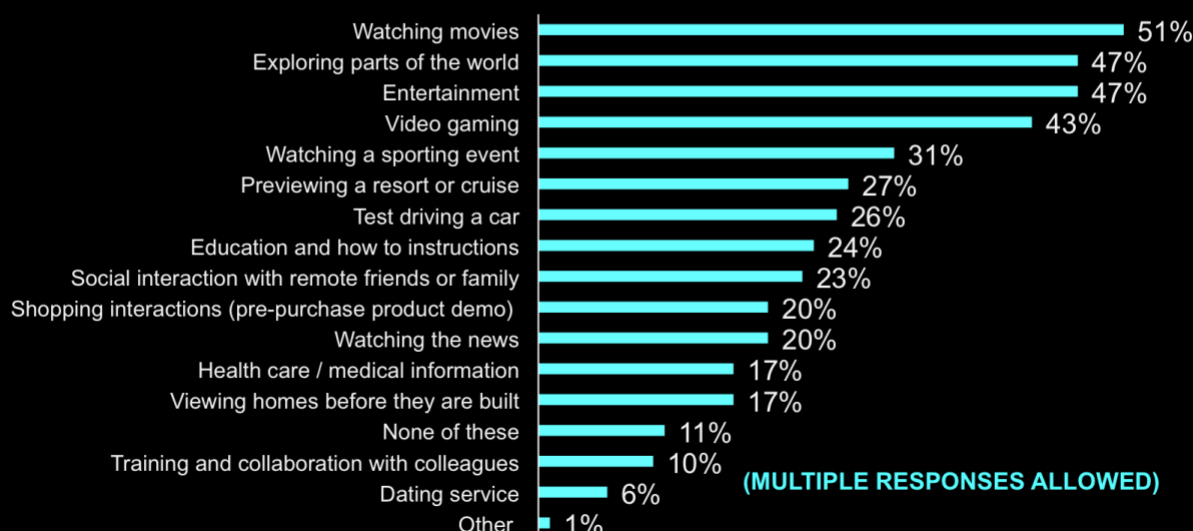|	Male	Female	All
$401+	27%	13%	20%
$201 to $400	27%	23%	25%
$100 to $200	46%	64%	55%

■ $100 to $200   ■ $201 to $400   ■ $401+

Source: Thrive Analytics, ARtillry | N=1865

Part IV: Applications

Drilling down yet another level, what are the VR applications and activities that most appeal to consumers? As examined earlier, content is key to VR adoption… and there must be enough of it to get consumers interested in adopting. But what kinds of content are they specifically looking for?

VR ACTIVITIES

WHAT VR ACTIVITIES WOULD MOST APPEAL TO YOU?

Activity	Percent
Watching movies	51%
Exploring parts of the world	47%
Entertainment	47%
Video gaming	43%
Watching a sporting event	31%
Previewing a resort or cruise	27%
Test driving a car	26%
Education and how to instructions	24%
Social interaction with remote friends or family	23%
Shopping interactions (pre-purchase product demo)	20%
Watching the news	20%
Health care / medical information	17%
Viewing homes before they are built	17%
None of these	11%
Training and collaboration with colleagues	10%
Dating service	6%
Other	1%

(MULTIPLE RESPONSES ALLOWED)

Source: Thrive Analytics, ARtillry | N=1865

The top result for favorable VR activities was watching movies. Though not very immersive (see section V), this was followed by potentially immersive activities like exploring the world (47 percent), watching sports (31 percent), test-driving a car (26 percent), and social interaction (23 percent).

These are the experiences to consider when exploring VR business opportunities, or evaluating its points of intersection with an existing business. Online travel booking and car shopping/comparison apps for example should look at the above results when devising product evolution strategies.

As for more altruistic VR applications – those that serve a greater good rather than a personal need – respondents rated medical training as the top use case. That was followed by education, communications for the elderly and mental therapy/conditioning. None of these were surprising.
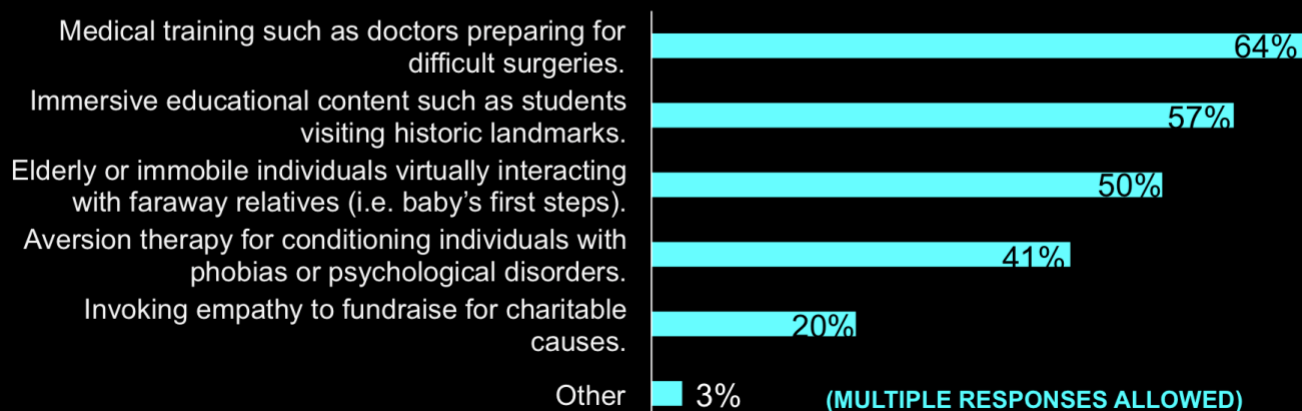
Meanwhile, activities that ARtillry believes are under-rated in these results include employee training and collaboration, social interaction, education and shopping interactions. These are areas we're examining and project strong long-term use cases for VR, despite lower reported interest today.

See the next section for more analysis on VR content/activity strategies.

PROJECTED SOCIETAL BENEFITS

WHAT VR APPLICATIONS DO YOU BELIEVE WILL HOLD THE MOST SOCIETAL BENEFIT?

Application	%
Medical training such as doctors preparing for difficult surgeries.	64%
Immersive educational content such as students visiting historic landmarks.	57%
Elderly or immobile individuals virtually interacting with faraway relatives (i.e. baby's first steps).	50%
Aversion therapy for conditioning individuals with phobias or psychological disorders.	41%
Invoking empathy to fundraise for charitable causes.	20%
Other	3%

(MULTIPLE RESPONSES ALLOWED)

Source: Thrive Analytics, ARtillry | N=1865

Part V: An Expansive Market

This report covers a large portion of the VR market in terms of today's products and use cases. But in a quickly evolving sector, there are other areas to acknowledge briefly. They include VR's use in enterprise (productivity, manufacturing, etc.), expansion of headset lines, price and native content.

Enterprise Expansion

Though a lot of attention around VR is fixed on consumers (including this report), there is equal if not greater potential in enterprise contexts. This is due to a clearer ROI in areas like remote collaboration and training, which can reduce travel costs, improve output and other measurable bottom-line impact.

"For us there are clearer benefits in the enterprise," Presence Capital Partner Amitt Mahajan told ARtillry. "You can really model out what [AR & VR] mean for business, or how much it's going to affect their bottom line and what that means in terms of a payback period for hardware investments."

Besides price and ROI, one of VR's (and AR's) biggest consumer adoption barriers is style, especially when asking someone to put something on their face. But that's not an issue at work, when style isn't really a factor, and where some individuals are already accustomed to wearing safety glasses.

"Almost all of the reasons to not adopt these things as a consumer go away in the enterprise," said Mahajan. "If you make an employee more effective, or you make it so that they are able to perform a job at all, the form factor does not matter. People will put that thing on."

Much of these claims apply in an AR context, in terms of graphics guided assembly that enhances one's field of view. But it can also very much happen in a VR context in terms of employee remote collaboration, or training. Walmart for example has recently adopted VR to train its employees.

Headset Expansion

This report examines the most prevalent headsets in the market. But that market is about to expand significantly. As capability improves and costs come down for VR components, we'll see Tier-1 VR capabilities packaged in smaller and more portable formats. This will drive new market entrants.

For example, Microsoft's Windows Mixed Reality (WMR) platform is being licensed to manufacturers such as Lenovo and Acer to build lower cost VR headsets that operate in tandem with Windows 10. These will exist somewhere between Tier 1 and Tier 2 in terms of quality, and be priced around $400.

Price Competition

$400 is a significant price point examined throughout this report. It's also the price that Oculus chose for its "summer of Rift" sale. Initiated in July, and returning to $499 in September, it has successfully boosted sales, according to Oculus. It also prompted HTC to lower the Vive price from $799 to $599.

These prices again must be qualified with the caveat that a PC with high-end graphical processing is required. So the "all-in" price for Rift and Vive usually exceeds $1000. The PSVR is $399, while the PS4 console is $399 and necessary peripherals can be $100+, altogether approaching $1,000.

Tier-2 headsets (Gear VR and Daydream View) cost between $59 - $129, and don't require a dedicated PC. They do require a compatible smartphone, but that cost can be negated for consumers who consider a smartphone an already fixed/sunk cost in their lives (most U.S. consumers).

ARtillry believes we'll see continued price competition, as emerging tech sectors often involve trading margins and unit economics for market share. The latter can produce greater long-term value, given that "platform wars" can be won on gaining early market share through device penetration.

This can have a domino effect, as content volume on a given platform is a function of the size and quality of the developer network working with that platform. Those developers are in turn attracted to platforms with the greatest revenue potential, which are often those with the greatest installed base.

And that starts with device penetration and competitive pricing. The lesson is to watch headset pricing and adoption as leading indicators for VR opportunity. Media companies looking for brand extension, for example, should develop apps on platforms with greater reach and demographic alignment.

Native Content

The most successful VR apps will apply "native thinking," meaning they're built specifically for the form factor. In other words, those that utilize the unique aspects of VR immersion tend to perform best. Those that take existing 2d media and shoehorn it into a VR view conversely do not resonate.

This is analogous to the "native thinking" that was a success factor among smartphone apps. Apps that utilize the unique hardware functions (accelerometer, GPS, camera, etc.) generally outperform those that simply put existing media on a smaller screen. The same principle will apply in VR.

Therefore, it's surprising to see activities like watching movies – a 2D format – score high on desired VR activities in VRM. The previous statement isn't meant to disparage consumer's stated interest, but to hypothesize that many won't know what they want until they try VR, as examined earlier.

In fairness, many of the high-ranking activities reported by VRM respondents do indeed have capacity for immersive and native experiences. These include exploring the world, watching sports, test driving a car, and social interaction. ARtilllry believes these areas represent strong business opportunities.

Related Viewing: Think Natively for VR

(Click URL)

https://youtu.be/Sk1cCxiUHXw?t=9m3s

Key Takeaways (Redux)

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  - This is a blessing and a curse: Though it results in high satisfaction levels, it requires direct experience that can't be replicated in commentary or marketing.
  - The industry's challenge is to bring technologically invasive experiences to the masses.

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  - This contrasts with owners' satisfaction, validating that you have to try VR to "get it."
  - This indicates two key areas of improvement for VR players: education and distribution.
  - Getting that "first taste" to the masses should be a key business objective for the industry.
  - Adoption accelerants include retail installations, VR arcades and Mobile VR.

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  - Content is currently a gap in VR's value chain, and a business opportunity for entrants.

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  - These areas are ripe for business opportunity, or synergies with existing businesses.

- The most successful VR apps will apply native thinking: building specifically for the form factor.
  - Just like with smartphones, apps that utilize unique aspects (i.e 3D immersion) will outperform those that shoehorn legacy 2D media it into a VR experience.

Takeaways are also highlighted throughout this report's main narrative.

About ARtillry

ARtillry is a publication and research firm that examines augmented reality (AR) and virtual reality (VR). Through writings 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://artillry.co/**

About Intelligence Briefings

ARtillry 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://artillry.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 ARtillry, covering emerging tech.

Mike is a frequent speaker at industry conferences such as VRLA, ad:tech and LeadsCon. He has authored in-depth reports on the changing tech & media landscape including social networking and mobile. 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. Mike was previously a San Francisco-based journalist for business and technology print publications, such as Red Herring, Business 2.0, and Mobile Magazine.

Note of Disclosure

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 results. Its mission is to provide superior research and support services that inspire clients to make smarter decisions. For more information or to contact, visit:

http://www.thriveanalytics.com

About Virtual Reality Monitor

Virtual Reality Monitor™ is Thrive Analytics' proprietary survey of virtual reality/augmented reality technology users. These surveys, conducted semi annually, 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 are used by marketers, product managers, consultants and other people working in the technology space.

Appendix: Headset Definitions, Analysis & Pricing

To provide more context to the narrative and analysis in this report, the below sections define each headset and its strengths and weaknesses.

Tier 1

Playstation VR

Price: $399 (plus PS4 console)
Estimated Units sold: 1 million

Analysis: PSVR's unit sales are greater than the Rift and VIVE because out of the gate, it's already compatible with an installed base of 60 million PlayStation4 units. That increases its addressable market and lowers the adoption barrier for many consumers, given that competing headsets require a designated PC purchase. However the PSVR lacks some of the feature advantages of competing systems such as resolution, field of vision, and its content library is narrower and focused mostly on games. Conversely, PSVR exceeds its Tier-1 competitors when it comes to social features. For example, it lets friends and family participate in or spectate VR experiences by mirroring game play on a nearby television. This adds a participative dynamic to some of VR's otherwise-isolating tendencies, and has boosted overall satisfaction levels, especially in family households.

HTC Vive

Price: $599 (plus dedicated PC)
Estimated Units sold: .42 million

Analysis: The Vive has the second highest unit sales in tier 1, mostly due to its longer tenure in the market. Due to supply chain and shipping delays, the Oculus Rift and PSVR entered the market later in 2016. Other Vive advantages include a better room scale tracking system (Valve's Lighthouse system) and more available content. The latter is a function of its content distribution model that utilizes the Steam platform, which is open for developer submissions. This has made it a favorite among developers. This is analogous to Microsoft's position in the PC world, compared with Apple's more gated approach to approved software. It is a double-edged sword as more content provides volume, but also quality control challenges. Vive has developed as more of an enterprise product (again like Microsoft) compared to the Oculus Rift's greater consumer appeal.

Oculus Rift

Price: $399 - $499 (plus dedicated PC)
Estimated Units sold: .24 million

Analysis: The Rift experienced many launch delays in 2016, including its anticipated Touch Controller. The hand controllers are now known as superior to competing HMD inputs, however delays to market hurt the Rift's market share. As stated above competitor HTC Vive has taken an open approach to content development; Rift has taken the opposite approach with a more strict set of standards for content distributed in its Home software distribution platform (again, like Apple). This has made it more of a consumer favorite, while developers and enterprises gravitate more towards the Vive's open and customizable parameters. Though the Rift has superior hand controllers, its room scale tracking system is inferior to HTC Vive. Rift further positioned itself advantageously in July when it dropped the bundled price of its headset and touch controllers to $399 (previously $599).

Tier 2

Samsung Gear VR

Price: **$99 - $129 (plus compatible smartphone)**
Estimated Units sold: 5 million

Analysis: Gear VR is the best selling headset on the market, due partly to its low price and the inherent benefits of mobile VR. Headsets in this category utilize the device that many consumers already own, rather than requiring an additional costly PC rig. Gear VR's sales volume also result from its tenure in the market. Its closest competitor — Daydream View — only recently entered the market (October 2016). However, Daydream has the potential to outpace Gear VR due to Google's reach and developer network (see below). Samsung is further challenged by the stain left by the Galaxy Note 7 recall. Beyond PR, the loss of that device drastically reduced the addressable market of compatible Gear VR handsets, creating a gap for competitors.

Google Daydream View

Price: **$59 - $99 (plus compatible smartphone)**
Estimated Units sold: .26 million

Analysis: Though Daydream View entered the market later than Gear VR, we believe it will outpace its tenured counterpart. Its growth and eventual market share will result from Google's advantages. For one, it has a massive developer network built from the Android operating system, on which the Daydream platform is based. This will amplify the device's consumer appeal with more content. That content will then compel more device manufacturers to build Daydream-compatible handsets. This virtuous cycle will create a more attractive choice for consumers than Gear VR. Its growth will mirror (in magnitude and model) that of the Android mobile operating system. Importantly, Google is also motivated and vested in Daydream becoming the center of the next major computing platform — just

as it did with Android and the smartphone revolution. This outlook indicates that Google will put a lot of muscle behind the Daydream platform.

Tier 3

Google Cardboard

Price: $0 - $15 (use with any smartphone)
Estimated Units sold: 10 million

Analysis: Google Cardboard matches Gear VR for the highest selling VR headset, though some consider it not worthy of that designation. It has achieved this status due simply to one factor: cost. Literally made of cardboard, it requires low cost components and a wide compatibility of smartphones. Much of its market penetration in fact has been a result of promotional giveaways in conference SWAG bags or the New York Times' famous cardboard distribution campaign. This was to seed its VR content for embedded reporting and video essays. The user experience is rudimentary, but has served to many as the "gateway drug" for VR. Google will put more effort into Daydream (and its Tango AR platform), but cardboard will still be supported in efforts to distribute VR to developing nations and within schools globally.