ARTILLRY INTELLIGENCE BRIEFING

THE CAMERA IS THE NEW SEARCH BOX: ADS IN AR

AUGUST 2018

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Executive Summary

One of the many areas projected to be transformed by immersive computing is advertising. The visually-immersive nature of technologies like AR and VR can offer advertisers new ways to spotlight products, and to engage prospective customers in deeper ways than two-dimensional media.

For example, advertisers can create AR campaigns that let consumers visually infuse products in the world around them, as captured through their smartphone's camera. Several brands like Nike, Home Depot and Michael Kors are already experimenting with – and learning from – such campaigns.

Beyond graphical AR overlays, advertisers will soon be able to participate in a related area: visual search. A close cousin of AR, this is represented by tools like Google Lens, which let users point their smartphone cameras at objects around them to contextualize (or purchase) those items.

Altogether, AR ad formats are beginning to map to existing 2D ad formats that advertisers have been using for years. For example, branded graphical AR overlays are analogous to display advertising, while visual search can carry similar dynamics and user intent as search advertising.

But the opportunity is to go much deeper than these legacy formats in both creative capacity and effectiveness. Indeed, brands that have experimented with AR-based promotion already see favorable engagement and conversion metrics, such as 11x increases in product purchases.

The opportunity is further fueled by vested interest of tech giants. Tech's "four horsemen" – Google, Apple, Facebook and Amazon – are especially keen on AR. Those specifically built on ad revenue (Google and Facebook), will fight to ensure positioning in advertising's next visually-immersive era.

Resulting competition will accelerate innovation, investment and market timing for AR advertising in general. Indeed, one point of confidence *ARtillry Intelligence* holds for AR's overall revenue generation and opportunity is the level of motivation behind these tech giants to make it happen.

But it won't be without challenges and question marks. Though all of the above stands to reason and quantitative analysis, one wild card is advertiser adoption. They're a famously laggard constituency of the tech ecosystem, and the survey data we examine in this report indicates their AR uncertainty.

There are also practical hurdles. Though mobile AR's addressable market is 762 million smartphones at the time of this writing, the *actual market* is a subset of that. Active AR users are relatively few, and session lengths are small, due to factors like arm strain, which diminish ad inventory.

All of these variables converge to drive $2.6 billion in AR ad revenues by 2022. But how will this materialize? What campaign tactics work? And what does it mean for developers, media companies and anyone vetting AR. This report answers such questions and dissects the AR ad opportunity.

Key Takeaways

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

- Advertising has been transformed by Internet and mobile revolutions. Visually immersive tech could be next.
  - Augmented Reality's (AR) visual orientation and interactivity align with advertising's core goals.
  - AR can enhance "upper funnel" awareness ads by letting consumers playfully interact with products.
  - AR can boost "Lower funnel" conversions by contextualizing products at or near the point of purchase.

- AR advertising will piggyback on smartphone scale (762 million smartphones), and a visually-engaging format.
  - AR can boost consumer purchase intent by 11x and time spent with media by 2.7x, according Houzz.

- Advertisers are already reporting favorable Key Performance Indicators (KPIs) for AR campaigns.
  - ASUS achieved 10x greater engagement with AR ads in Facebook Messenger.
  - Kia achieved a 46 percent boost in dealer inventory searches, and a 20 percent boost in phone calls.
  - Home Depot achieved 2+ minute engagement time and a 12.5 percent click through rate.
  - Nike's commerce-enabled AR ad for the exclusive Kyrie 4 shoe sold out all inventory in one hour.

- Tech giants are investing heavily in AR advertising, providing further momentum and confidence.
  - Ad-dominant business models (Facebook and Google) are motivated to position for advertising's next era.
  - Ad approaches map to existing business models and formats, such as display-oriented AR for Facebook.
  - Google is investing heavily in visual search (Google Lens and VPS) given its ties to a $60 billion search business.
  - Visual search will provide Google additional query volume and "last mile" attribution for in-store engagement.

- Display-oriented AR ads dominate thus far, but visual search will emerge as an intuitive way to gather information.
  - Visual search will take longer to develop, due to its reliance on advanced computer vision and the AR cloud.
  - Longer term, visual search will gain share of AR ad dollars, due to its high-intent (thus high-value) use case.
  - Visual search is also aligned with buying-empowered millennials' sensibilities, given their affinity for the camera.

- Location-relevant AR will be opportune given buying intent, proximity and immediacy that drive local search today.
  - Most retail spending happens local/offline, but a growing portion is influenced by mobile engagement like search.
  - AR will amplify this existing dynamic through an intuitive way to contextualize local stores, activities and products.
  - ARtillry survey data indicate that the most desired AR use cases include local apps, such as city guides.

- It's not all good news for AR Advertising: Challenges await in brand adoption, risk aversion and learning curves.
  - AR ad campaigns so far represent an adoptive minority: About 10% of brands have active AR initiatives.
  - The rest are uncertain, citing lack of clear ROI, scale and internal aptitude.
  - These reasons are misaligned with reality, such as ROI metrics, indicating that industry education is needed.

- Technical and practical realities also present adoption hurdles for AR advertising.
  - Though potential scale is high given 762 million smartphones, active users are a subset of that (158 million).
  - AR has short session lengths due to arm fatigue, which further diminishes ad inventory.
  - Platform fragmentation raises additional barriers by segmenting audience and complicating creative production.
  - Success hinges on "native" development and analytics which will require time and learning curves.

- All of the above variables converge to inform an AR advertising revenue outlook of $2.6 billion by 2022.
  - This correlates to an active user base that grows from 158 million to 1.19 billion by 2022.
  - AR Advertising will hold 5.4% of overall AR revenues, compared with mobile ads' 10% of mobile industry revenue.
  - AR ads will be display-dominant in early years, while visual search ad revenues gain share over time.
  - This has historical parallels to online display ads that preceded more technically-advanced search ads.
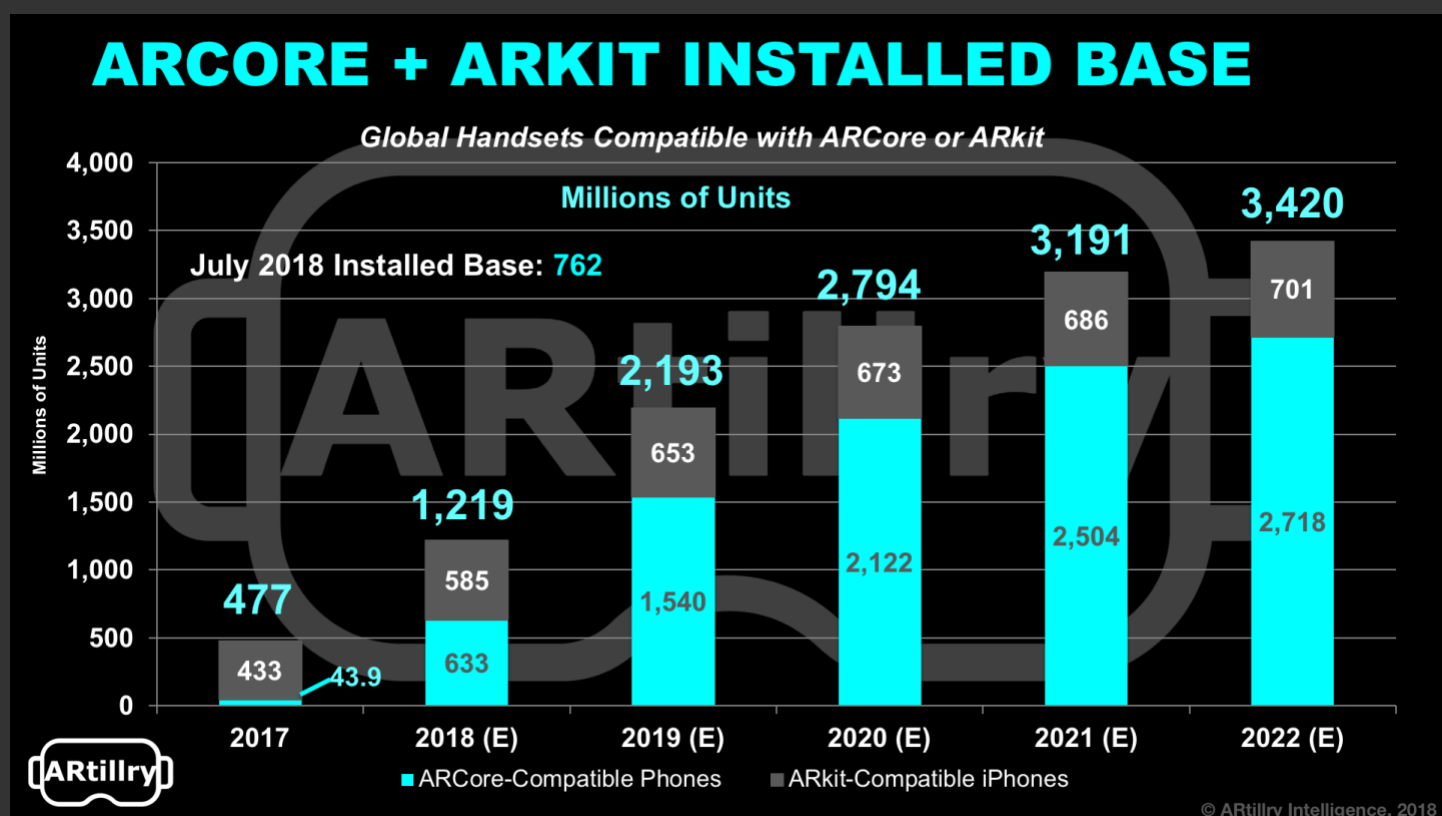
Introduction: Signs of Opportunity

Whenever tech revolutions come along, they affect – and create opportunity within – several aspects of our lives and work. This was the case with the PC, commercial internet and mobile revolutions. One of the areas most transformed by these technology shifts has been media and advertising.

Advertising specifically has been completely transformed by the Internet, which was then further catapulted by the distribution, formats and strategies developed in the smartphone era. *ARtillry Intelligence* believes the next advertising inflection will happen with immersive media such as AR.

AR's visual orientation and interactivity align with advertising's core goals. It can enhance "upper funnel" (e.g. awareness) ads by letting consumers playfully interact with products. And "lower funnel" actions (e.g. conversions) are achieved by contextualizing products at or near the point of purchase.

Further boosting these qualitative attributes are quantitative measures. The advertising opportunity piggybacks on AR's scale: *ARtillry Intelligence* pegs mobile AR's installed base at 762 million smartphones at the time of this writing. This is key, given that brand advertisers are reach driven.

ARCORE + ARKIT INSTALLED BASE

Global Handsets Compatible with ARCore or ARkit

Millions of Units

July 2018 Installed Base: 762

Year	ARCore-Compatible Phones	ARkit-Compatible iPhones	Total
2017	43.9	433	477
2018 (E)	633	585	1,219
2019 (E)	1,540	653	2,193
2020 (E)	2,122	673	2,794
2021 (E)	2,504	686	3,191
2022 (E)	2,718	701	3,420

■ ARCore-Compatible Phones　■ ARkit-Compatible iPhones

Beyond high level or theoretical advantages, we're seeing proof points that these factors translate to real results. Among several key performance indicators (KPIs) detailed later in this report, AR can boost consumer purchase intent by 11x and time spent with media by 2.7x, according Houzz.

Influential tech giants are also investing heavily in AR advertising, providing further confidence in its opportunity. Ad-dominant business models at Facebook and Google have motivated significant resources to ensure positioning in advertising's next era, thereby accelerating the AR industry overall.

But it's not all positive signals. Advertisers will be slow to adopt (as they often are), and already indicate some uncertainty. And mobile AR presents challenges such as diminished ad inventory through short session lengths, which can result from arm fatigue and other form-factor realities.

Further jeopardizing available ad inventory are questions of reach. Though the installed base of compatible AR smartphones is sizeable, as noted, a more relevant figure is active AR users. That figure stands at about 158 million users today, which is fragmented between different AR apps.

So where do all of the advantages and potential drawbacks come together and indicate the path forward? We'll examine all the factors in the following pages, including bull and bear perspectives, and our ultimate revenue outlook. But first let's examine the types of mobile AR ads developing today.

WHEN AR FEATURES ARE USED IN APP, CONSUMERS...

ARE 11X MORE LIKELY TO PURCHASE.

SPEND 2.7X MORE TIME IN APP.

SOURCE: HOUZZ

© ARtillry Intelligence, 2018

AR Advertising: 3 Examples

So what does AR advertising look like? It will develop in several ways as the medium evolves and as creative professionals gain their "native footing" to optimize campaigns in ways that play to AR's strengths. Until then, we're seeing early signs of effectiveness by several prominent brands.

Here are three illustrative examples.

1. Shoe Drop

Advertiser: Foot Locker
App/Network: Snapchat
Advertising Stage: Upper funnel, awareness
Cost: Programmatic ad buy, $3-$8 CPM (estimated total campaign cost = $22,000)
Results: 45 second average play time, 4 million impressions

Foot locker, in partnership with Jordan Brand, devised an AR campaign to run on Snapchat. Using Snapchat's "Ad to AR" format, users swiped up on a related story to reveal a branded lens. In this case, the lens featured an AR animation for a new shoe release and Gatorade flavor.

Specifically, users could launch the AR overlay, which featured the new shoe in an animated sequence placed in their immediate surroundings. The gamified and animated appeal of the campaign drove an average play time of 45 seconds, and four million total impressions.

Though it wasn't the case in this campaign, Snapchat's AR lenses can be integrated with its "shoppable AR" program. This lets advertisers integrate an additional layer of transactional functionality that lets users purchase goods right within Snapchat, which is more user-friendly.

This commerce infusion will be a key evolution in AR advertising, given the potential for lower-funnel, high-intent interactions with products. As time goes on and advertisers gain greater levels of comfort and skill with AR advertising, commerce functionality will allow them to take a "full funnel" approach.

2. The Future's Looking Bright

Advertiser: Michael Kors
App/Network: Facebook
Advertising Stage: Full-funnel, awareness and direct response
Cost: Undisclosed
Results: Unavailable (early stage)

Speaking of full funnel, Michael Kors is a launch partner for Facebook's newest AR ad format which places actionable AR ads in the news feed. Similar to standard news feed ads, these are placed programmatically based on social signals and targeting parameters, but also come with AR triggers.

Known as News Feed AR ads, they let advertisers apply AR camera effects (in Facebook's terminology) including virtual product try-ons. The Michael Kors campaign did just that, allowing users to quickly go from the ad unit to a front-facing camera activation that virtually tries on sunglasses.

Beyond the novelty and utility of trying on sunglasses, the ads can capture high user intent by flowing into a transaction thread. Specifically, advertisers can integrate calls to action that lead users to an online store. Video of product try-ons can also be shared with friends for an additional viral kick.

Though it's too early to tell the results from this campaign, other KPIs are available for AR ads on Facebook. For example, ASUS saw 10x greater engagement with AR ads in Facebook Messenger, and Kia saw a 46 percent boost in dealer inventory searches, and a 20 percent boost in phone calls.

3. 'Tis The Season

Advertiser: Home Depot
App/Network: Oath/Yahoo Mail
Advertising Stage: Lower-funnel, direct response
Cost: Undisclosed
Results: 2+ minute average engagement time. 12.5 percent CTR to shopping page.

To drive interest around its holiday décor products, including Christmas Tree decorations, Home Depot built an AR campaign that let users virtually decorate a tree. This was done with digital agency RYOT using Unity, through publishing giant Oath, with Yahoo Mail as a distribution channel.

Much like the above examples, an AR activation could be launched from a typical banner ad. Once clicked, users could place a virtual tree in their surroundings, then decorate that tree with animated lights and ornaments. Interested users could then click to a transaction page to buy said items.

The results included an average engagement time that exceeded two minutes, and a 12.5 percent click through rate to transaction pages. These are strong metrics in advertising terms. Also notable: the campaign achieved greater scale through email distribution, and by not requiring app downloads.

"You click on a little link and it launches an AR shopping experience right there," Unity's Tony Parisi said at AWE. "You decorate your Christmas tree and it closes the loop to the shopping page. They got double the lift in terms of click-through, which demonstrates engagement to the shopping page."

Honorable Mention: Does it Fit?
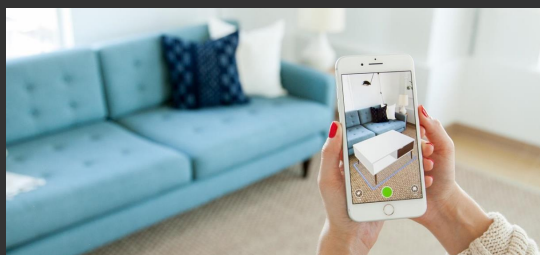
Advertiser: N/A
App/Network: Houzz
Advertising Stage: Lower-funnel, direct response
Results: 11x increase in purchase intent. 2.7x increase in time-in-app

When discussing AR engagement that drives measurable commerce, it's only fair to cite Houzz. It achieved an 11x boost in purchase intent and 2.7x boost in time spent. We list this as "honorable mention" because it's not technically an ad campaign (paid "ad buy") like the above examples.

It is rather the standard engagement within its organic app, specifically using its AR furniture visualization feature. This should be delineated from paid ad campaigns, but is nonetheless an important indicator of commerce-oriented engagement levels that can be achieved with AR.
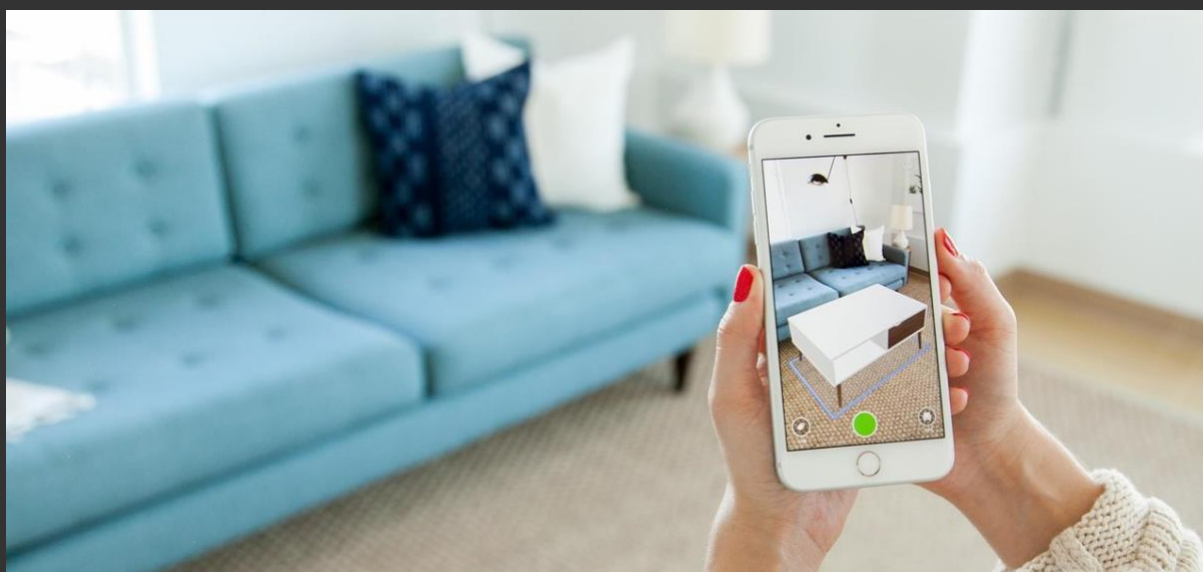
Image Credit: Houzz

Are AR Ads Working?

The examples above specify results and performance indicators. For convenience, we've also aggregated them below, along with a broader set of campaigns. For example, Nike's Kyrie 4 shoe sold out in less than an hour through exclusive availability in a Facebook Messenger AR campaign.

Here are several more:

Advertiser	App/Publisher	Campaign Dynamics	Results
Home Depot	Yahoo Mail	AR sequence launched from static email banner ad.	2+ minute average engagement time. 12.5 percent CTR to shopping page.
Kia	Facebook Messenger	Car visualization via AR overlay, launched from Kia's Facebook Messenger Bot.	46 percent boost in dealer inventory searches; 20 percent boost in phone calls.
Nike	Facebook Messenger	Kyrie 4 shoe release available exclusively through Facebook Messenger after users launched AR visualization feature.	Shoe sold out in less than an hour
Asus	Facebook Messenger	Customers "virtually unbox" latest ZenPhone 5 via AR visualization launched from Messenger.	Achieved 10x engagement compared to non-AR campaigns.
Foot Locker	Snapchat	The latest Jordan sneaker visualized through AR animations, launched from Snap Stories.	45-second average play time, 4 million impressions.
N/A	Houzz	In-home furniture visualization of a large portion of Houzz's online catalogue.	11x increase in purchase intent. 2.7x increase in time-in-app.
N/A	Snapchat	Branded Lenses, Shoppable AR and Ad to AR comprise its current range of paid AR offerings.	Overall 15 percent boost in purchase intent and a 9 percent boost in conversions from branded AR lenses.

How Much Does It Cost?

One factor that comes up in any discussion of advertising efficacy and ROI is cost. With AR, it's nascence dictates a small corpus of available pricing data, as the above players keep their early and experimental ad initiatives relatively quiet. But there are some signals and disclosures to examine.

The most information so far has come from Snapchat (or leaked by its advertisers). These figures can be used as a proxy for the moving target that is AR ad pricing. For example, these are some of the signals that *ARtillry Intelligence* uses in its bottom-up methodology[i] for market sizing (explored later).

Currently, Snapchat offers a few options. The example given above for Foot Locker's campaign involves the relatively new "Snap Ad to AR" ads. One of its points of appeal is cost: It has been reported to be more economical than branded AR lenses (though Ad to AR includes lenses).

Specifically, Ad to AR ads are auctioned at $3 to $8 CPMs, then placed programmatically and targeted to relevant users and affinity groups in Snapchat's social graph. Using these prices and reported reach, we've estimated the cost of the above Foot Locker campaign to be $22,000.

This compares to branded lenses which cost $40,000 per day to run, plus an $8-$20 CPM. The difference between "Ad to AR" and branded lenses is how they're distributed. The former are delivered through Snap Ads, while the latter are delivered through the lens tray of targeted users.

Though this is an admittedly a sample of one, it's a valuable data point to calibrate how AR ad pricing is shaping up today. Just like in the early days of smartphone advertising (which we covered at the time), more data will become available. We'll be watching closely and collecting it as that happens.

Image Credit: Snap, Inc.

Interested in AR Ads… Now What?

Though this report's scope is mostly high-level strategic analysis, we would be remiss to not at least mention a few tactical details. For example, where do you begin? Many of the AR providers mentioned above have tools to make it easier, but 3D graphical creation is still a specialized field.

Snapchat has launched its Lens Studio which provides developers and creative agencies a toolkit for campaign creation. Facebook meanwhile offers a Video Creation Kit as part of its Camera Effects platform. This similarly lets developers build campaigns from new or existing content assets.

Though these platforms are a bit fragmented in terms of standards and languages, we believe the market will move towards more interoperability. That will happen through web XR, as well as tools that allow developers to repurpose graphical assets or plug in to each platform as a unification layer.

This is analogous to what Unity has done in the broader world of 3D asset creation (and Unity will play a part in AR ad creation, as it did with the above Home Depot ad). Several 3D graphics tools will also continue to democratize creation, such as Google Blocks, Amazon Sumerian, and Adobe Aero.

But it will take a while to reach true interoperability. Fragmentation will inhibit growth among an already-hesitant set of buyers (explored later). And despite democratized graphics tools, it's safe to assume that in the near term, 3D development skills are needed for campaigns like those above.
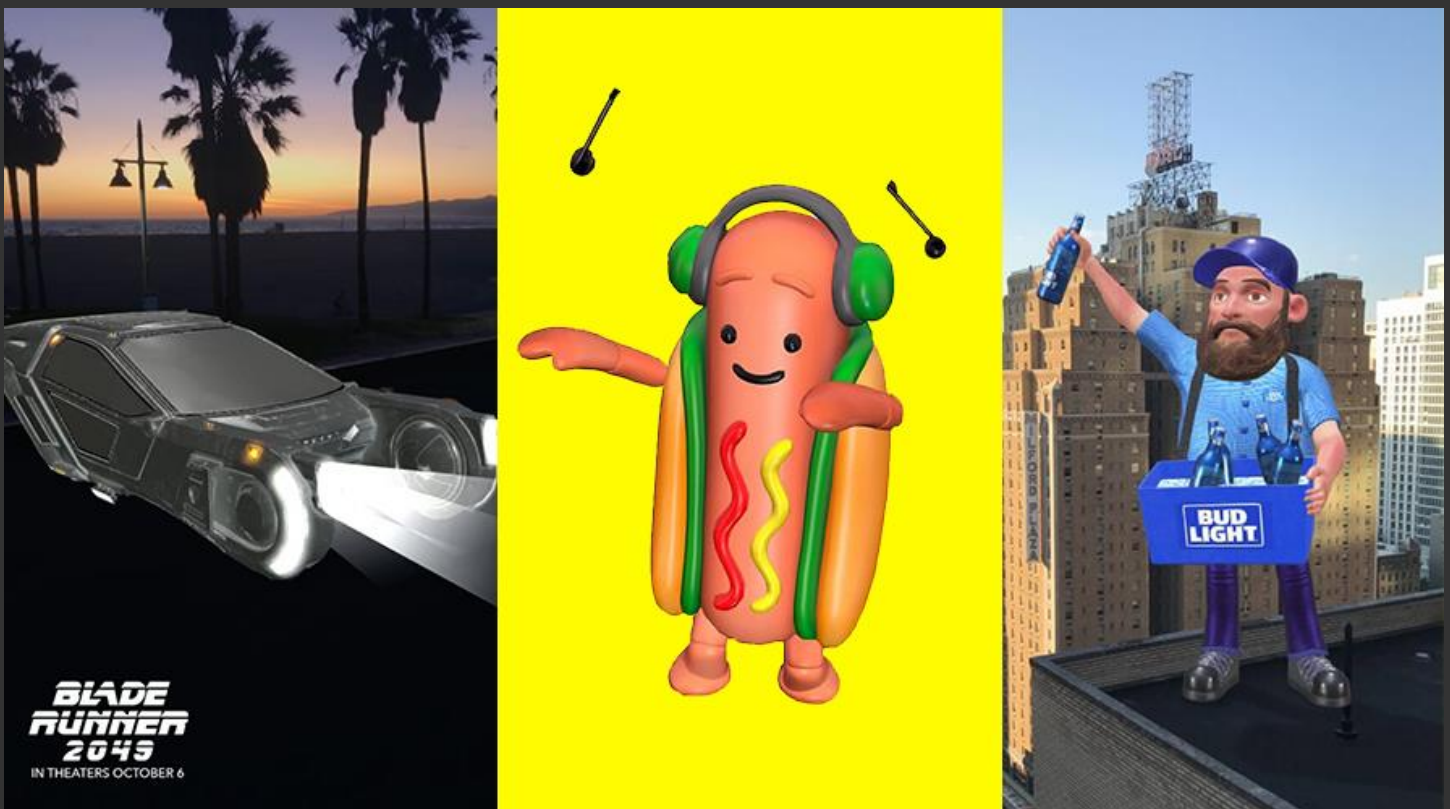
Image Credit: Snap, Inc.

Visual Search: Push vs. Pull

Most AR ad campaigns examined so far involve ads that are programmatically *pushed* to users in a targeted way. This is analogous to digital display ads today. Indeed, many of those AR activations piggyback on exiting display ad channels and tactics. AR simply adds dimension as a call to action.

But beyond that push format, what about the advertising world's other modality: *pull*. We're of course referring to search. It's a $90 billion per year industry,[ii] whose success has a lot to do with its contextual relevance and alignment with user intent. That's because users explicitly indicate a need.

This *push* versus *pull* delineation will play into AR advertising's evolution. Just as the web started with display ads before search was introduced (GoTo.com, Overture, Google Page Rank, etc.), a similar progression will happen in AR. That's why the above examples are display-heavy in AR's early days.

But search will gain prominence in AR in both native fit and in dollars (as quantified later). If you think about it, AR is inherently a form of search. But instead of typing or tapping search queries in the traditional way, the search input is your phone's camera and the search "terms" are physical objects.
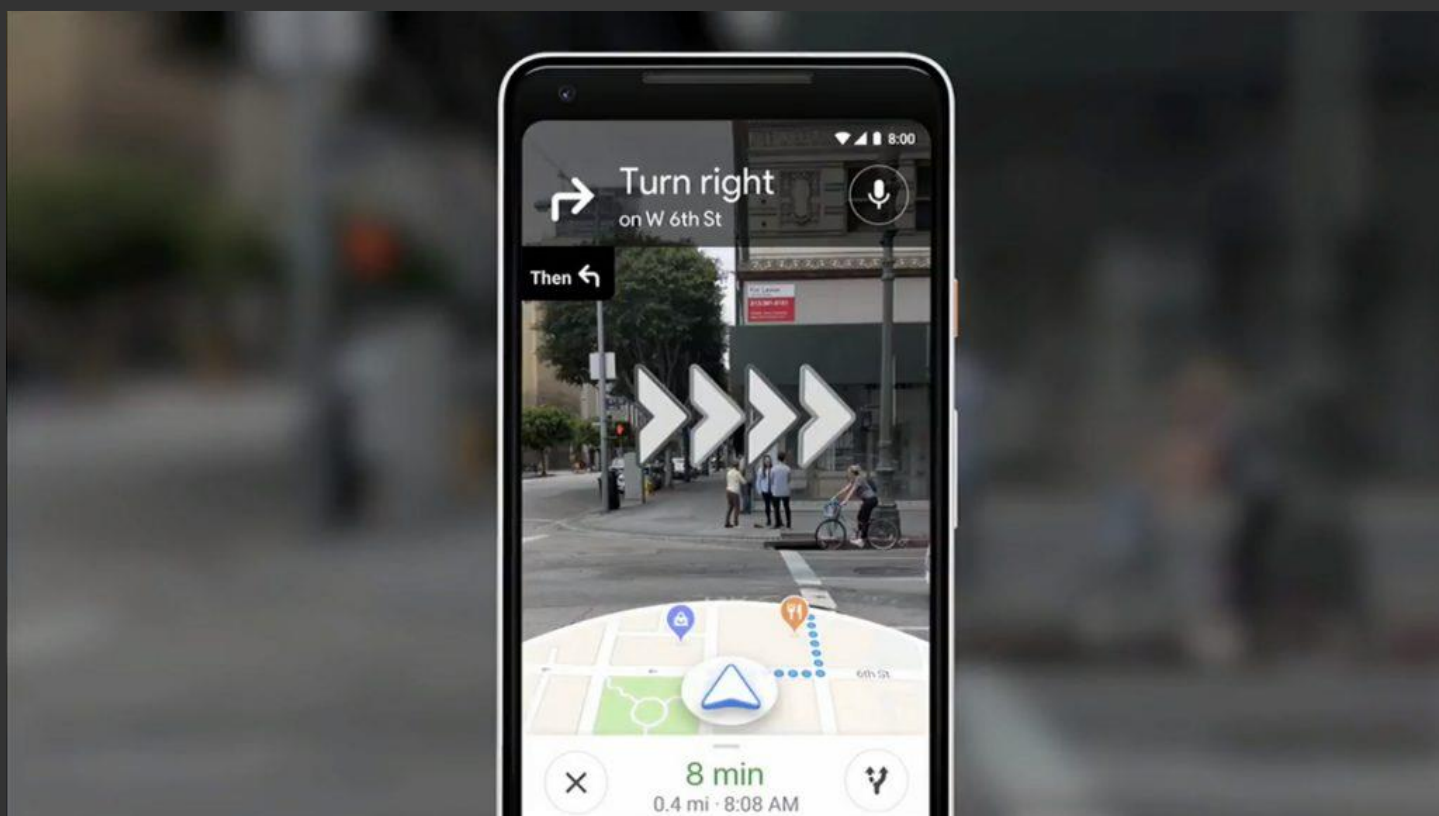
Image Credit: Google

The way this is taking shape so far is "visual search." Represented best by Google Lens, users point their phones at items to retrieve information (or transact). Its use cases and product categories will materialize over time (think: electronics and apparel), but could be almost as broad as search itself.

"A lot of the future of search is going to be about pictures instead of keywords," Pinterest CEO Ben Silberman said recently. His claim also underscores another key factor that indicates visual search's potential appeal: millennials. The buying-empowered generation has a high affinity for the camera.

Google Lens: Highly Motivated

These are some reasons why Google is keen on AR. As with all its XR initiatives, Google's AR efforts are driven to advance its core business.[iii] In other words, to continue dominating and deriving revenue from search, Google must establish its place in this next visual iteration of the medium.

"Think of the things that are core to Google, like search and maps," said Google XR Partnership Lead Aaron Luber at ARiA. "These are core things we are monetizing today and see added ways that we can use [AR]. All the ways we monetize today will be ways that we think about monetizing with AR."

For example, a key search metric is query volume (along with cost-per-click, click-through-rate and fill rates). Visual search lets Google capture more "queries" when consumers want information. These out-of-home moments are "high intent" when monetization potential is greatest (see next section).

The Meatball Shop
4.2 ★★★★☆
$$ · Italian Restaurant
♥ Heather, Elliott and 3 others

MEATBALL

MEAT
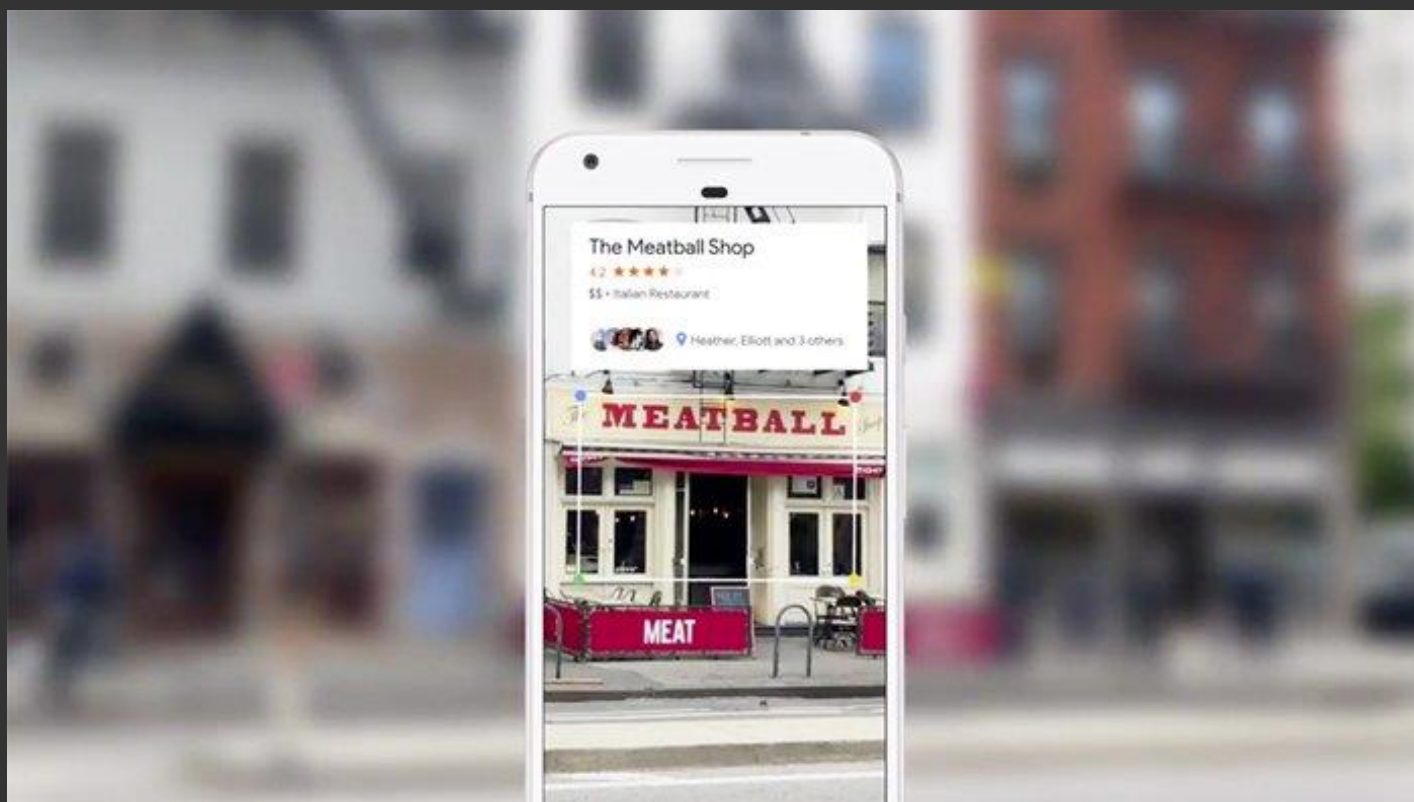
Image Credit: Google

These aspirations will manifest initially in Google Lens. Using Google's vast image database and knowledge graph, Lens will identify and provide information about objects you point your phone at. For example, point your phone at a store or restaurant to get business details overlaid graphically.

This can all be thought of as an extension to Google's mission statement to "organize the world's information." But instead of a search index and typed queries, local AR delivers information about an item *on that item*. And instead of a web index, this works towards a sort of "internet of places" (IOP).[iv]

AR in Retail: The Last Mile

Google's visual positioning service (VPS) is another manifestation of IOP. It helps shoppers navigate and obtain product information in retail stores like Lowes. Using point-cloud based 3D mapping data within retail partners' locations, it will help consumers find the aisles and products they're looking for.

"GPS can get you to the door, and then VPS can get you to the exact item that you're looking for," said Google's VR/AR lead Clay Bavor at last year's VPS unveiling at Google I/O. "Imagine in the future your phone could just take you to that exact screwdriver and point it out to you on the shelf."

Like visual search, this will help Google serve monetizable information to consumers. But it also ties nicely into Google's existing search ad business with "last-mile" attribution data to report ROI to its advertisers. It knows the best way to do that is to track dollars where they're mostly spent – offline.
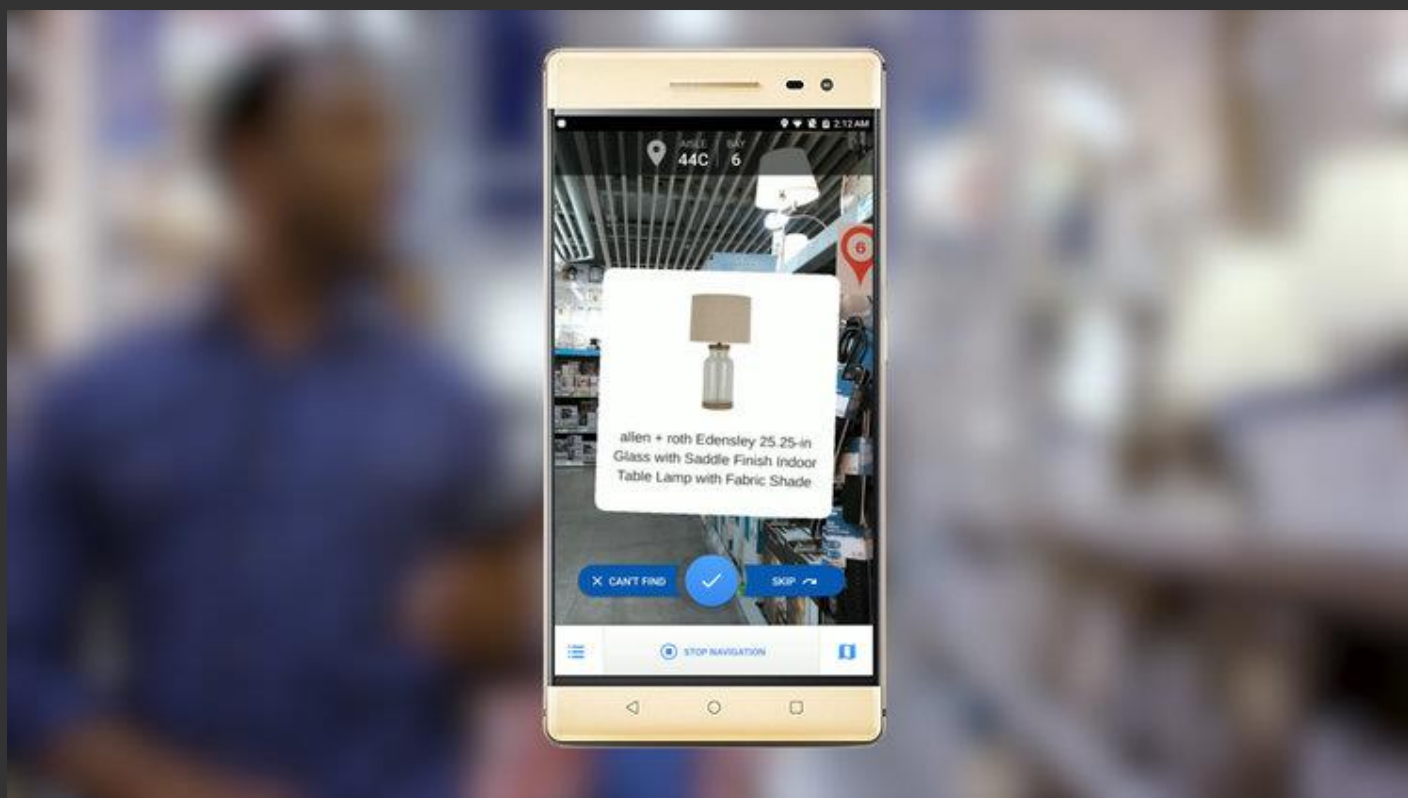
Image Credit: Lowes

Location, Location, Location

Much of this report has focused on AR advertising that involves product engagement that flows into an eCommerce function. Though we're bullish on that opportunity, as characterized earlier, it could pale in comparison to a separate but related opportunity: AR-guided *offline commerce*.

As background, it's often forgotten that $3.7 trillion is spent in consumer retail purchases in the U.S.[v] Of that total, $300 billion (8 percent) is e-commerce. This means offline brick & mortar spending – though often overshadowed by its sexier online counterpart – is where the true scale occurs.

But digital media like mobile search is still impactful. Though spending happens predominantly offline, it's increasingly *influenced* online. Specifically, $1.7 trillion (46 percent of that $3.7 billion) is driven through online and mobile consumer interactions. This is known as online-to-offline (O2O) commerce.

O2O is one key area where AR will find a home. Just think: is there any better technology to unlock O2O commerce than one that literally melds physical and digital worlds? AR can shorten gaps in time and space that currently separate those interactions (e.g. search) from their offline outcomes.

We're talking contextual information on items you point your phone at. AR overlays could help you decide where to eat, which television to buy, and where to buy the shoes you see worn on the street. This is what *ARtillry Intelligence* calls "Local AR," and it will take many forms – both paid and organic.

U.S. CONSUMER SPENDING

AR'S ADDRESSABLE MARKET WILL MAP TO WHERE THE MONEY IS BEING SPENT

U.S. $ Trillions

- Total Retail Sales: $3.70
- Digitally-Influenced Offline Sales: $1.70
- Mobile-Influenced Offline Sales: $0.97
- eCommerce: $0.30
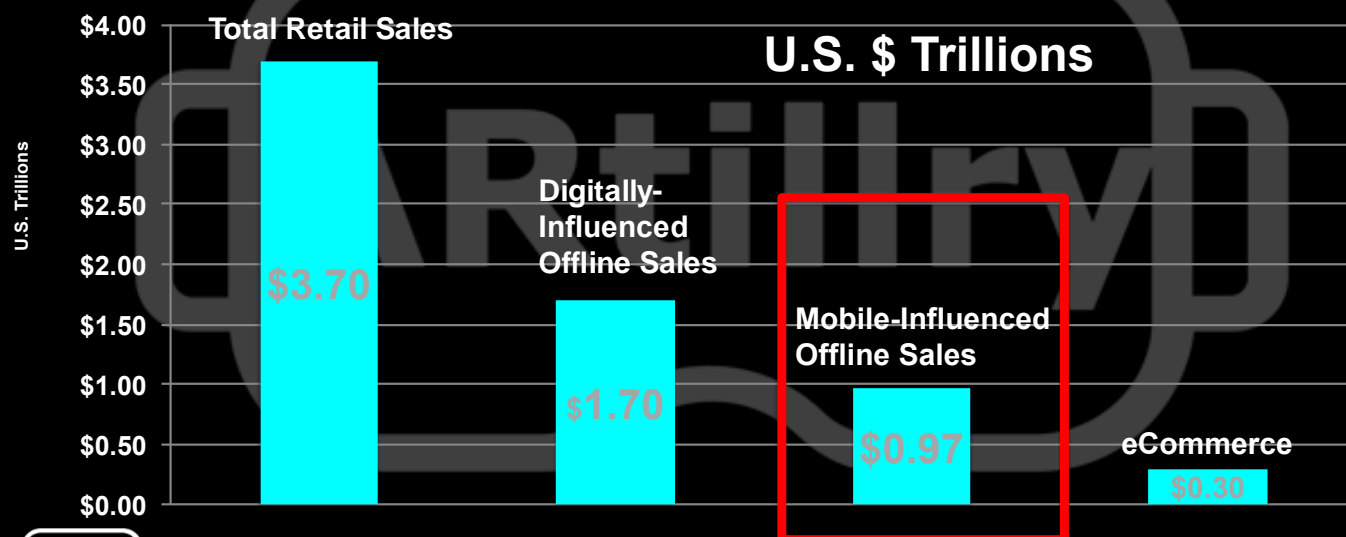
Source: Deloitte Digital

© ARtillry Intelligence, 2018

This once again goes back to search and its longstanding dynamics. For example, traditional (typed) local search performs best when consumers are out of home, using their smartphones.[vi] This is when "buying intent" is highest, and therefore when click-through-rates and other metrics are highest.

Proximity-based visual searches could carry that same high-value user intent. In fact, our recent consumer survey research indicates local commerce could be a prominent AR use case.[vii] Among types of AR apps that consumers want, city guides, in-store retail and commerce apps scored high.

These proximity-based searches are conducive to AR because the phone is near the subject (think: a restaurant you're walking by), and can therefore derive information and context after mapping it visually. This really just makes it an evolution of high-intent local search… but done with the camera.

MOBILE AR APPS IN DEMAND

What types of mobile AR would be most valuable to you?

■ AR USER   ■ NON-USER

72%
33% 22%
38% 21%
35% 16%
39% 27%
40% 25%
25% 19%
32% 13%
3% 39%
23%

In-store retail (product information, in-store navigation) | Games (Pokemon Go, NBA AR) | Visualizing large items in your home (furniture, new car) | Sports (live stats & player info during events) | City guides (menus, reviews, navigation) | Educational (historical landmarks, museum tours, astronomy) | In-home technical support ("see what I see" remote assistance) | Social media (augmenting pictures and videos) | I'm not interested in AR on my mobile device.

Thrive Analytics
smart decisions that drive success

N= 2,198

© ARtillry Intelligence, 2018

Video Companion: AR Advertising
 (click URL to open)

https://youtu.be/naJ9MEeb0Ws
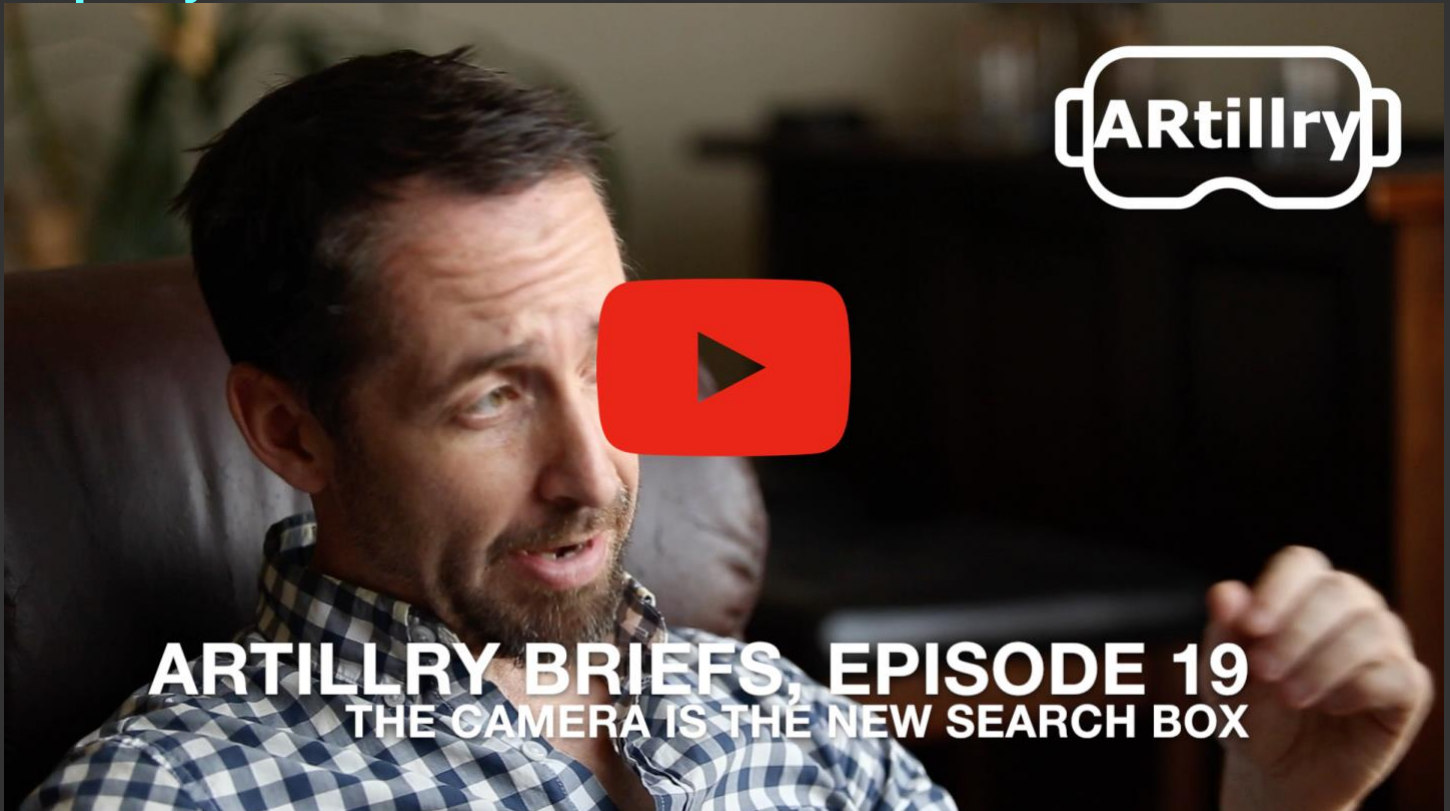
Buy Side: Advertiser Adoption

AR campaign examples in this report represent an adoptive minority. How does the rest of the industry look? According to Boston Consulting Group (BCG), ten percent of companies have AR campaigns, 45 percent are interested, and 35 percent foresee campaign launches within two years.

ADVERTISERS' AR ADOPTION

What best describes your company's use of AR marketing?

INDUSTRIES/VERTICALS DRIVING ADOPTION

10%
25%
10%
10%
45%

- ■ Integrated
- ■ Experimenting
- □ < 1 year away
- ■ > 1 year away
- ■ Non-users

INNOVATORS
FASHION, LUXURY & BEAUTY
ENTERTAINMENT & GAMING
RETAIL

ADOPTERS
CONSUMER DURABLES
FOOD & BEVERAGE
FINANCIAL
TRAVEL
AUTO
TECH
CPG

Source: BCG Marketing Executive Benchmarking Study, January 2018; BCG Analysts. N = 55

© ARtillry Intelligence, 2018

As for the stage in the consumer purchase funnel where AR is making a mark, it's mostly in "consideration." This makes sense, as higher-funnel stages like awareness are better served by reach media like TV. But as examined above, AR presents an opportunity for full-funnel engagement.

Advertisers see this potential: when asked where AR will be in two years, BCG's survey respondents see it moving down the funnel (figures below). They also recognize that AR's melding of digital and physical worlds makes it fitting to proximity-based engagement like Google Lens or in-store overlays.

But advertisers' feelings on the AR advertising opportunity aren't all positive. They show lots of signs of doubt or uncertainty. Among those uninterested in AR advertising, top reasons for holding back include a lack of scale (explored later), internal expertise and unclear ROI (figures below).

ADVERTISERS' AR ADOPTION
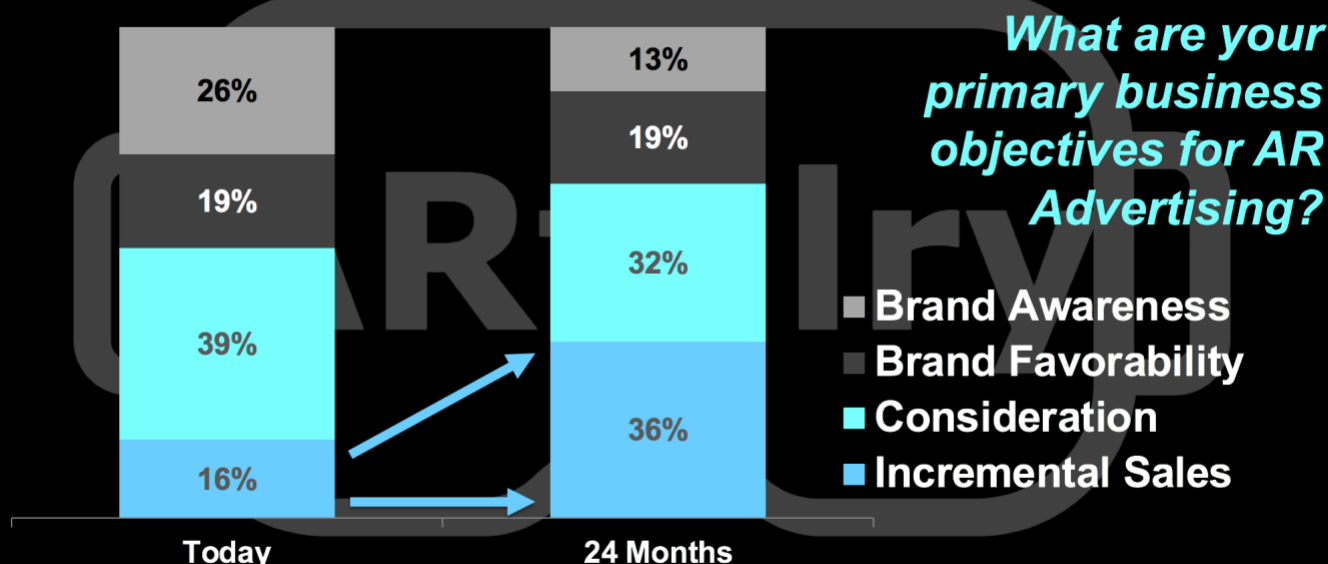
What are your primary business objectives for AR Advertising?

- Brand Awareness
- Brand Favorability
- Consideration
- Incremental Sales

Today: 26%, 19%, 39%, 16%

24 Months: 13%, 19%, 32%, 36%

Source: BCG Marketing Executive Benchmarking Study, January 2018; BCG Analysts. N = 55

© ARtillry Intelligence, 2018

This speaks to the need for education because the KPIs for AR's advertising efficacy are certainly there. Advertisers just have to be made aware en masse, which will take a while if history is any indication. Their acclimation to smartphone advertising is still underway, 10 years later.

But it goes beyond awareness and even real interest and adoption. AR ad campaign effectiveness and sustained spending will come down to execution. And that will be an even longer learning curve, which will be all about native ad design and measuring the right things (explored later).

In the meantime, there will be misfires and porting of legacy media to AR. It's a necessary process, like we saw in early days of smartphone ads. We even still see this, given that the desktop-inherited static banner ad persists in mobile. But AR's eventual payoff will be big for those who get it right.

"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."

ADVERTISERS' AR ADOPTION

What are your biggest challenges for AR advertising adoption?
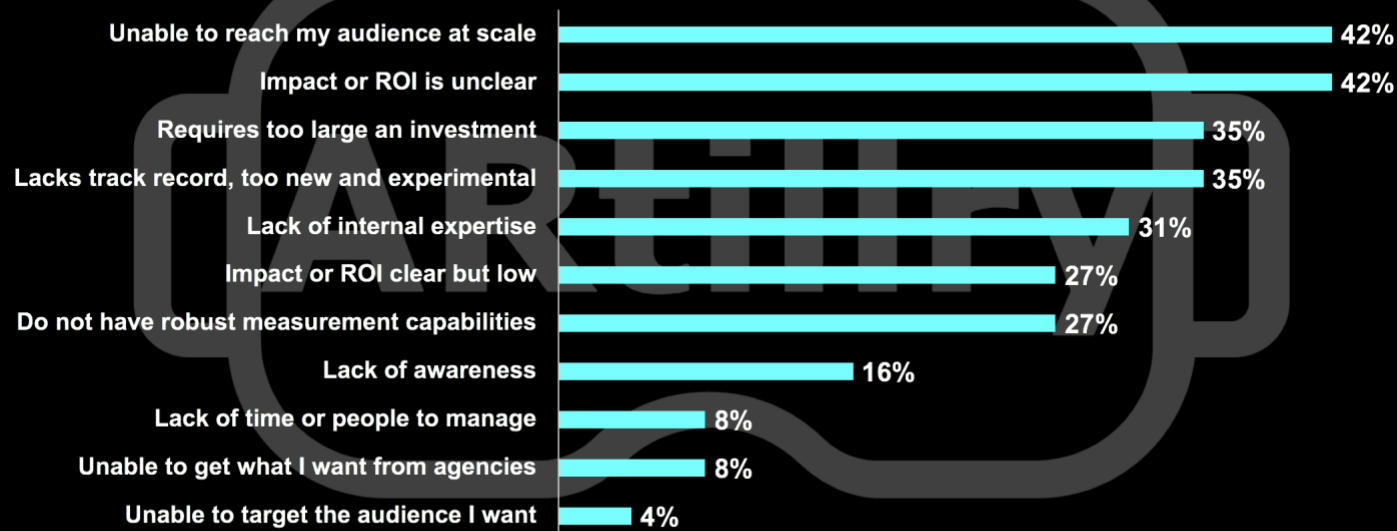
Challenge	Percent
Unable to reach my audience at scale	42%
Impact or ROI is unclear	42%
Requires too large an investment	35%
Lacks track record, too new and experimental	35%
Lack of internal expertise	31%
Impact or ROI clear but low	27%
Do not have robust measurement capabilities	27%
Lack of awareness	16%
Lack of time or people to manage	8%
Unable to get what I want from agencies	8%
Unable to target the audience I want	4%

Source: BCG Marketing Executive Benchmarking Study, January 2018; BCG Analysts. N = 55

The Bear Case: Does it Scale?

When it comes to AR's ad scenarios, there are lots of potential strengths including the high user engagement and performance indicators examined earlier. But though that could be effective on an individual-impression basis, AR advertising could be challenged to scale in the aggregate.

In other words, AR in the next 12-18 months will continue to have a relatively niche status in media and advertising terms. This diminishes reach, which is a primary objective of most brand advertisers and ad agencies. There's simply not enough scale yet in AR to get them excited.

"Advertising is something we've thought of," Snaappy CEO Gal Shvebish told ARtillry recently. "At the moment, it won't be interesting enough for brands because there isn't enough muscle; there isn't enough of a user base and critical mass. How many people will see their ads?"

Quantifying that, there are about 2000 ARkit apps within a universe of about 2.2 million iOS apps. And there will be 1.21 billion AR-compatible smartphones by the end of 2018. That's a strong addressable market, but a more relevant figure is the *actual market* of 158 million active AR users.

In other words, ad networks, media companies and publishers don't sell ads based on hardware penetration (e.g. how many people own TVs). Ad sales happen based on specific and validated network or publisher reach (e.g. how many people watch CBS on Tuesday night).

Those 158 million users represent 13 percent of 1.21 billion AR-compatible smartphones. Over time, that percentage will grow as the industry evolves. Specifically, we project 1.19 billion mobile AR active users by 2022 which is 36 percent of the 3.4 billion AR compatible smartphones at that time.

Beyond active *users,* it's also important to consider metrics for *usage.* For example AR session lengths are known to be short due to arm strain of holding one's phone up. Developers are learning and applying this to app design which is a good thing: but a by-product is diminished ad inventory.

Those ad inventory constraints combined with advertisers' historically-validated pace of new technology adoption (further supported by survey data in the previous section) signal us that AR ad revenues will be relatively moderate in the near term. We'll quantify that in more detail next…

ARCORE + ARKIT INSTALLED BASE

AR-Compatible smartphones versus active users   (DETAILED VIEW)

Millions of Units

July 2018 Installed Base: 762

Year	AR-Compatible Phones	Monthly Active AR Users
2017	477	48
2018 (E)	1,219	158
2019 (E)	2,193	439
2020 (E)	2,794	699
2021 (E)	3,191	957
2022 (E)	3,420	1,197

■ AR-Compatible Phones   ■ Monthly Active AR Users
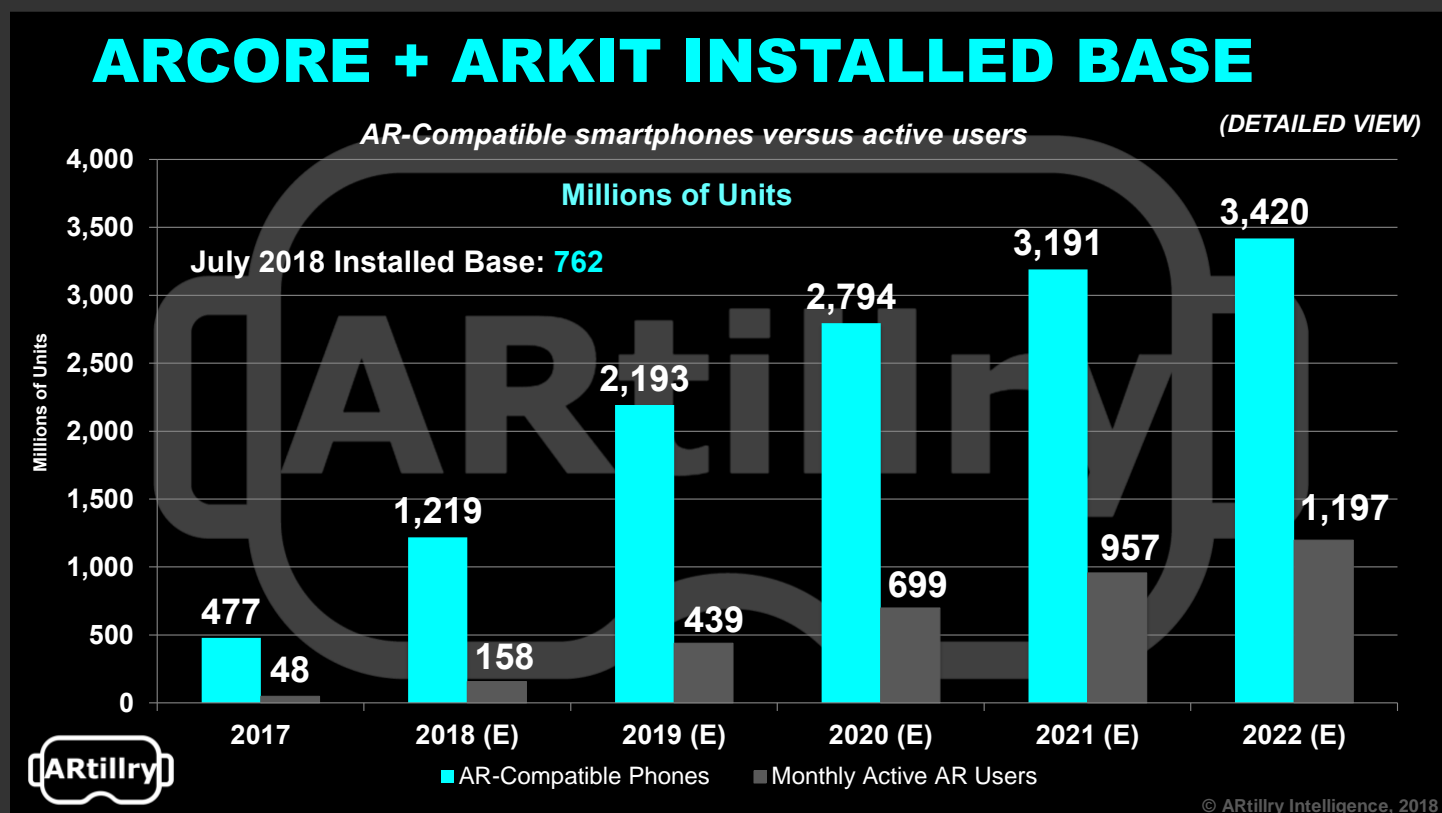
Quantifying AR Ads: The Revenue Outlook

Based on variables examined in the previous sections and several other market signals, *ARtillry Intelligence* has quantified the revenue outlook for AR advertising. These figures are a component of our global XR Revenue Forecast[viii] but are broken out in greater depth for the first time here.
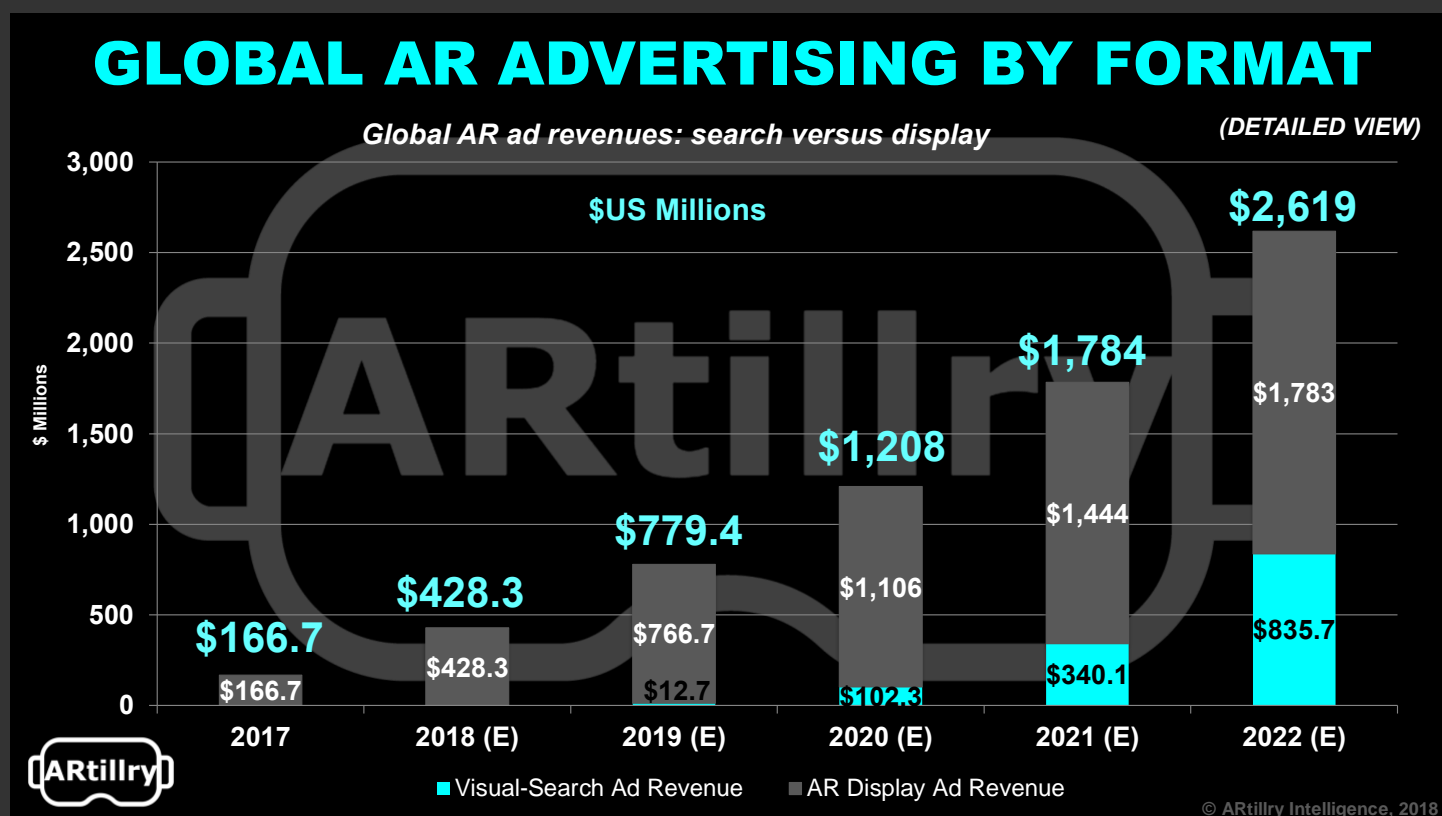
Specifically, we project AR advertising to grow from $167 million in 2017 to $2.6 billion in 2022. Notably, this is dominated by display-oriented AR advertising in the near term. Over time, search-based AR advertising (visual search), will gain share for many of the reasons explored earlier.

This "late arrival" for visual search also follows a familiar historical pattern. As noted earlier, display advertising was a predominant format in the web's early days before search advertising started to emerge. This is partly due to more complex and sophisticated technology, such as search algorithms.

In AR, visual search will also require more evolution in computer vision and the AR cloud. Though it's convenient to envision the act of pointing one's phone at objects to receive qualifying information, its "prime-time" introduction will involve lots of technology still in development by Google and others.

GLOBAL AR ADVERTISING BY FORMAT

Global AR ad revenues: search versus display

(DETAILED VIEW)

$US Millions

$ Millions

Year	Total	AR Display Ad Revenue	Visual-Search Ad Revenue
2017	$166.7	$166.7	
2018 (E)	$428.3	$428.3	
2019 (E)	$779.4	$766.7	$12.7
2020 (E)	$1,208	$1,106	$102.3
2021 (E)	$1,784	$1,444	$340.1
2022 (E)	$2,619	$1,783	$835.7

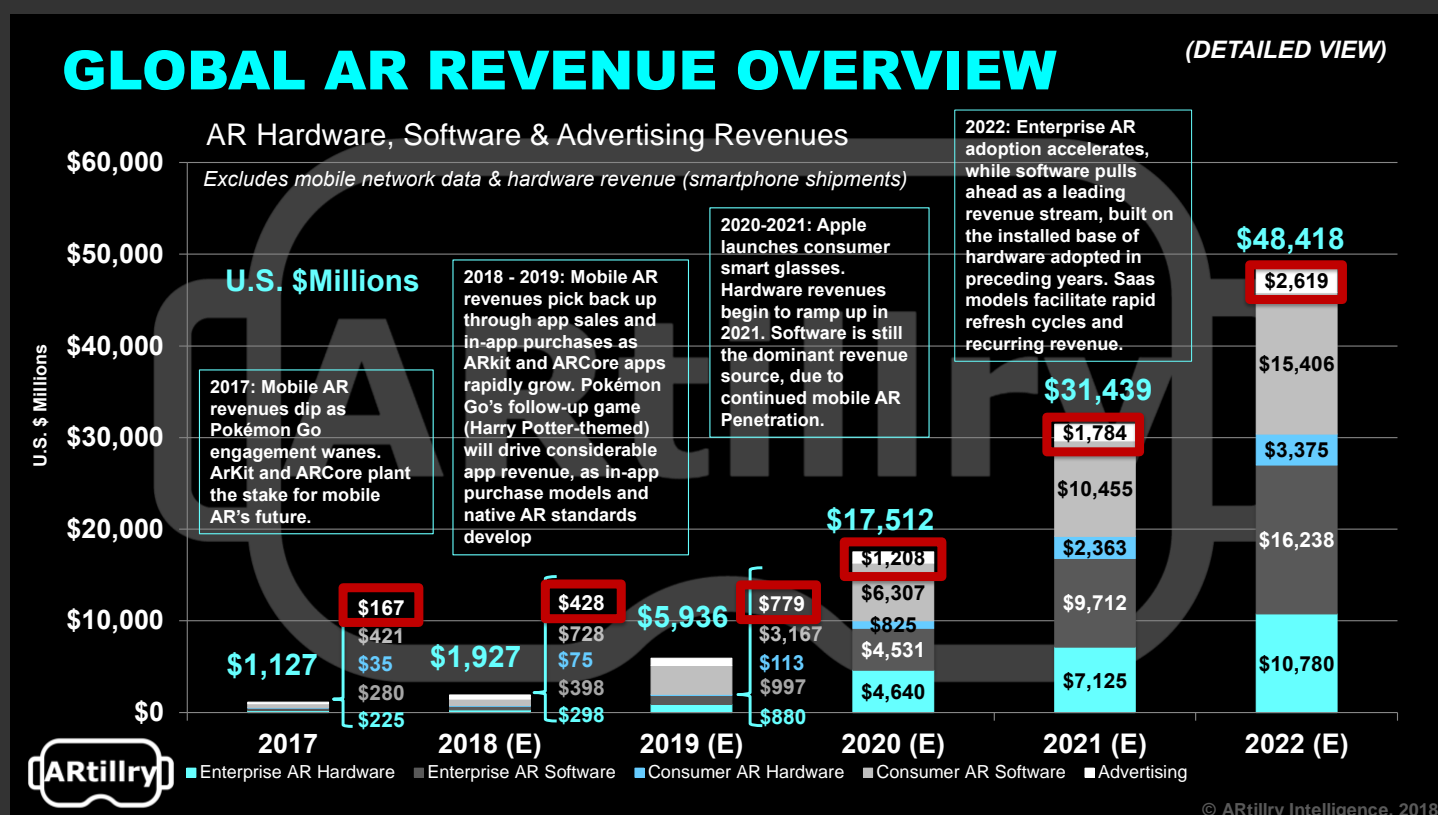■ Visual-Search Ad Revenue ■ AR Display Ad Revenue

In Perspective

Panning back, AR advertising will be a relatively small portion of overall AR revenues. That overall pie also includes AR software (e.g. app purchases) and hardware (AR glasses),. These are each driven by different market dynamics and growth curves explored in our Global XR Revenue Forecast.[ix]

Specifically, advertising will hold a 14.8 percent share of AR revenues in 2017, shifting to 5.4 percent in 2022. Reduction in share isn't due to a deficiency in AR advertising but rather more accelerated growth from other opportune areas of AR, such as consumer and enterprise hardware and software.

To put this further into perspective, mobile ad revenues today are about $107 billion.[x] Though that's sizeable, it's only 10 percent of the $1.1 trillion[xi] mobile industry, including hardware, software, apps and other revenue drivers. A similar share breakdown will play out in mobile AR as it matures.

It's also important to specify what's being measured. AR advertising includes money spent on paid AR campaigns, such as the examples given earlier. It does not include general "marketing" spend, such as brands that develop their own AR apps (measured under enterprise AR software spend).

Furthermore, devising these figures involves the "bottom-up" market-sizing methodology which involves granular ad revenue dynamics such as campaign pricing and spending. For more on *ARtillry Intelligence's* market sizing calculations, see methodology section at the end of this report.

GLOBAL AR REVENUE OVERVIEW   *(DETAILED VIEW)*

AR Hardware, Software & Advertising Revenues
Excludes mobile network data & hardware revenue (smartphone shipments)

U.S. $Millions

2022: Enterprise AR adoption accelerates, while software pulls ahead as a leading revenue stream, built on the installed base of hardware adopted in preceding years. Saas models facilitate rapid refresh cycles and recurring revenue.

2020-2021: Apple launches consumer smart glasses. Hardware revenues begin to ramp up in 2021. Software is still the dominant revenue source, due to continued mobile AR Penetration.

2018 - 2019: Mobile AR revenues pick back up through app sales and in-app purchases as ARkit and ARCore apps rapidly grow. Pokémon Go's follow-up game (Harry Potter-themed) will drive considerable app revenue, as in-app purchase models and native AR standards develop

2017: Mobile AR revenues dip as Pokémon Go engagement wanes. ArKit and ARCore plant the stake for mobile AR's future.

Year	Total	Advertising	Consumer AR Software	Consumer AR Hardware	Enterprise AR Software	Enterprise AR Hardware
2017	$1,127	$167	$421	$35	$280	$225
2018 (E)	$1,927	$428	$728	$75	$398	$298
2019 (E)	$5,936	$779	$3,167	$113	$997	$880
2020 (E)	$17,512	$1,208	$6,307	$825	$4,531	$4,640
2021 (E)	$31,439	$1,784	$10,455	$2,363	$9,712	$7,125
2022 (E)	$48,418	$2,619	$15,406	$3,375	$16,238	$10,780

■ Enterprise AR Hardware ■ Enterprise AR Software ■ Consumer AR Hardware ■ Consumer AR Software ■ Advertising

Final Thoughts: It's All About Analytics

One key theme in this report – and in lots of ARtillry writing is – "native" thinking. The idea is to build new experiences around AR, rather than tacking AR to existing UX. Also known as "AR-first," we learned similar lessons in "mobile-first" design principles of the last decade, including advertising.

That not only applies to mobile apps and ads but how they're *measured*. Just like AR ads will evolve, analytics will have to evolve with them. That means metrics that align with user behavior and accurately capture engagement. We've witnessed the same ongoing evolution with mobile ads.

In fact, this report's author wrote an op-ed in 2009 that argued mobile engagement shouldn't be measured with the same metrics as the desktop PC.[xii] Things like clicks and impressions don't do justice to mobile's more immersive engagement (e.g. touch). A similar scenario now faces AR.

This can be viewed as an opportunity. Due to relatively laggard advertiser adoption rates examined earlier, we're still measuring mobile ads with clicks and impressions. "Legacy" metrics will likewise follow AR ads for years. But that signals opportunity for anyone who can break out of this mold.

Otherwise, misaligned ad metrics like click-through-rates will define AR ads. But AR advertising's value will only be realized when metrics truly capture user intent and behavior. Whether that's gaze-based or action-oriented (e.g. tracking store visits), there will be lots of transformation to watch.

Image Credit: BMW

Key Takeaways (redux)

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

- Advertising has been transformed by Internet and mobile revolutions. Visually immersive tech could be next.
  - Augmented Reality's (AR) visual orientation and interactivity align with advertising's core goals.
  - AR can enhance "upper funnel" awareness ads by letting consumers playfully interact with products.
  - AR can boost "Lower funnel" conversions by contextualizing products at or near the point of purchase.

- AR advertising will piggyback on smartphone scale (762 million smartphones), and a visually-engaging format.
  - AR can boost consumer purchase intent by 11x and time spent with media by 2.7x, according Houzz.

- Advertisers are already reporting favorable Key Performance Indicators (KPIs) for AR campaigns.
  - ASUS achieved 10x greater engagement with AR ads in Facebook Messenger.
  - Kia achieved a 46 percent boost in dealer inventory searches, and a 20 percent boost in phone calls.
  - Home Depot achieved 2+ minute engagement time and a 12.5 percent click through rate.
  - Nike's commerce-enabled AR ad for the exclusive Kyrie 4 shoe sold out all inventory in one hour.

- Tech giants are investing heavily in AR advertising, providing further momentum and confidence.
  - Ad-dominant business models (Facebook and Google) are motivated to position for advertising's next era.
  - Ad approaches map to existing business models and formats, such as display-oriented AR for Facebook.
  - Google is investing heavily in visual search (Google Lens and VPS) given its ties to a $60 billion search business.
  - Visual search will provide Google additional query volume and "last mile" attribution for in-store engagement.

- Display-oriented AR ads dominate thus far, but visual search will emerge as an intuitive way to gather information.
  - Visual search will take longer to develop, due to its reliance on advanced computer vision and the AR cloud.
  - Longer term, visual search will gain share of AR ad dollars, due to its high-intent (thus high-value) use case.
  - Visual search is also aligned with buying-empowered millennials' sensibilities, given their affinity for the camera.

- Location-relevant AR will be opportune given buying intent, proximity and immediacy that drive local search today.
  - Most retail spending happens local/offline, but a growing portion is influenced by mobile engagement like search.
  - AR will amplify this existing dynamic through an intuitive way to contextualize local stores, activities and products.
  - ARtillry survey data indicate that the most desired AR use cases include local apps, such as city guides.

- It's not all good news for AR Advertising: Challenges await in brand adoption, risk aversion and learning curves.
  - AR ad campaigns so far represent an adoptive minority: About 10% of brands have active AR initiatives.
  - The rest are uncertain, citing lack of clear ROI, scale and internal aptitude.
  - These reasons are misaligned with reality, such as ROI metrics, indicating that industry education is needed.

- Technical and practical realities also present adoption hurdles for AR advertising.
  - Though potential scale is high given 762 million smartphones, active users are a subset of that (158 million).
  - AR has short session lengths due to arm fatigue, which further diminishes ad inventory.
  - Platform fragmentation raises additional barriers by segmenting audience and complicating creative production.
  - Success hinges on "native" development and analytics which will require time and learning curves.

- All of the above variables converge to inform an AR advertising revenue outlook of $2.6 billion by 2022.
  - This correlates to an active user base that grows from 158 million to 1.19 billion by 2022.
  - AR Advertising will hold 5.4% of overall AR revenues, compared with mobile ads' 10% of mobile industry revenue.
  - AR ads will be display-dominant in early years, while visual search ad revenues gain share over time.
  - This has historical parallels to online display ads that preceded more technically-advanced search ads.

About ARtillry Intelligence

ARtillry is a publication and intelligence firm that examines augmented reality and virtual reality, collectively known as XR. Through writings, data and multimedia, it provides deep and analytical views into the industry's biggest players and opportunities. It's about insights, not cheerleading.

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

Learn more at **https://artillry.co/about**

About Intelligence Briefings

ARtillry 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 at:
https://artillry.co/artillry-intelligence/

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's been an industry analyst covering mobile and social media since 2005, and is now Chief Analyst of *ARtillry Intelligence*, and SF president of the *VR/AR Association*.

Mike is a frequent speaker at industry conferences such as AWE, VRLA and LeadsCon. He has authored in-depth reports and market-sizing forecasts on the changing 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 found at:
http://www.mikebo.land/

Methodology

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

For market sizing and forecasting, *ARtillry Intelligence* follows disciplined best practices, developed and reinforced through its principles' 15 years in tech sector research and intelligence. This includes the past 2.5 years covering AR & VR exclusively, as seen in research reports and daily reporting.

AR advertising figures specifically include money spent on paid AR campaigns, such as the examples cited early in this report. Figures do not include general "marketing" spend, such as brands that develop their own AR apps. The latter is measured in our forecast under enterprise AR software.

Furthermore, devising these figures involves the "bottom-up" market-sizing methodology, which involves granular ad revenue dynamics such as campaign pricing and spending. For more on *ARtillry Intelligence's* market sizing and forecasting methodology, see the explanations at the following link.

https://artillry.co/artillry-intelligence/forecasts/methodology/

Disclosure and Ethics Policy

ARtillry has no financial stake in the companies mentioned in this report, nor was it commissioned to produce it. With respect to market sizing, ARtillry remains independent of players and practitioners in the sectors it covers, thus mitigating bias in industry revenue calculations and projections.

ARtillry's disclosure and ethics policy can be seen in full at:
https://artillry.co/about/disclosure-and-ethics-policy/

Contact

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

References

[i] https://artillry.co/artillry-intelligence/forecasts/methodology/

[ii] https://www.statista.com/outlook/219/100/search-advertising/worldwide

[iii] See ARtillry Intelligence Briefing, *Tech Giants Tackle AR*: https://artillry.co/2017/08/08/tech-giants-tackle-ar-top-takeaways/

[iv] See ARtillry Intelligence Briefing, *AR Cloud and the 'Internet of Places'*: http://artillry.co/artillry-intelligence/ar-cloud-and-the-internet-of-places/

[v] U.S. retail spending breakdown: https://www2.deloitte.com/us/en/pages/consumer-business/articles/navigating-the-new-digital-divide-retail.html

[vi] Mobile users' local purchase intent: http://www.mikebo.land/forecasting

[vii] See ARtillry Intelligence Briefing, *Mobile AR Usage & Consumer Attitudes*: http://artillry.co/artillry-intelligence/mobile-ar-usage-and-consumer-attitudes/

[viii] See ARtillry Intelligence Briefing, *XR Global Revenue Forecast 2017-2022*: http://artillry.co/artillry-intelligence/forecasts/xr-global-revenue-forecast-2017-2022/

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[x] https://www.recode.net/2017/9/14/16294450/mobile-ad-spending-growth-worldwide

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