



# ARTILLERY INTELLIGENCE BRIEFING

MOBILE AR USAGE & CONSUMER ATTITUDES

APRIL 2019

PRODUCED IN PARTNERSHIP WITH



**Thrive Analytics**  
smart decisions that drive success

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# Executive Summary

How do consumers feel about mobile AR? Who's using it? How often? And what do they want to see next? Perhaps more importantly, what are non-users' reasons for disinterest? And how can app developers and anyone else building mobile AR apps 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 3000 U.S. adults in Thrive's established consumer survey engine. The results are in and we've analyzed the takeaways in a narrative report.

This follows the last few months' ARtillery Intelligence Briefings, which examined social and commerce-based AR. Now, a deeper view into real consumer usage and attitudes validates those narratives while providing new dimension on mobile AR strategies and opportunity spotting.

As for the findings, mobile AR usage is up to 22 percent of the U.S. population. These users are mostly experiencing mobile AR through apps, such as those built on ARkit and ARCore. But we see trending towards lower-friction experiences such as "AR-as-a-feature" and web AR.

Mobile AR users also appear active and engaged across the board, with more than half reporting that they use mobile AR at least weekly. The top app category is gaming, which we attribute to Pokémon Go's popularity. But other key categories, such as Social AR and visual search, are on the rise.

Mobile AR users also indicated high levels of satisfaction with the experience. But beyond these and a few other positive signals, there are some negative signs and areas for improvement. For example, non-mobile AR users report low likelihood of adopting soon, and an explicit lack of interest.

This disparity between current-user satisfaction and non-user disinterest continues to underscore a key challenge for AR: you have to "see it to believe it." In order to reach high satisfaction levels, apps have to first be tried. This presents marketing and logistical challenges to push that "first taste."

Put another way, AR's highly visual and immersive format is a double-edged sword. It can create strong affinities and high engagement levels. But the visceral nature of its experience can't be communicated to prospective users with traditional marketing such as ad copy or even video.

The same challenge was uncovered in our corresponding VR report last July<sup>1</sup> (we'll publish the second wave in Q3). This makes it a common challenge with immersive media like AR and VR. It will take time and acclimation before they reach a more meaningful share of the consumer public.

Meanwhile, there are strategies to accelerate that process, and to build AR apps that align with consumers' current standards. In the coming pages, we'll examine those strategies and unpack the full set of survey results. This is meant to empower readers with a greater knowledge position.

# Key Takeaways

*Key takeaways are also highlighted throughout the main body of this report.*

- 22% of consumers have tried mobile AR.**
  - ☞ This represents healthy adoption, but also substantial headroom to grow.
  - ☞ We expect adoption to accelerate in future VRM survey waves, similar to early smartphone adoption.
- 47% have used ARCore apps, 36% ARkit apps, 46% AR-as-a-feature, and 16% web AR.**
  - ☞ Though apps have an early lead, web AR's advantages will vault it forward in the coming years.
  - ☞ AR-as-a-feature (AR within non-AR apps) represents a low-friction user access point and distribution strategy.
- 76% of mobile AR users are active at least monthly. 52% are active weekly or greater.**
  - ☞ Active frequency is a key mobile app metric that impacts monetization potential, such as in-app purchases.
  - ☞ Mobile AR that fuses novelty with frequency (e.g. social messaging) can achieve high active use and retention.
- Games lead mobile AR usage (82%), followed by social (37%) and product visualization (25%).**
  - ☞ Social app success can result from sticky/frequent behavior, viral growth and network effect.
  - ☞ Product visualization succeeds on saving users time and money through more-informed purchases.
- Mobile AR users want more AR games (75%), city guides (41%), sports (33%) and retail apps (31%).**
  - ☞ AR city guides and retail apps are inherently monetizable, and offer possibilities for brick & mortar innovation.
- 76% of mobile AR users report high or very high satisfaction.**
  - ☞ There are few consumer products (including VR) that show such high satisfaction levels.
  - ☞ AR's visual and immersive format can captivate consumers as a departure from routine mobile interfaces.
- 54% of non-mobile AR users report definitive disinterest, and 19% report confusion.**
  - ☞ These findings signal a need for better consumer education and outreach.
  - ☞ Mobile AR will slowly assimilate, but can be accelerated with aforementioned components like social and gaming.
- Stark variance between user and non-user attitudes underscores AR's double-edged sword.**
  - ☞ Users are highly engaged, but getting them to that point requires pushing a "first taste" on a wide scale.
  - ☞ AR's visual and visceral state can't be captured in ad copy or video, creating a marketing challenge.
- 53% of mobile AR users will pay \$1.00 or more for apps. 13% will pay \$5.00 or more.**
  - ☞ This is a strong demand signal, and compares to greater price sensitivity in the broader app universe.
- 21% of non-users will pay \$1.00 or more for apps. 43% won't pay any amount.**
  - ☞ Price sensitivity underscores another stark variance in attitudes between users and non-users.
- In-app purchases (IAP) showed strong acceptance among users (23%) and non-users (28%)**
  - ☞ IAP should always be considered as it addresses the largest range of interests.
  - ☞ Pokémon Go has made more than \$2 billion to date through IAP
  - ☞ Revenue per user is often greater with IAP due to proven behavioral economics of micro transactions.
- AR's true widescale adoption will hinge on the release of a killer app in the next year.**
  - ☞ There's not enough of an adoption impetus yet for mainstream consumers to flock to AR en-masse.
  - ☞ Broad AR appeal and high-frequency use could result from mundane "all-day" utilities such as visual search.
  - ☞ Developers' acclimation and "native footing" is underway and will be a key factor in bringing a killer app to market.

# Introduction: A Snapshot

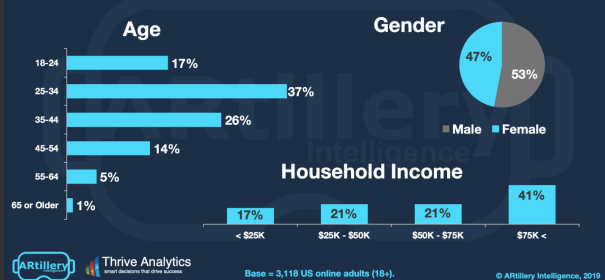
The last few ARtillery Intelligence monthly reports have covered topics like social AR and commerce. This compelled us to follow up with additional dimension into AR strategies. And the best way to do that is to ask consumers how they feel. So we helped produce the latest AR consumer survey.

Working closely with our consumer data partner [Thrive Analytics](#), ARtillery Intelligence wrote questions to present to a sample of more than 3000 U.S. adults. This represents the third wave of Thrive's [Virtual Reality Monitor](#).<sup>ii</sup> And now that the results are in, there are several implications and takeaways.

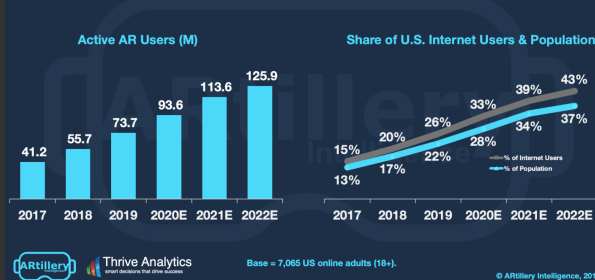
The survey results are a telling snapshot of mobile AR adoption, which we'll detail in the coming pages. That will include charts and a narrative story arc that unpacks strategic takeaways, and our outlook for mobile AR. But before we take a deeper dive, here's the highlight reel of survey findings.

- 22% of consumers have tried mobile AR.
- 47% have used ARCore apps, 36% ARkit apps and 16% have used web AR.
- 78% of mobile AR users are either satisfied or very satisfied.
- 76% of mobile AR users are active at least monthly, 52% are active at least weekly.
- 82% of mobile AR users have used games, 37% have used social apps.
- 75% of mobile AR users want more games, 44% want education apps and 41% want city guides.
- 53% of mobile AR users would pay \$1.00 or more for an app, 13% would pay \$5.00 or more.
- 43% of non-mobile AR users are unwilling to pay any amount for mobile AR.
- 60% of non-mobile AR users are unlikely or extremely unlikely to try mobile AR.

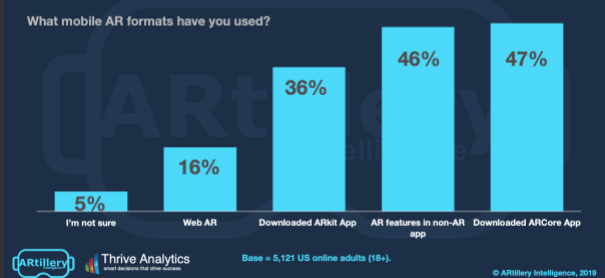
## Mobile AR User Profile



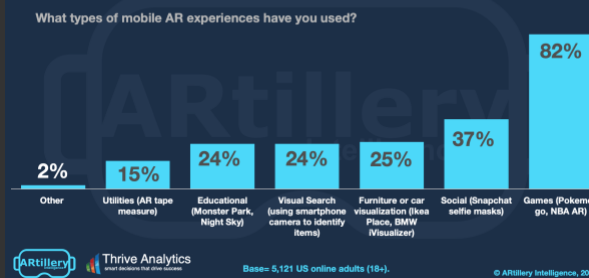
## U.S. AR Users 2017-2022



## Mobile AR Formats



## Mobile AR Categories





# Survey Audience: The “Who?”

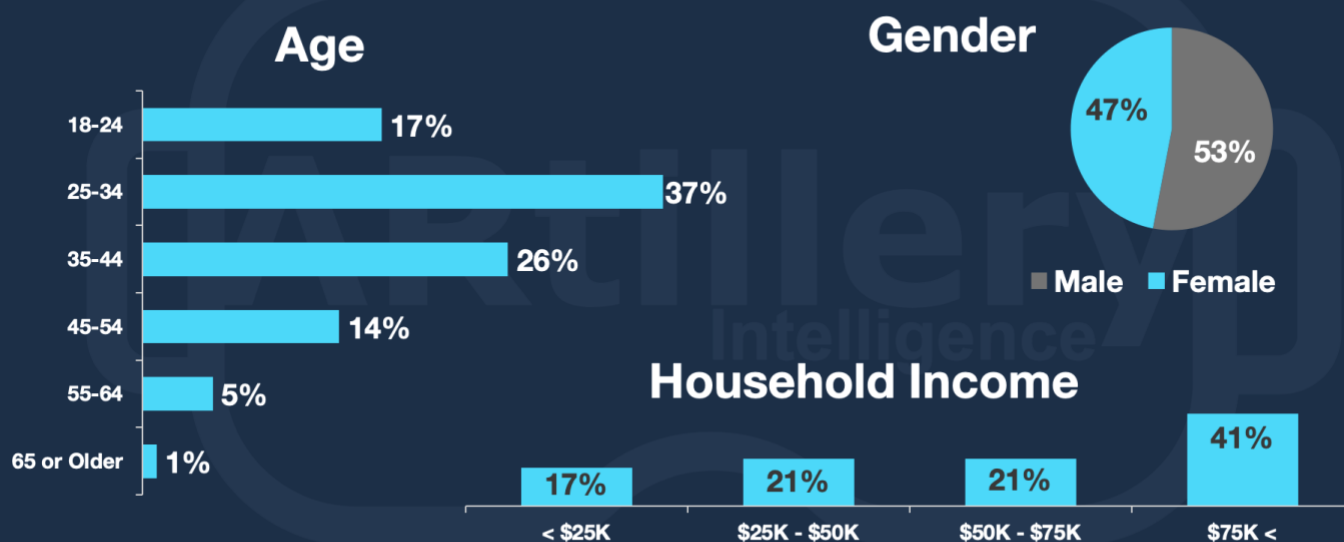
To first add context to survey findings throughout this report, who’s answering the questions? It includes more than 3000 U.S. adults. Going deeper into demographics and psychographics, AR users break down as shown below. More detail and segmentation are available on request.

As the data show, the segment of AR users spans a wide range of U.S. adult consumers. Gender breaks down fairly evenly, while age and income levels skew towards attractive demographic groups. That includes active and buying-empowered age groups (25-34), and high-income homes (\$75K+).

This is all a function of Thrive Analytics’ longstanding position and strategy development in consumer surveys. Its time-tested methodology and survey network comply with industry standards and best practices. ARtillery will continue working with Thrive for annual AR and VR consumer surveys.

“AR and VR are in initial adoption stages,” said Thrive Analytics managing partner Jason Peaslee. “This means user behavior and affinities are still developing, just as we saw in early stages of past tech adoption cycles. AR & VR have the ability to transform the way people work, connect, and learn, so we’ll continue to track the consumer adoption that informs product and business strategies.”

## Mobile AR User Profile

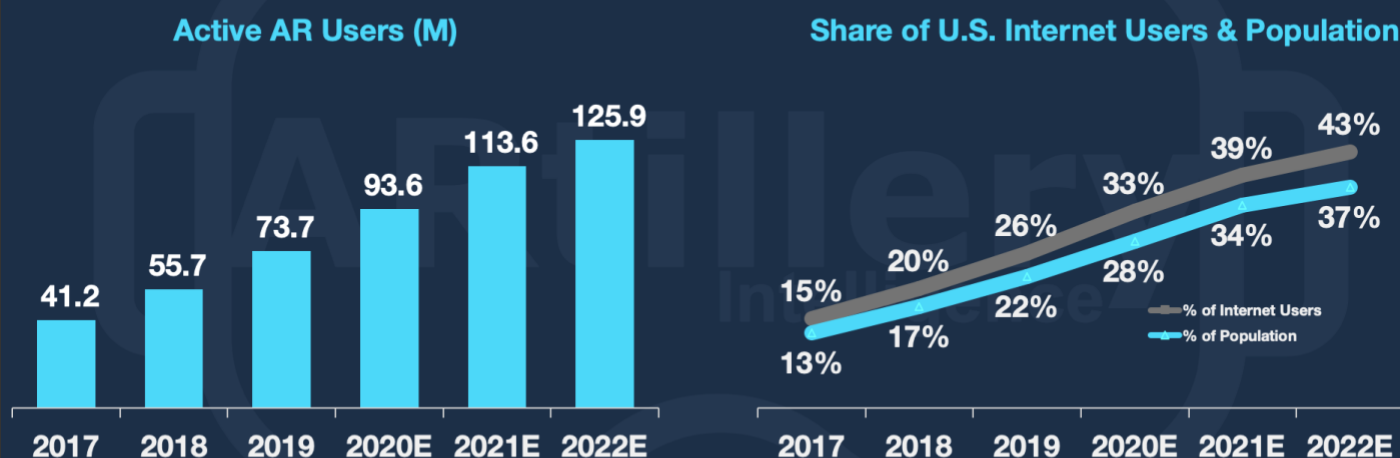


# Usage: The “How Many?”

Starting our analysis at the very top, what’s the overall penetration and adoption of mobile AR among consumers? Survey results indicate that it currently stands at **22 percent** of the U.S. population. This isn’t surprising, however it’s slightly greater than anecdotal evidence would suggest.

This is a positive sign for the health of consumer-based mobile AR: **These figures represent a combination of healthy adoption (considering the early stage) and lots of room to grow.** We expect usage levels to accelerate quickly in future survey waves, similar to early smartphone adoption.

## U.S. AR Users 2017-2022



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Base = 7,065 US online adults (18+).

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# Formats: The “How?”

Drilling down one level, how are AR users consuming the experience, and in what formats is it being delivered. **Given that Apple and Google’s respective AR app developer kits (ARkit and ARCore) have “democratized” and popularized mobile AR, they are the leading delivery channels in early days.**

Specifically, **47 percent** of AR users report using ARCore apps while **36 percent** report using ARkit apps. This is somewhat surprising due to these platforms' market shares. Though ARCore will eventually reach the larger Google Android universe, ARkit has an early lead of compatible iPhones.<sup>iii</sup>

But more interesting is what lies beyond these two platforms. As we've examined<sup>iv</sup>, apps might not be the best vessel for AR, given download friction and other dynamics. So we're bullish on two other formats represented in these results – one that's already outperforming and one that's emerging.

The outperforming format is what we call "AR-as-a-feature." This lowers adoption barriers by planting AR functionality right within already-well travelled apps. **This gives AR a sort of "training wheels" approach, before it's popular enough to compel its own dedicated apps and destinations.**

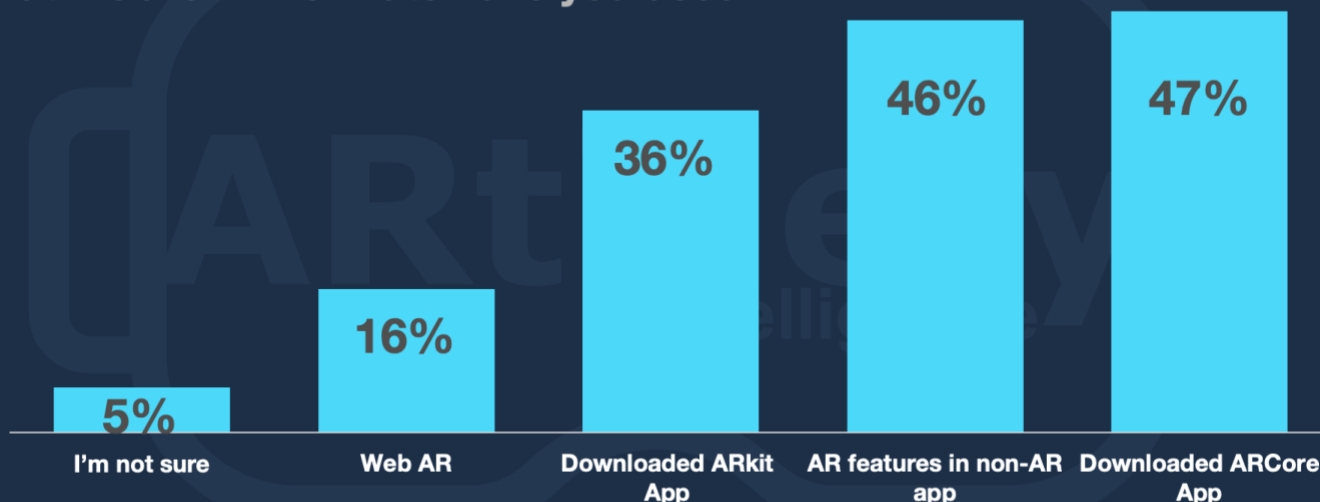
In fact, the most popular flavors of AR date are Pokémon Go and Snapchat Lenses. Both of these fall into the category of AR-as-a-feature. They are or include AR features within more broadly defined (non-AR) apps. They've also interestingly received the most AR traction without ever saying "AR."

The second area we're bullish on is Web AR. These are AR experiences delivered in the mobile browser. **Because AR is so nascent, the friction involved in downloading apps makes web AR easier to access. Its also avoids fragmented platforms and compatibility issues that can diminish reach.**

Web AR still has some quality and capability deficiencies compared to apps, but that's quickly changing due to the work of innovative startups like 8<sup>th</sup> Wall. ARtillery Intelligence will circle back to this topic in an upcoming report, but for now these survey results are promising for web AR.

# Mobile AR Formats

What mobile AR formats have you used?





# Content: The “What?”

Drilling down yet another level, what content categories are mobile AR users consuming most? As mentioned, the most popular flavors of AR so far are Pokémon Go (PGO) and Snapchat Lenses. So naturally, our survey results peg gaming (82 percent) and social (37 percent) as top categories.

As a matter of process and methodology, we should mention here that we explicitly name these experiences as examples when asking survey respondents about the corresponding categories. In order to avoid false positives, it’s always good to be very specific in survey questionnaires.

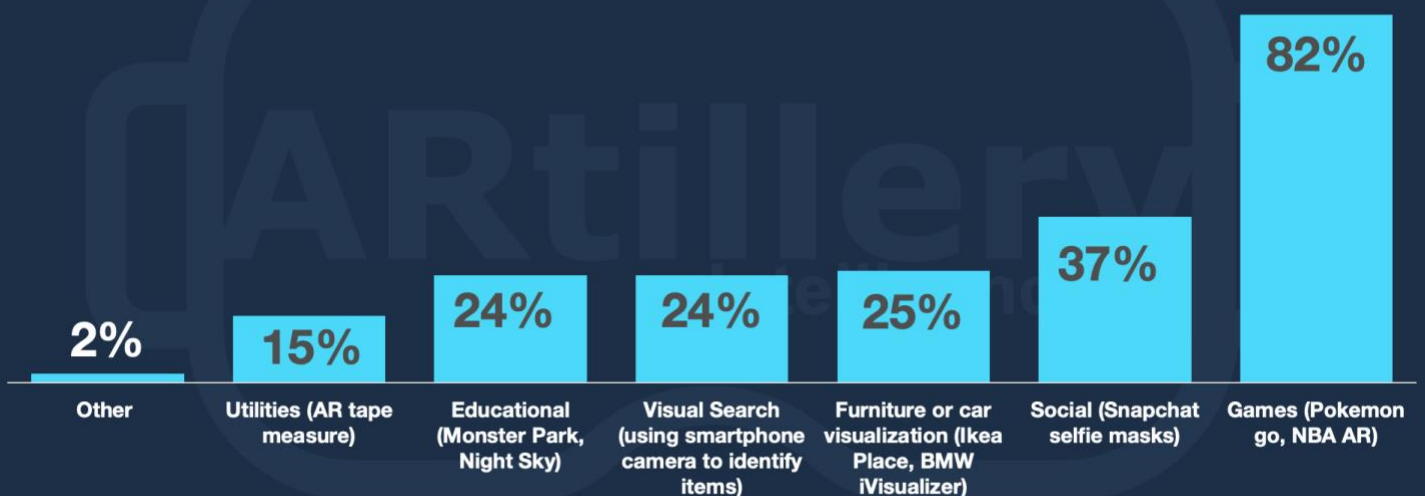
While we’re at it, we’ll address another looming question: Are Pokémon Go and Snapchat Lenses AR? Many purists argue that they are not. Our take is that any graphical, audible or geographically-contextual augmentation (as is the case with PGO) fits a broad definition of “augmented reality.”

As for the factors that have caused this user traction, Pokemon Go has an optimal mix of game mechanics, leveling up, challenging play and contextual augmentation. The latter involves geographically relevant game elements, which create a sense of discovery and accomplishment.

For social AR Lenses, success factors include simplicity and virality. There is a fun element, amplified by social-graph driven network effect and viral growth. This has caused Snapchat and Facebook to reach television-sized audiences such as 700 million lenses viewed on New Year’s Eve.<sup>v</sup>

## Mobile AR Categories

What types of mobile AR experiences have you used?



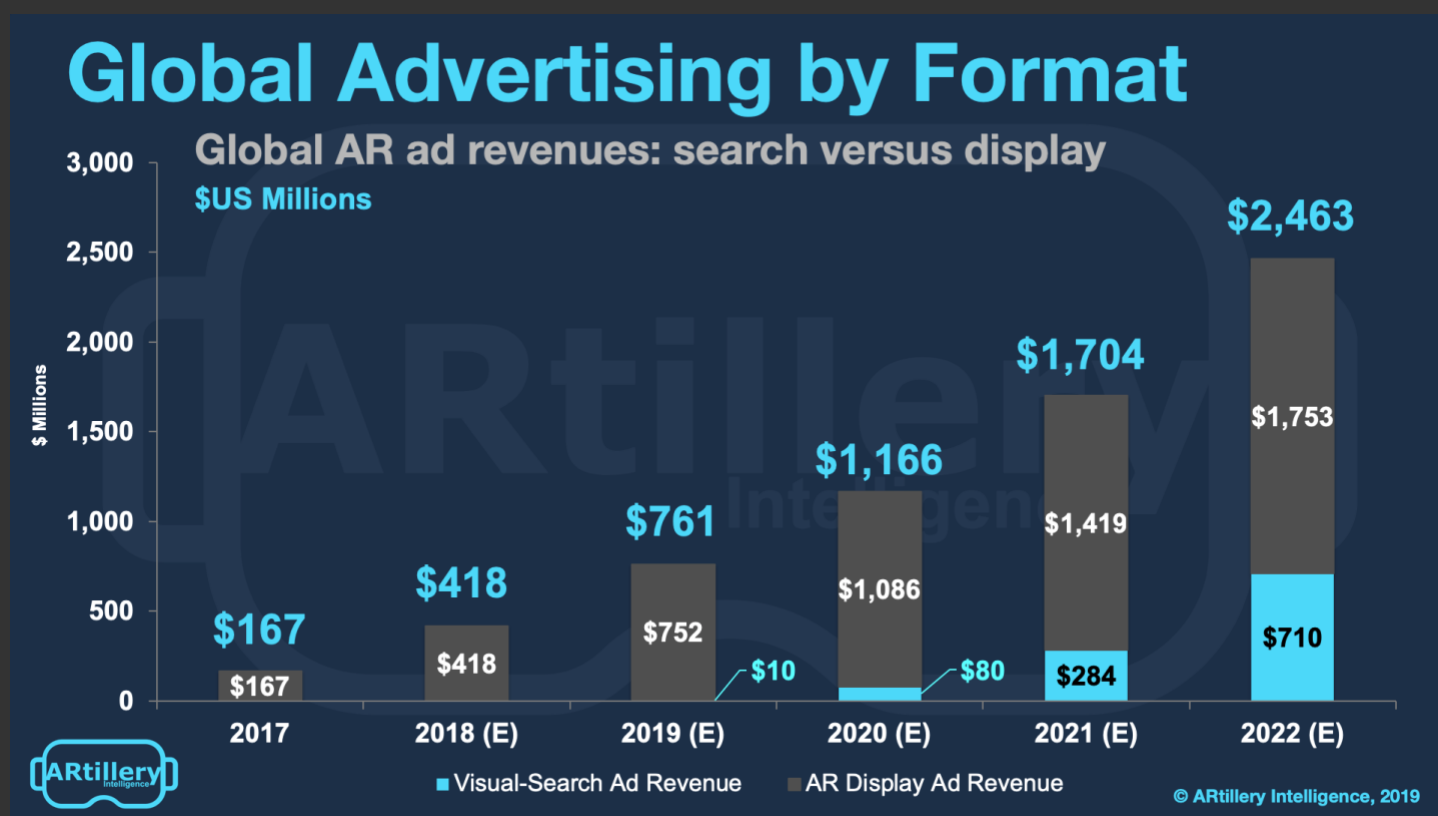
The thing to watch next is Facebook's growth in social lenses. Though Snapchat enjoys an early lead, Facebook's operational scale and global installed base make it more likely to pull ahead. That includes several distribution points such as the News Feed, Messenger and the mighty Instagram.

The motivating factor for Snap and Facebook is high engagement and repeat use, validated by their own numbers and these survey figures. That not only keeps users in their walled gardens but directly monetizes: Branded lenses drove about \$408 million last year, growing to \$1.7 billion in 2022.<sup>vi</sup>

To acknowledge other categories, product visualization (25 percent) and visual search (24 percent) offer users value. Though less frequent, product visualization apps like IKEA Place and BMW's iVisualizer can save consumers time and headaches by enabling informed purchases.

Visual search likewise provides utility in letting users "search what they see," by pointing the camera at real world items. As shown in Google Lens<sup>vii</sup> visual search is not only valuable to users but has commercial potential. Google views this as another input on which to cultivate monetizable searches.

But more importantly, visual search has the potential to be an "all day" use cases with versatility and broad application. The ability to pull out your phone and identify items – commercial or not – can happen in lots of daily contexts. So it has the potential for a key AR success factor: frequency.



# Frequency: The “When?”

Picking up where the last section left off, a key variable in tracking mobile AR success is how often it's being used. As we've written, AR is a snack (VR is a meal). [So shorter sessions should be counterbalanced by high-frequency.](#) The name of the game is to instill active use or “replayability.”

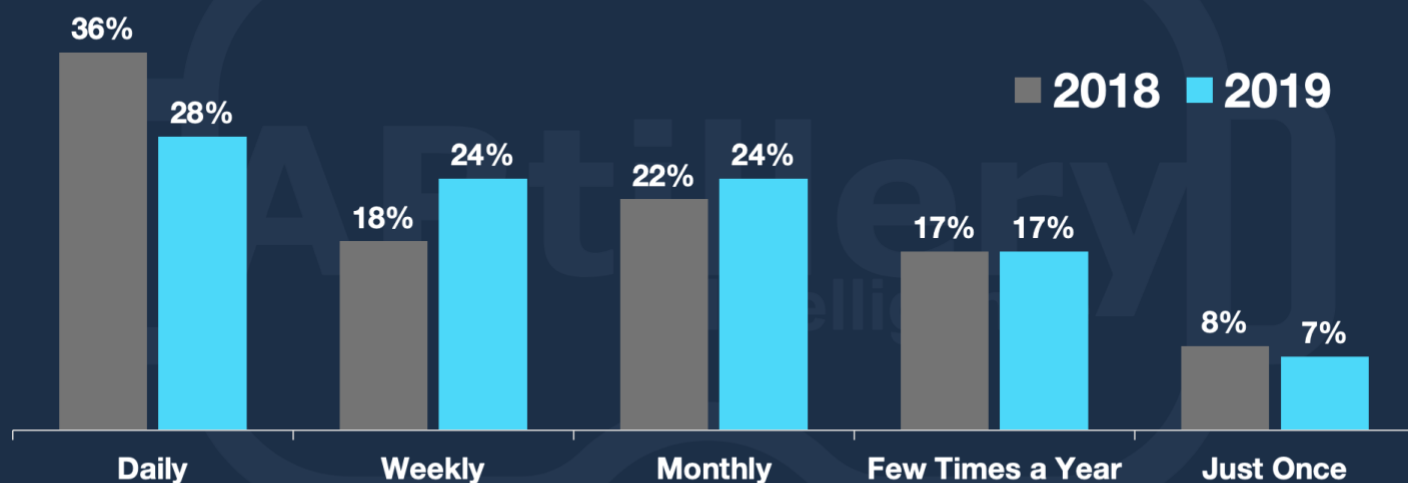
Mobile AR experiences that fuse the novelty of augmentation with frequent or repeatable activities show the most monetization potential (e.g. in-app purchases). These “sticky” behaviors include social messaging, gaming, and commerce-related functions. These are things that happen daily or more.

Drilling into the data, [82 percent](#) of mobile AR users are active at least monthly, [52 percent](#) do so at least weekly, and [28 percent](#) daily. These are relatively high figures by mobile app standards,<sup>viii</sup> and indicate that the active-use challenges endemic to mobile apps aren't as great in AR.

That's the good news. The bad news is that daily active use is down from 2018. We attribute this to the novelty that drove last year's daily active usage. [There's been a bit of a backlash to AR's initial hype and inflated expectations,](#) but active usage will bounce back as experiences continue to evolve.

## Mobile AR Frequency

How often do you use mobile AR?



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Base = 5,121 US online adults (18+).

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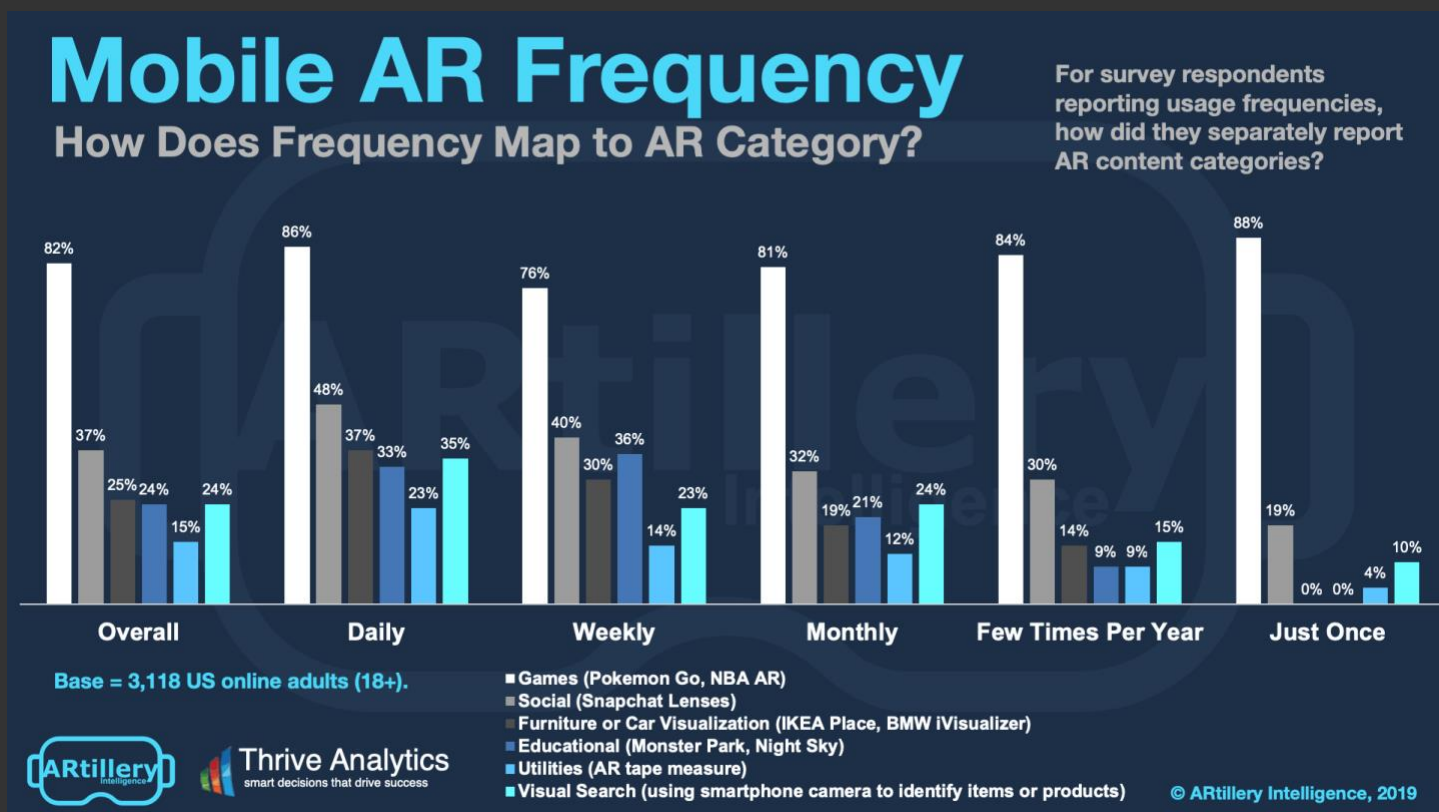
# Deeper Dive: Frequency + Content

Staying with the topic of frequency, we can gain added dimension by combining the variables that have been examined so far. In other words, what *types* of AR experiences are driving the most repeat usage? And how does reported AR frequency map to the types of AR that are being used?

To do this, we cross-referenced some of the survey results. For survey respondents reporting usage frequencies, how did they separately report the AR content categories they were using? Just like in the overall content breakdown examined earlier, AR gaming leads various usage frequency levels.

But going deeper into AR categories at different frequency levels reveals new insights. For example, social AR and product visualization were used most by respondents who reported daily use. [This indicates these two AR use cases are naturally recurring and can be used to boost engagement.](#)

Visual search had an even greater divergence of use across frequency levels. Its share of users was greatest among those that reported daily AR use ([35 percent](#)) compared to weekly ([23 percent](#)) monthly ([24 percent](#)) or just once ([10 percent](#)). It's a strong signal for visual search's business case.



# Satisfaction: The “How Good?”

Another positive sign for mobile AR is satisfaction levels that users report. **78 percent** report either high (**47 percent**) or very high (**31 percent**) satisfaction levels. **18 percent** remain neutral and only **four percent** report low or very-low satisfaction. This remains mostly on track with last year’s findings.

In fact there are few consumer products that show such high satisfaction levels. As a point of comparison, the VR findings from Virtual Reality Monitor that we examined in last July’s Intelligence Briefing<sup>ix</sup> were likewise high. But they were still slightly lower than these reported AR sentiments.

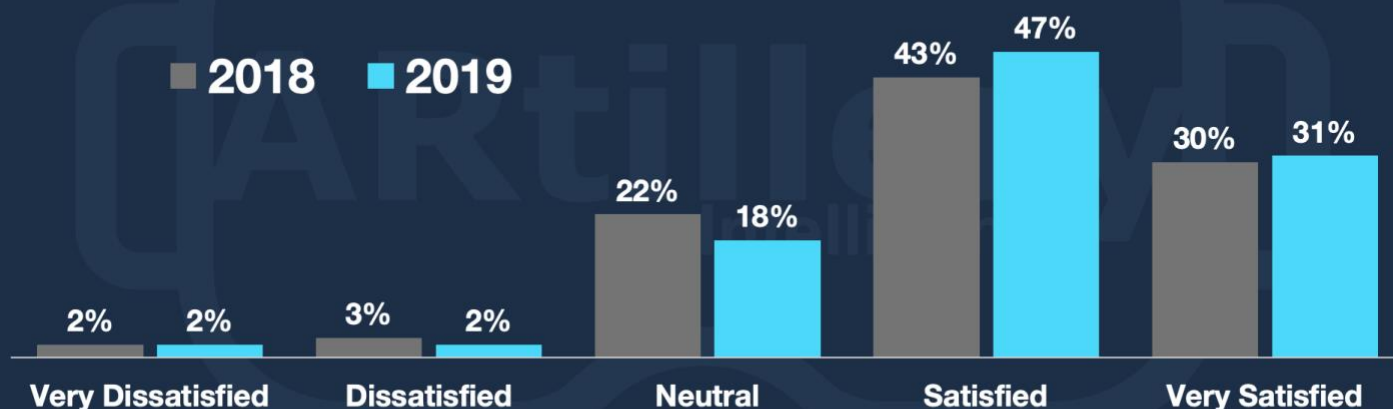
This tells us a few things. For one, AR’s highly visual and immersive format is already proving to captivate consumers. **This is largely due to its revolutionary – rather than evolutionary – interface when compared with non-immersive mobile app experiences that have become routine.**

It also counters some of the anecdotal observations we and others have made about the sub-par and underwhelming state of mobile AR experiences so far. **We stand by the assertion that apps will evolve a great deal, just as early iOS apps did, but high satisfaction is happening already.**

With two waves of survey research, consistent findings is another point of validation. Indeed, with a larger collective sample and two waves of research, consistently-higher than expected satisfaction levels can’t be chalked up to anomaly. And future waves will provide additional longitudinal analysis.

## Mobile AR Satisfaction

How satisfied are you with mobile AR?





# Deeper Dive: Frequency + Satisfaction

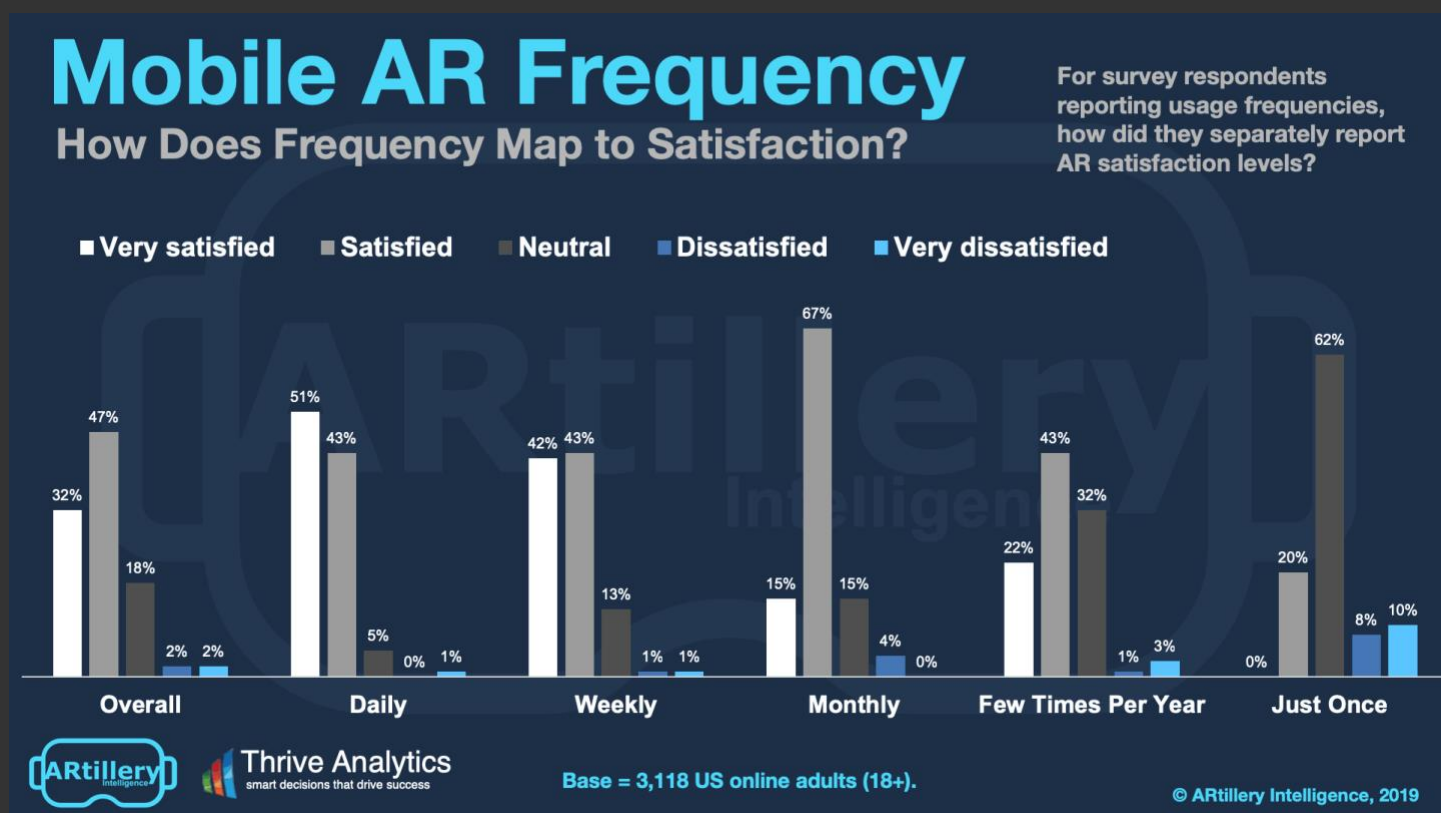
As we did earlier, we'll now cross reference different sections of the survey data to gain additional insight. The question is, how do the above satisfaction ratings relate to the usage frequency levels that were examined earlier? Or, how does AR usage frequency map to satisfaction levels?

To do this we examined the range of reported usage frequency levels, then referenced how those respondents separately reported AR satisfaction levels. **The high-level takeaway is that the greatest satisfaction was reported for daily users, while moderate satisfaction was highest for monthly users.**

This isn't surprising, as frequency should map to satisfaction. But a few nuances emerge. For "satisfied" users, monthly use (67%) exceeds daily and weekly use (43% each). But "very satisfied" users show the opposite, with much stronger daily (51%) and weekly (42%) than monthly (15%) use.

The takeaway is that there is a big jump in frequency that can be achieved by turning users from satisfied to very satisfied. **That should be an obvious goal of any product, but the takeaway here is that there is an outsized payoff in usage frequency which directly impacts monetization potential.**

Converting such users from satisfied to very satisfied will involve AR product and UX tactics that continue to develop. So far, they include some of the lessons examined earlier, such as adding social components (e.g. messaging), utility and gamification features to any given AR experience.





# The Bad News

Returning to overall AR satisfaction levels examined earlier, positive results are offset by negative signals from AR non-users. Specifically, **53 percent** report that their reason for disinterest is “just not interested.” This rather definitive and discouraging sentiment represents a key challenge for AR.

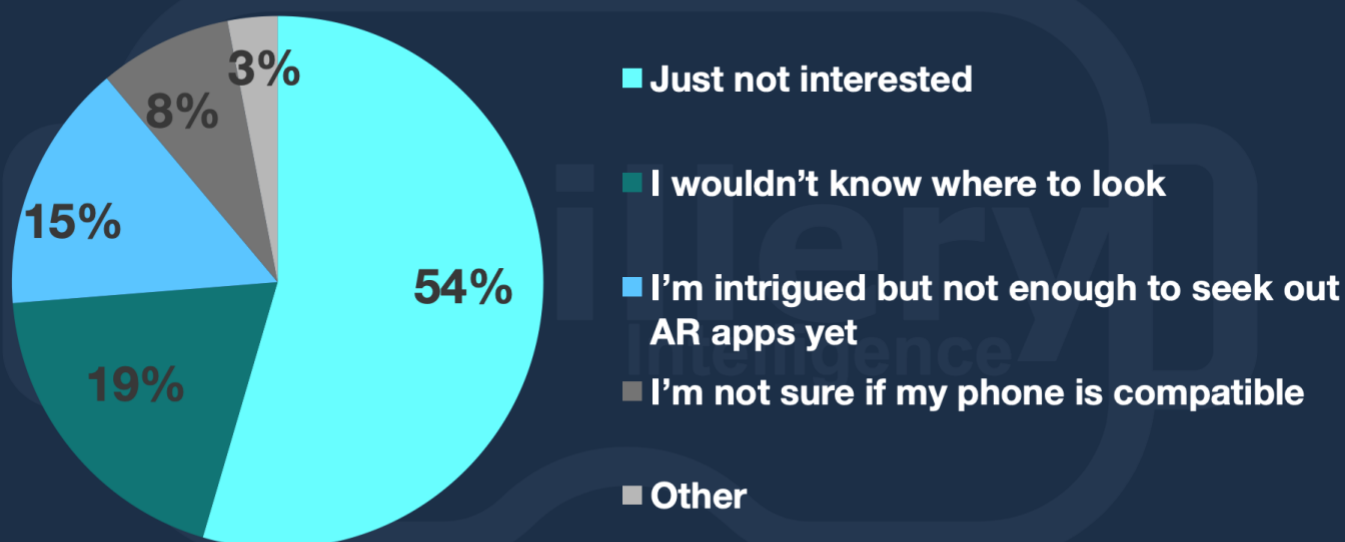
Adding to that, **28 percent** report confusion with mobile AR. That includes “I wouldn’t know where to look,” (**19 percent**) and “I’m not sure if my phone is compatible” (**8 percent**). Meanwhile, **15 percent** reported interest but not enough to go through the trouble of looking for and downloading AR apps.

As for the “just not interested” crowd, that’s perhaps the most damning of these non-user responses. Not only is it supportive of more consumer education, like the above points, but it highlights a key challenge for immersive tech. Because it’s so visual and visceral, you have to see it to believe it.

In other words, the variance in satisfaction for users and non-users underscores AR’s marketing challenge. **People love it after they get a taste... but you have to get them to taste it before achieving that coveted point of satisfaction.** And with AR, it’s difficult to do this through ad copy or video.

This will slowly alleviate over time as mobile AR naturally assimilates into the consumer population through viral and other means. **Meanwhile, adoption for any given app can be accelerated through gamification and social features that carry the experience to more users via network effect.**

## Mobile AR Reasons For Non-Use



# So You're Saying There's a Chance...

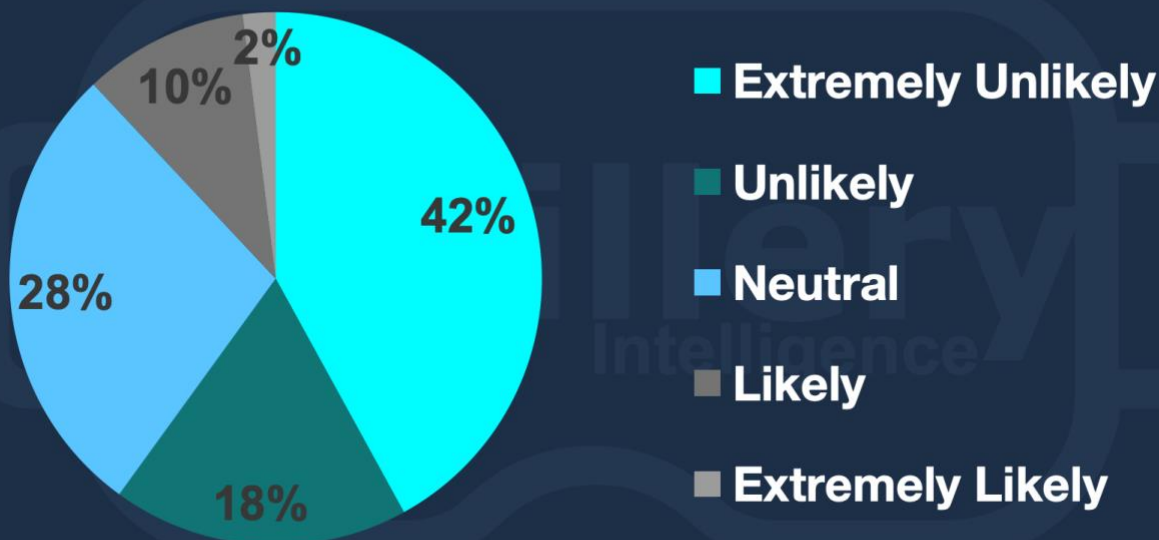
Going beyond reasons for disinterest, we asked the same non-users about the likelihood of being swayed by mobile AR in the next 12 months. There, the answers were similarly discouraging, with the majority of respondents (60 percent) reporting that they're unlikely or extremely unlikely to adopt.

These findings, along with those in the previous section, signal a need for better consumer education. This is especially true for the technologically-confused sentiments (e.g. "wouldn't know where to look"). Education will partially come from partnerships with mobile carriers or retail installations.

In fact, Magic Leap has done both through a partnership with AT&T to bring Magic Leap to AT&T stores. Though it's not mobile AR, the lesson is the same: consumer acclimation is needed. As Magic Leap CEO Rony Abovitz once said (paraphrasing) "Selling AR is like selling TV sets on the radio."

This speaks to the challenge explored above in terms of marketing AR. It will recede as consumers develop more acclimation and comfort levels. But for now, this should signal the industry that AR remains in "techy" territory in terms of confusion and other factors that require consumer education.

## Mobile AR Adoption Likelihood



# Price: The “How Much?”

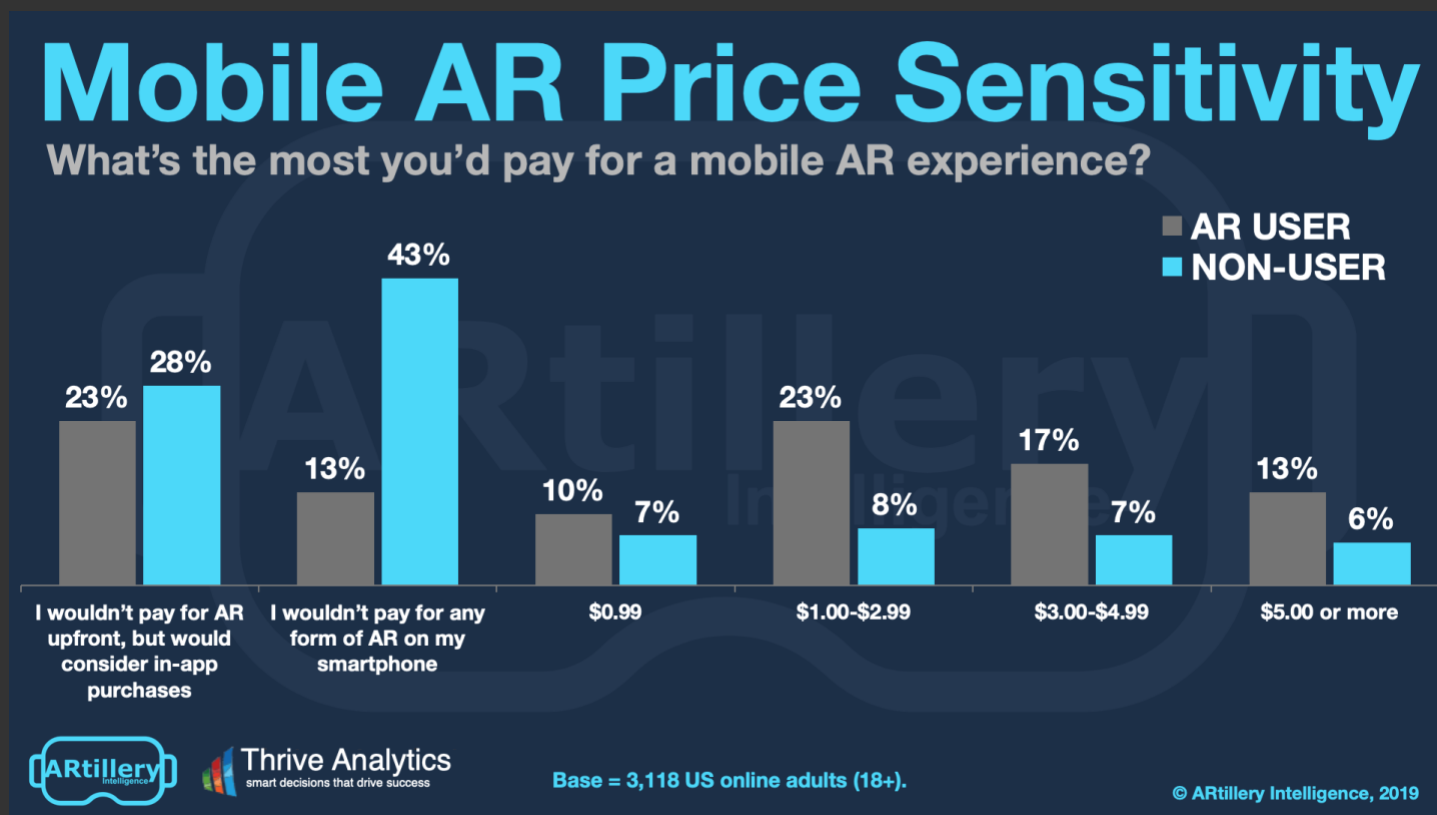
Next on the list of survey questions is the all-important matter of price. Once again, this is delineated between mobile AR users and non-users – with varying responses for each. Starting with users, 53 percent will pay \$1.00 or more for AR apps. And 13 percent will pay more than \$5.00

This is a strong demand signal, considering greater price sensitivity in the broader universe of mobile apps. We attribute this higher willingness to pay for mobile AR to the same factors explored earlier regarding satisfaction. High satisfaction with AR logically correlates to more willingness to spend.

Further delineating AR users’ cost sentiments, the “magic price” seems to be between \$1.00 and \$3.00. In fact, 23 percent of users indicated interest at this price point, a statistically significant increase from other price thresholds. Only in-app purchases scored higher (more on that in a bit).

Meanwhile, non-users sing a different tune for price sensitivity. Only 21 percent will pay \$1.00 or more for mobile AR apps. More worrisome is that the greatest share of responses (43 percent) is unwilling to pay *any amount* for mobile AR. These users align with the “just not interested” crowd.

However, one positive signal from non-users is that 28 percent would consider in-app purchases after having downloaded a free mobile AR app. Along with the current-user responses, this indicates that in-app purchases should be considered to address the largest range of users and affinity groups.



# IAP Pulls Ahead

Expanding a bit on in-app purchases (IAP), these data clearly support it. **23 percent** of AR users report that they won't pay upfront for mobile AR apps but will use IAP. This is a key finding that validates several other market signals we've separately examined around the IAP opportunity.<sup>x</sup>

In short, several signs point to IAP as a prevailing revenue model for mobile AR. **Besides the evidence seen in this survey, IAP is a purchase method in which consumers are already comfortable, given its prevalence in mobile gaming.** There, it drives **\$156 billion** in annual revenues<sup>xi</sup>

In AR specifically, IAP likewise indicates traction. The AR revenue leader so far is Pokemon Go and majority of its revenue – to the tune of about **\$2.3 billion**<sup>xii</sup> to date – is through IAP. Given price sensitivity to early/unproven technology, IAP lets users “ease into” the experience before paying.

In fact, IAP can be advantageous for several reasons. **Average revenue per user is often greater than upfront app purchases, due to the behavioral economics of micro transactions and unit economics of recurring revenue.** It depends on the app being developed, but IAP should always be considered.

This is especially so in gaming and social AR. Conversely, signals indicate that IAP isn't as effective in media and information experiences. That's where consumers have been conditioned to expect subscription or free ad-supported experiences. The latter is likely how visual search will monetize.

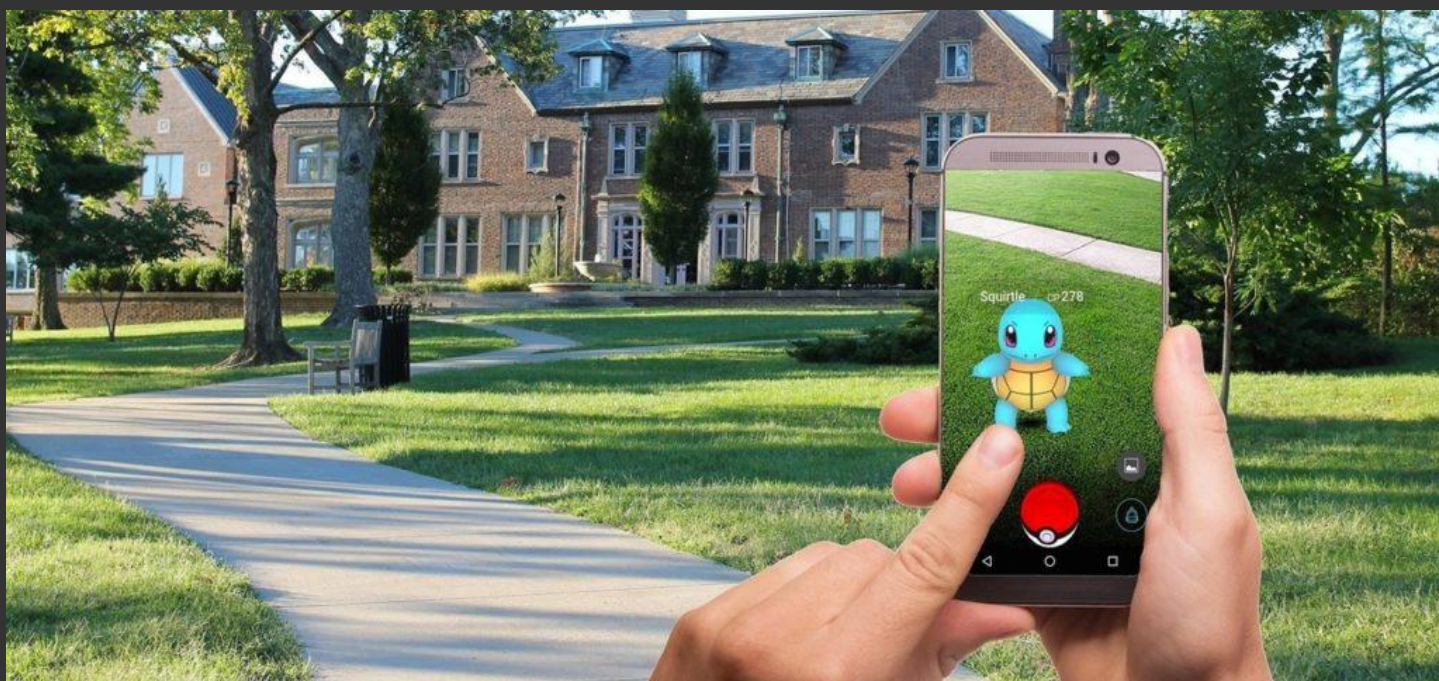


Image Credit: Niantic



# Aspiration: The “What’s Next?”

Perhaps more important than consumers’ current usage is their sentiment about what they’d like to see next. Gaming was the clear winner (75 percent) among AR users, followed by education (40 percent) and product visualization (38 percent). But here, we also see new categories emerge.

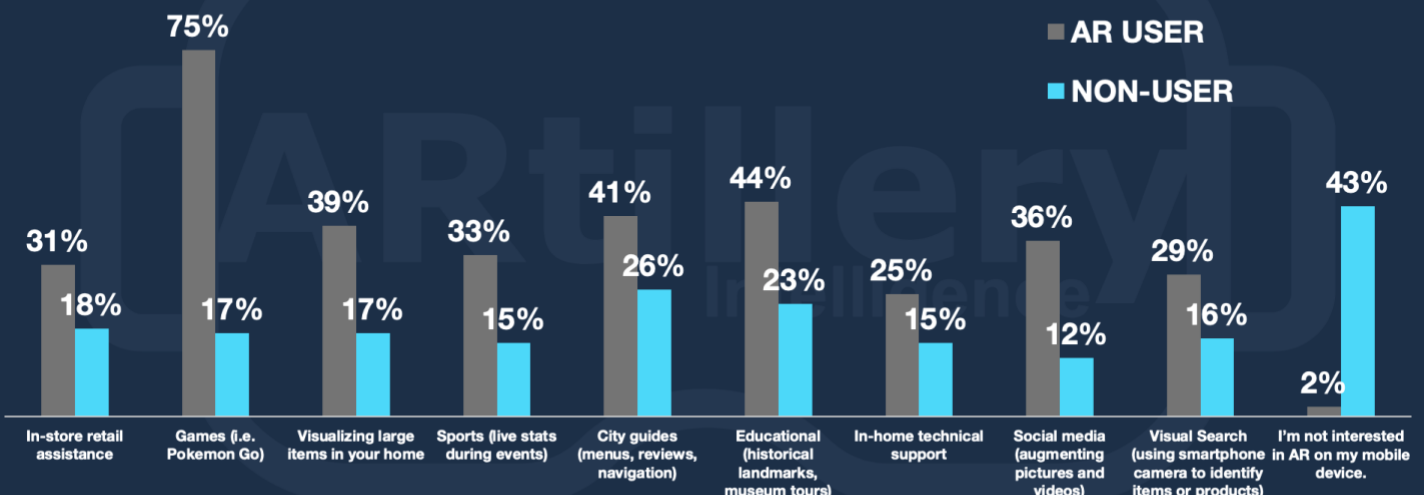
These include city guides (39 percent), sports (35 percent) and retail (33 percent). City guides and retail align well with AR, given the potential to overlay product info like reviews and promotions. Like many other use cases explored above, these also naturally map to high-frequency activities.

Meanwhile, AR in sports can provide team owners the ability to create compelling arena experiences, such as player stats and additional layers of entertainment.<sup>xiii</sup> Meanwhile, broadcasters hungry for innovation can battle cord-cutting with compelling “second-screen” mobile AR features in the home.

In all categories, the same trend continues to emerge: users are more interested in AR than non-users. This validates once again that current AR users are “sold” on the experience and highly engaged. Non-users conversely show explicit disinterest. This is partly because they haven’t tried it.

## Mobile AR Experiences Wanted

What types of mobile AR experiences are you most interested in?



# Confidence Signal: Where's the Money?

Expanding on the above aspirational sentiments, another important trend jumps out at us. When zeroing in on a few of the top desired AR experiences among users, a theme emerges. *Several of the top demanded AR experiences also happen to be the most monetizable forms of AR.*

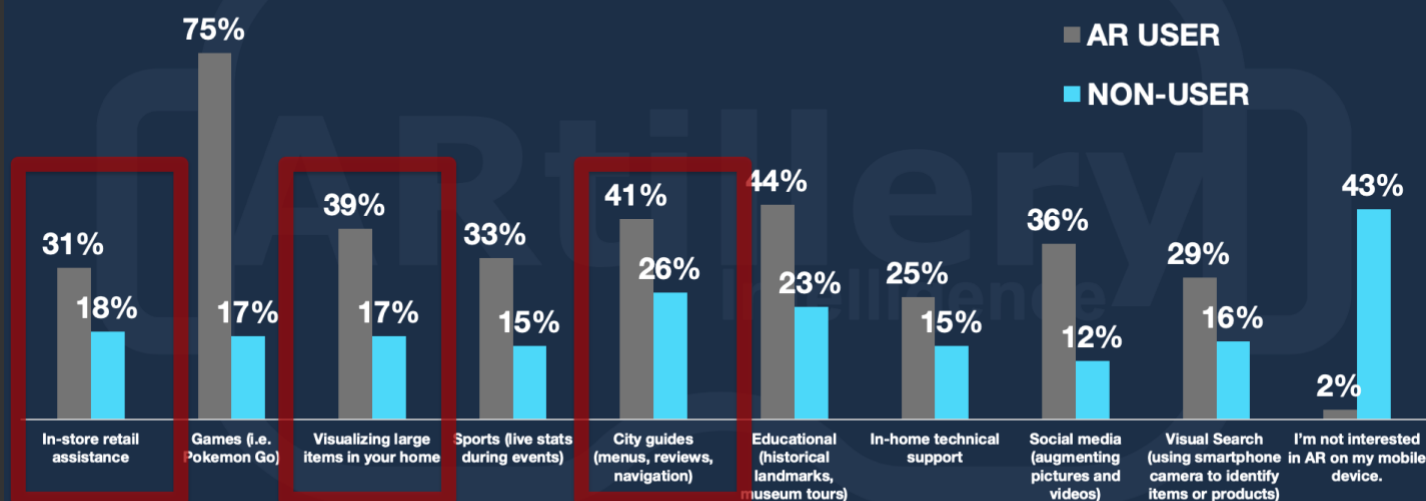
Including product visualization, city guides and in-store AR, these represent many potential AR business models we've examined. ARtillery Intelligence's recent AR commerce report for example projects **\$6.1 billion** in U.S. commerce to be influenced through AR shopping features by 2022.<sup>xiv</sup>

But beyond the admittedly early-stage and speculative analysis of consumer AR's potential, these survey data provide additional validation. *In other words, user demand signals are aligned with the areas of AR that are potentially the most monetizable, due to their natural ties to commerce.*

We'll continue to see user behavior develop, as well as products and business models. In the meantime, these are positive signals for AR's business case. It shows signs of being a valuable user shopping tool (engagement) and informational/promotional tool for brands & retailers (monetization).

## Mobile AR Experiences Wanted

What types of mobile AR experiences are you most interested in?



**Thrive Analytics**  
smart decisions that drive success

Base = 3,118 US online adults (18+).

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# Final Thoughts: Strategic Implications

One of the key themes throughout this survey is the stark difference in sentiment between mobile AR's current users and non-users. The former show high satisfaction, demand for app functionality and willingness to pay. Non-users conversely show explicit disinterest and price sensitivity.

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

Consumers need to experience mobile AR before they become converts, which presents logistical challenges in pushing that "first taste" on a wide scale. *So it will take time for assimilation to happen naturally, though we will see accelerants such as potential killer apps that emerge.*



Image Credit: Apple

# Historical Lessons

Meanwhile, what AR development tactics could accelerate the above cycle? One is to “think native.” Build new experiences around AR, rather than tacking AR to existing experiences. Also known as “AR-first,” we learned a similar lesson in “mobile-first” app design principles of the last decade.

But it goes deeper than native thinking. There are other best practices and success factors we’ve observed over the past decade. For example the “if it ain’t broke” test: If a given AR app fills a gap that wasn’t really a pain point for anyone, it could be a solution in search of a problem.

Mobile payments are one historical example of this. After lots of hype, they faced (and still face) a challenging road to ubiquity because paying by cash or credit isn’t broken. These are entrenched behaviors whose proposed replacement was only slightly better (tap versus swipe).

This invokes Visicalc inventor Dan Bricklin’s rule of thumb for disruption. In order to get consumers over the adoption hump, he theorizes that new tech has to be two orders of magnitude (100x) better. That means the old tech has to be really broken... or your mousetrap has to be *really stellar*.

“You have to be two orders of magnitude — that’s 100 times better — than what came before,” he said at ARiA. “Doing a good-sized spreadsheet by hand took hours, but with an electronic spreadsheet, you can build it in minutes. That’s night & day difference, not just a little better.”



Image Credit: IKEA

# Does AR Make it Better?

For mobile AR, before passing the 100x test — a high bar — we should ask if AR makes something better at all. For example, tabletop AR (e.g animated battle scene on your coffee table) is compelling, but is it better than battle games that let you sit back and point the phone wherever you want?

Put another way, the tabletop aspect makes it novel and native, but crouching and holding up your phone isn't ergonomic nor conducive to long/repeat sessions. The latter could overpower the former as novelty wears off while gravity doesn't. So the bar is set high for compelling game play.

Speaking of novelty versus sustained value, some AR experiences lack “replayability.” For example, Google's “Playground” AR stickers are fun, but mostly for reasons of fleeting novelty. [Stickiness comes from ongoing utility, such as Google's potential with Google Lens, as explored earlier.](#)

Going beyond whether something's better in AR (AR first), another target is if it's *only* possible in AR (AR only). This principle drove the killer apps of the iPhone era like Waze, Uber and Foursquare. [The common element: they weren't possible on the previous form factor, the desktop PC.](#)

“You couldn't make an Uber style app when it was on a PC,” said Escher Reality CEO Ross Finman at TechCrunch Disrupt last year. “It only made sense after a mobile platform came out. Now it's about understanding what are the new things you can do with the mobile platform for AR.”

Product visualization apps explored in this report are good examples of AR-Only: They solve a pain point — personalizing large items — and are only possible in AR. [IKEA and BMW exhibit this, and are inherently monetizable as they influence buying decisions and flow into trackable commerce.](#)



Image Credit: Google



# Enabling Scale

Related to the question of whether or not AR makes an experience better or worse is the question of if it makes it bigger or smaller. In other words will the addition of AR features be an engagement driver and growth engine, or will it cause less people to be able to (or want to) use a given app?

Here we'll play devil's advocate on a topic that's become popular in AR circles: Multi-player AR. Having synchronous AR games or experiences between multiple users is thought to open up new capabilities, and use cases for social engagement. And it could represent the first big killer app(s).

But when chasing that goal, be careful not to prevent scale. Requiring another player in close proximity could be limiting, compared to place-shifted play. So greater user compatibility, which AR needs at this stage, should accommodate remote players or spectators in addition to on-site ones.

"[With] mobile AR, you're probably somewhere random in the house, at the office or on the move," said Tony Parisi at the AWE conference. "Requiring someone to be in a specific place is damn inconvenient—unless the whole point is to get you there, such as Niantic's location-based titles."

Finally, scale comes from reducing access friction, which Web AR will eventually do. As explored earlier and as validated in the survey data, web AR is growing as a format. And when developing apps, consider "AR-as-a-feature" which worked well for Snapchat Lenses and Pokemon Go.

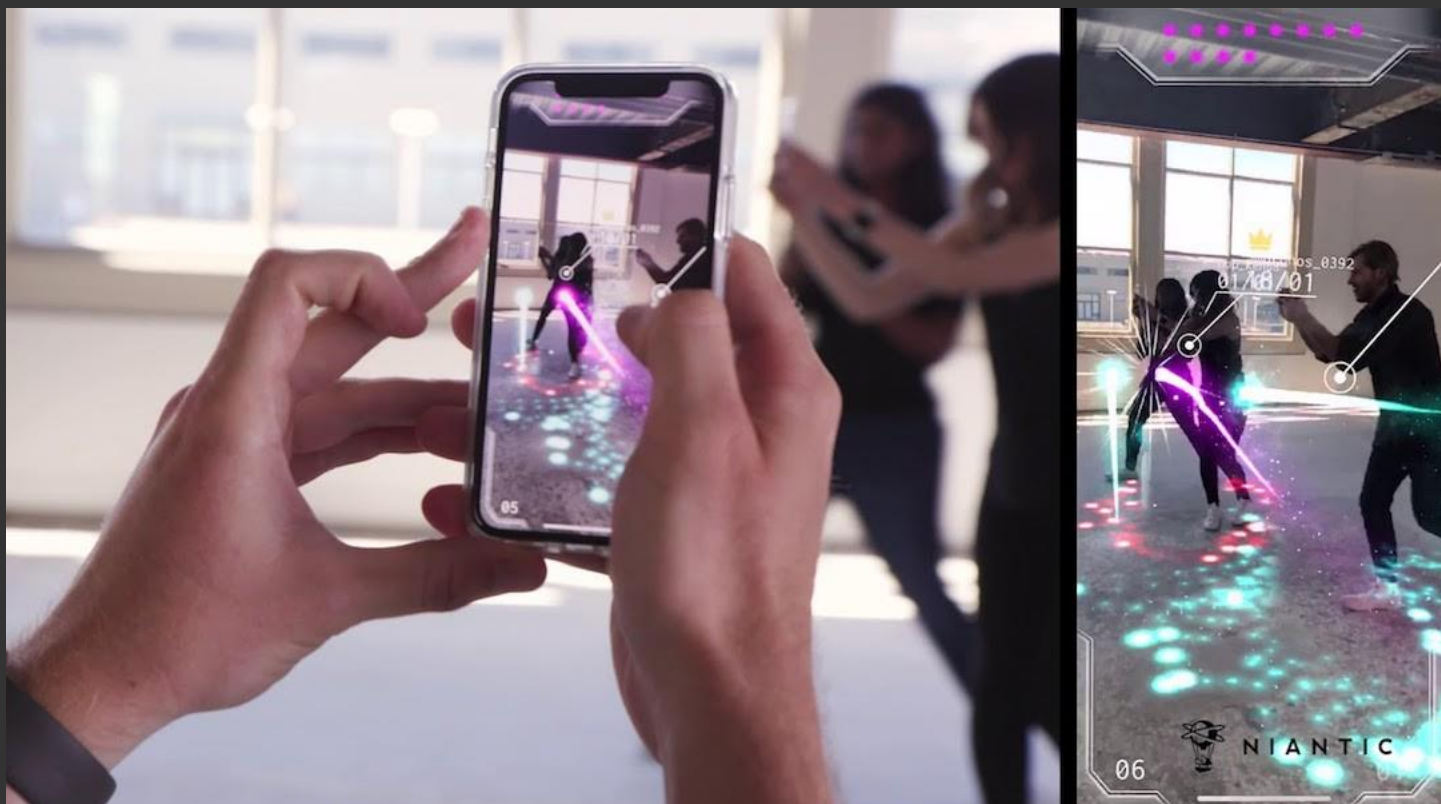


Image Credit: Niantic

# Timing is Everything

In the above market development, what everyone's really waiting for is AR's killer app, which we could see emerge sometime next year when AR developers truly gain their native footing. [We believe the first killer apps will involve social AR, gaming or "all-day" utilities such as visual search.](#)

As a historical comparison, it took three years after the first iPhone in 2007 before we saw killer apps, such as Waze and Uber in the 2010 timeframe. [We could see killer AR apps start to emerge in that same elapsed time from 2017's ARkit launch, which would be sometime next year.](#)

"In 2007 when Apple launched the iPhone, most of the apps were flashlights," said Escher Reality CTO Diana Hu at TechCrunch Disrupt. "People didn't know what to do yet. And there's going to be this phase of learning. There's a genesis of any technology when people need to experiment."

Meanwhile, we're not without good apps and early user traction as seen in this report. [There are flashes of promise seen in product visualization apps, Google's work with Google Lens, and "AR-first" startups like Happy Giant.](#) Development will continue for these and other AR experiences.

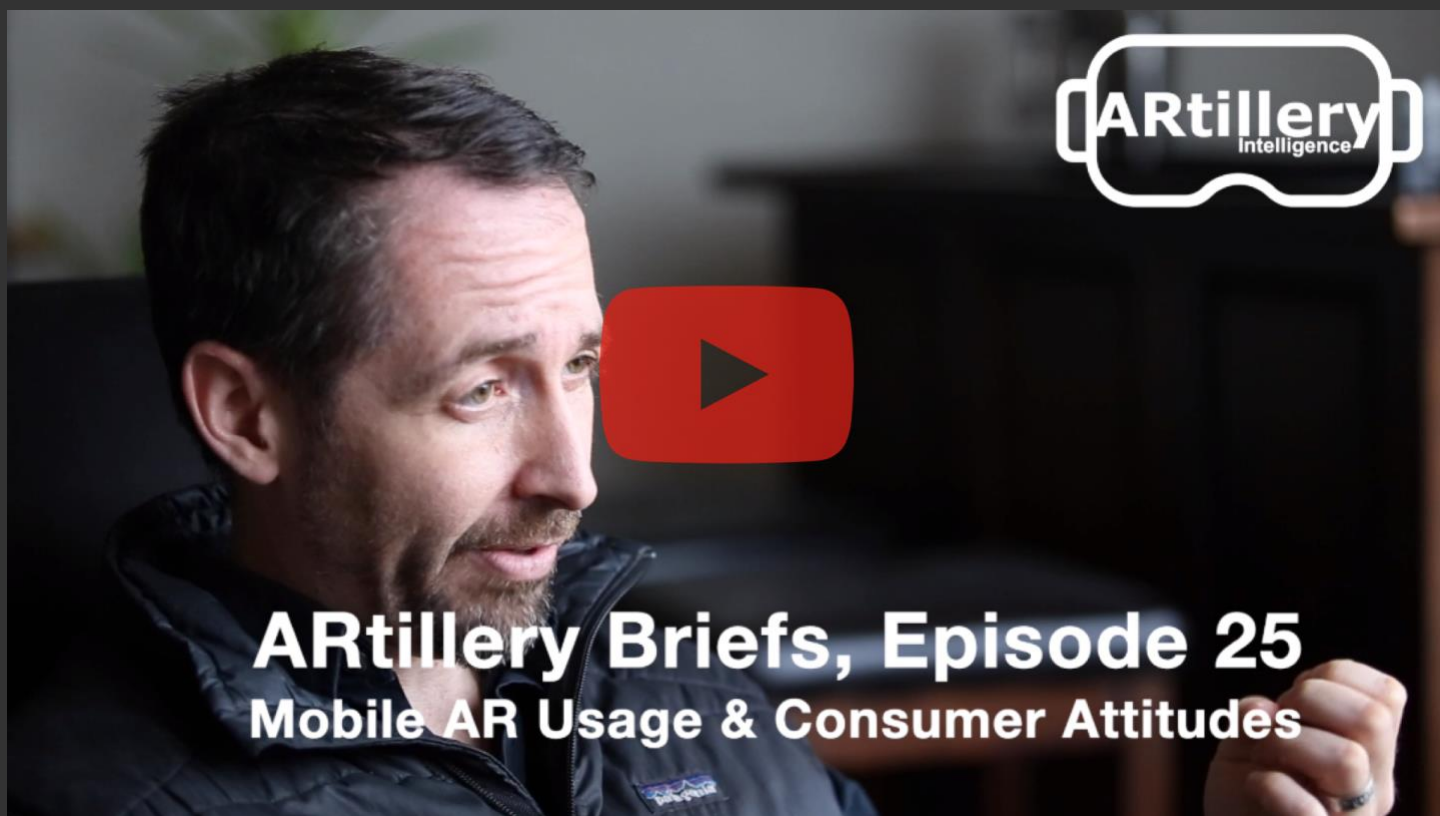
"As far as AR apps and consumer-based products, I think you're going to see a lot of crap over the next year or two," said Niantic CTO Phil Keslin during the same TC Disrupt panel. "But you'll see some nuggets of creative genuine things that will spark something that will truly be amazing."





# Video Companion: Mobile AR Consumer Behavior

(click video to open)





# Key Takeaways (redux)

*Key takeaways are also highlighted throughout the main body of this report.*

- **22% of consumers have tried mobile AR.**
  - This represents healthy adoption, but also substantial headroom to grow.
  - We expect adoption to accelerate in future VRM survey waves, similar to early smartphone adoption.
- **47% have used ARCore apps, 36% ARkit apps, 46% AR-as-a-feature, and 16% web AR.**
  - Though apps have an early lead, web AR's advantages will vault it forward in the coming years.
  - AR-as-a-feature (AR within non-AR apps) represents a low-friction user access point and distribution strategy.
- **76% of mobile AR users are active at least monthly. 52% are active weekly or greater.**
  - Active frequency is a key mobile app metric that impacts monetization potential, such as in-app purchases.
  - Mobile AR that fuses novelty with frequency (e.g. social messaging) can achieve high active use and retention.
- **Games lead mobile AR usage (82%), followed by social (37%) and product visualization (25%).**
  - Social app success can result from sticky/frequent behavior, viral growth and network effect.
  - Product visualization succeeds on saving users time and money through more-informed purchases.
- **Mobile AR users want more AR games (75%), city guides (41%), sports (33%) and retail apps (31%).**
  - AR city guides and retail apps are inherently monetizable, and offer possibilities for brick & mortar innovation.
- **76% of mobile AR users report high or very high satisfaction.**
  - There are few consumer products (including VR) that show such high satisfaction levels.
  - AR's visual and immersive format can captivate consumers as a departure from routine mobile interfaces.
- **54% of non-mobile AR users report definitive disinterest, and 19% report confusion.**
  - These findings signal a need for better consumer education and outreach.
  - Mobile AR will slowly assimilate, but can be accelerated with aforementioned components like social and gaming.
- **Stark variance between user and non-user attitudes underscores AR's double-edged sword.**
  - Users are highly engaged, but getting them to that point requires pushing a "first taste" on a wide scale.
  - AR's visual and visceral state can't be captured in ad copy or video, creating a marketing challenge.
- **53% of mobile AR users will pay \$1.00 or more for apps. 13% will pay \$5.00 or more.**
  - This is a strong demand signal, and compares to greater price sensitivity in the broader app universe.
- **21% of non-users will pay \$1.00 or more for apps. 43% won't pay any amount.**
  - Price sensitivity underscores another stark variance in attitudes between users and non-users.
- **In-app purchases (IAP) showed strong acceptance among users (23%) and non-users (28%)**
  - IAP should always be considered as it addresses the largest range of interests.
  - Pokémon Go has made more than \$2 billion to date through IAP
  - Revenue per user is often greater with IAP due to proven behavioral economics of micro transactions.
- **AR's true widescale adoption will hinge on the release of a killer app in the next year.**
  - There's not enough of an adoption impetus yet for mainstream consumers to flock to AR en-masse.
  - Broad AR appeal and high-frequency use could result from mundane "all-day" utilities such as visual search.
  - Developers' acclimation and "native footing" is underway and will be a key factor in bringing a killer app to market.

# 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 such as AR & VR, 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 are used by marketers, product managers, consultants and other people working in the technology space.

# About Intelligence Briefings

ARtillery Intelligence Briefings are monthly installments of VR/AR data and analysis. They synthesize original and third-party data to reveal opportunities and dynamics of VR and AR sectors. In addition to data, 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 LeadsCon. 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 3000 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 2.5 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 information and background on each firm can be seen in the preceding "about us," sections, or through the website links included with those descriptions.

More details about the survey sample (demographics, etc.) can be seen in this report's introduction and 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

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- <sup>i</sup> ARtillery Intelligence Briefing: **VR Consumer Usage & Attitudes**
- <sup>ii</sup> Thrive Analytics: **Virtual Reality Monitor**
- <sup>iii</sup> ARtillery Intelligence Briefing: **Global XR Revenue Forecast, Fall Edition**
- <sup>iv</sup> ARtillery Intelligence Briefing: **2018 Lessons, 2019 Outlook**
- <sup>v</sup> AR Insider Article: **700 Million AR Lenses in One Day**
- <sup>vi</sup> ARtillery Intelligence Briefing: **The Camera is the New Search Box: Ads in AR**
- <sup>vii</sup> ARtillery Intelligence Briefing: **AR Commerce: Monetization Comes into View**
- <sup>viii</sup> Localytics: **Mobile App Retention Data**
- <sup>ix</sup> ARtillery Intelligence Briefing: **VR Consumer Usage & Attitudes**
- <sup>x</sup> AR Insider Article: **Lessons from Pokemon Go Revenue**
- <sup>xi</sup> TechCrunch Article: **Consumer Spending in-App**
- <sup>xii</sup> AR Insider Article: **Pokemon Go Surpasses \$2 Billion in Revenue**
- <sup>xiii</sup> ARtillery Intelligence: **Interview with the Golden State Warriors**
- <sup>xiv</sup> ARtillery Intelligence Briefing: **AR Commerce: Monetization Comes into View**