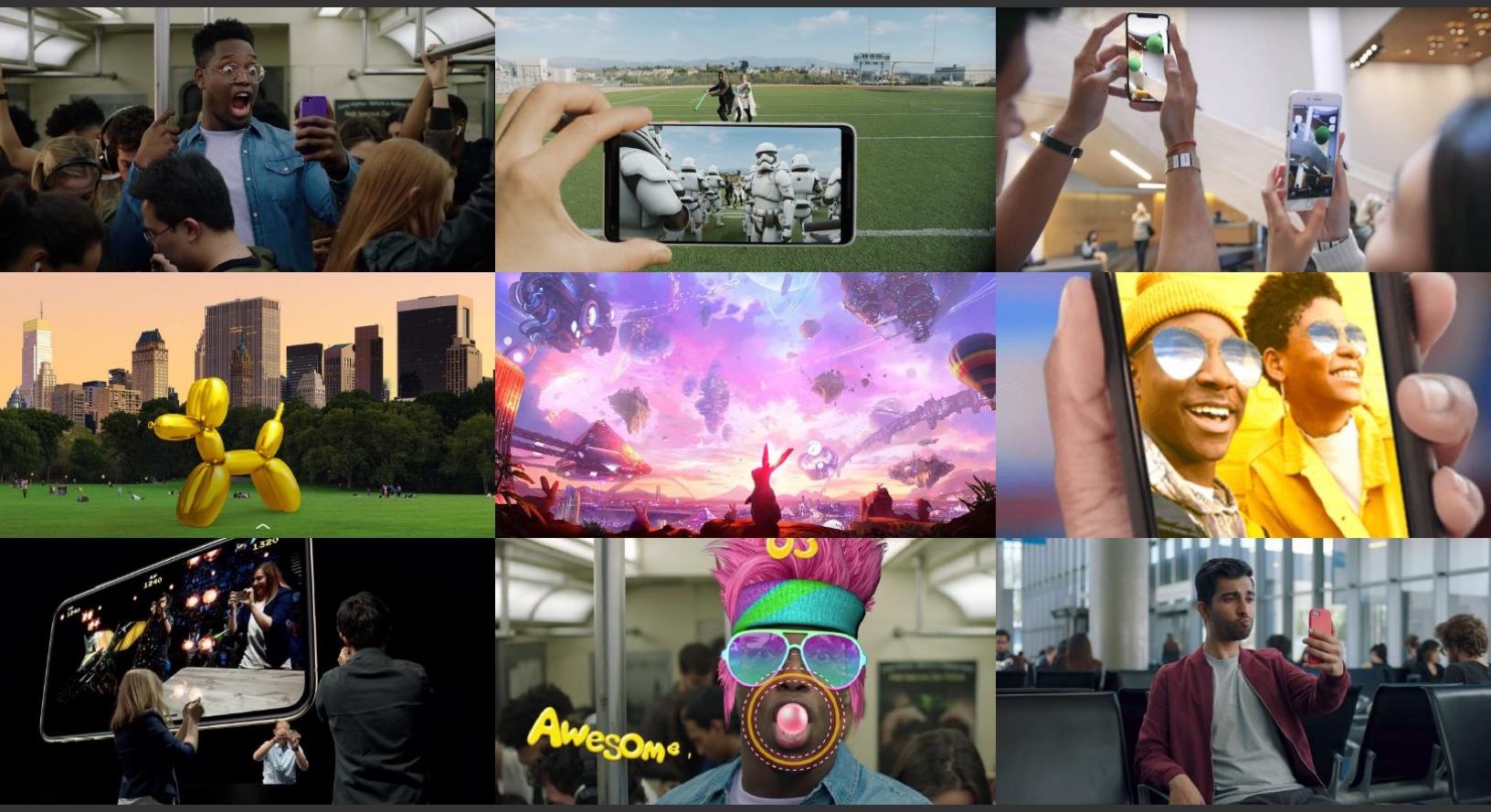

ARTILLERY INTELLIGENCE BRIEFING

SOCIAL AR: SPATIAL COMPUTING'S NETWORK EFFECT, PART II

MARCH 2019

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Executive Summary

One of the biggest questions nagging the Augmented Reality (AR) sector is what will be its killer app? And when will it arrive? The medium needs such an accelerant to legitimize and bring AR into mainstream acceptance – something it's failed to do in the 18-months since Apple's ARkit launch.

We've speculated in past Intelligence Briefings that killer apps will likely extend beyond the novel and "sexy" attributes that have thus far driven the industry's speculation, imagination and design principles (e.g. games). It will rather be something more mundane that provides all-day utility, like visual search.

But another category will also vie for the position of AR killer app: social. Indeed, you could argue that a social AR killer app has already arrived and accelerated mass acceptance: social lenses. We see these as an important AR "gateway drug," but only a glimpse into social AR's true potential.

One thing missing from social AR lenses – though quite popular through Snapchat and Facebook – is meaningful social interaction. More "augmented media" than augmented reality, they're created in isolation then shared with friends to be consumed asynchronously at a different time or place.

But true social AR will combine this time/place-shifted paradigm – which will still be valuable to achieve scale – with *synchronous* AR. This will rely on technically complex multi-player functionality, a key tenet of the AR cloud. But when it arrives, it will unlock new possibilities and use cases.

Moreover, the multi-player use case inherently accelerates usage and adoption through viral growth. It also has the potential to benefit from the fundamentals of network effect. With each node (user) added to shared AR experiences, the value and appeal of those experiences can grow exponentially.

Beyond the multi-player angle, augmentation is generally a natural fit for social interaction. Extending from social lenses (face filters, etc.), next-generation graphical overlays will include real-time layers of information that people choose to share with others through live AR overlays as they walk around.

These shared titbits could be everything from mood to relationship status to stylistic accouterments. The latter opens the door for business models around the exchange of virtual style items. This builds on the concept of marketplaces for digital identity, manifesting today in communities like Fortnight.

Speaking of which, one construct for socially-oriented AR is – as Ubiquity 6 CEO Anjney Midha puts it – "an MMO for the real world." This envisions layers of virtual worlds all around us which can be dynamically activated by users through AR interfaces, while managed and permissioned by creators.

But questions remain. Who will build this? What will the ecosystem consist of? Will there be open platforms for developers to create shared spatial experiences? Part I of this report tackled these questions. Now we embark on Part II to drill down further into case studies and company profiles.

Key Takeaways

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

- Social engagement is an early leader among AR use cases, mostly through AR lenses.
  - Snapchat alone has 70 million daily active users for its AR Lenses.
  - Active social AR users will grow to 468 million by 2022 according to ARtillery Intelligence data.

- Along with Pokémon Go, this social use case has validated AR's mass appeal
  - Though not "true AR" these early AR successes have served as a key "gateway drug."
  - Snapchat has also validated an ad revenue model, with more than $400 million in 2018.
  - Though it has a later start, Facebook will eclipse Snapchat as a social AR powerhouse.

- ARtillery Intelligence survey data further indicate demand for social AR.
  - 45 percent of AR users report that they actively engage with social AR, such as lenses.
  - One third of AR users choose social as a top AR use case for the future.

- Social AR's potential is grounded in an innate human need to connect with others.
  - Historical evidence points to social infusion as a technology accelerant (e.g. web 2.0).
  - Mobile AR could counteract social media isolation due to an upheld/outward focus.

- Social AR will also benefit from the principles of network effect.
  - Connections, value and utility grow with each person added to a given social graph.
  - Social interactions fuel any technology's growth through virality.

- Social AR so far lacks meaningful interaction because it is asynchronous
  - Social AR lenses are recorded in isolation then shared for remote consumption.
  - True potential will be reached with more synchronous (same time and place) interaction.
  - This involves technical challenges of the AR cloud such as multi-player functionality.
  - Google and Apple have built multi-player support into ARkit and ARcore.
  - Focused startups like Ubiquity6, 6D.ai and YouAR are taking the technology further.

- Though synchronous AR will unlock new experiences, it's not a silver bullet.
  - Syncronicity in both time and space can limit scalability by forcing spatial presence.
  - The magic formula will combine synchronous and time/place-shifted play.
  - Apps will diminish multi-player interaction due to download friction. Look to WebAR.

- The AR Cloud will be the great enabler for building meaningful social AR
  - Multiplayer, image persistence and localization are all key tenets of the AR cloud.
  - The AR cloud will be a "plurality" that maps to the strengths of participating companies.
  - Social players like Facebook will build social identity layers for dynamic AR interactions.

- Tech giants could be disadvantaged by data collection conflicts and legacy business models.
  - Nimbler startups could have an edge in native focus and lack of conflicts.
  - After exploring Social AR's dynamics and drivers in Part I, we'll now go deeper into case studies.

Diving Deeper: Case Studies

In Part I of this report series, (available in the ARtillery PRO library) we examined the drivers and dynamics of socially-oriented AR. Building from that report, we now go one level deeper into case studies and company profiles of the players that exemplify the social AR opportunity.

These case studies will be split it two. This half (Part II of the series), will focus on the tech giants that are defining Social AR, such as Facebook, Snapchat, Google and Apple. The remaining half (Part III of the full series) will move “down market” to players like Niantic and Ubiquity 6.

As for the giants, what better place to start the drilldown than the 800-pound gorilla of social media: Facebook. Though this report is about social AR, Facebook’s spatial computing ambitions build from the common technological underpinnings of AR *and* VR. In fact, the latter is where the story begins.

Facebook: On Your Face

There have been several VR waves, each of which crested and crashed before gaining enough momentum for a long ride. The current wave – whose proponents echo the rally cry that “it’s different this time” – was kicked off in 2014 when Facebook acquired VR hardware maker Oculus for $2 billion.

The first domino had fallen. The acquisition’s size and suitor sent symbolic signals through the tech world that VR’s day may finally be near. You know the rest: the excitement snowballed, sparks flew, and the inevitable sequence of Silicon Valley’s herd mentality and hype cycle was underway.

Without going into the expansion and contraction that led to today, the main question is ‘Why?’ Why did Facebook acquire a fledgling hardware player in a moon-shot category? And why did it pay so much – a sum that’s since ballooned in internal R&D? The answers to this question can tell us a lot.

Long Game

Facebook’s VR motivations include a powerful force: FOMO. “Fear of missing out” was etched in Mark Zuckerberg’s strategic memory from not releasing a hardware product as a direct consumer touch point in the smartphone era. This ceded direct consumer ownership to its competitors.

Source: Oculus

It must reach consumers through apps that operate on, and are beholden to, devices that Google and Apple control. Not only is this risky and deferential, but from a technological standpoint it lacks vertical integration to tune hardware for an optimal Facebok UX. It wants to own the hardware *and* software.

Given Mark Zuckerberg's vision of a VR future, the lack of control over hardware isn't a barrier he wants to face again. Though smartphones are highly conducive to social engagement, he sees VR as an even greater bedfellow for the future of social interaction. Facebook wants to be on your face.[i]

And it continues to double down. Oculus Go was dispatched as a $199 loss leader to seed an installed base that drives Facebook's long-game platform strategy. Oculus Rift and Quest pricing followed suit, undercutting and severely challenging margin-dependent VR competitors.

Facebook can afford this loss-leader approach with an eye on the larger prize: Owning the hardware that's a trojan horse for that privileged spot on your face. And in the meantime, it can wage battles for nearer-term revenue with VR's technological cousin. That's where AR comes into the picture.

Facebook's social graph engenders a sort of "identity-layer" to the internet. Applied to AR, it could someday own a 3D identity layer built from its ability to recognize faces. It could trigger permission-based info about oneself (e.g. status), seen through AR glasses. This work can also advance VR.

"VR can advance farther and faster by leveraging AR technology," Oculus CTO John Carmack said at the OC8 conference. "No off-the-shelf display technology is good enough for AR, so we had to develop a new display system. And that system also has the potential to take VR to a different level."

Source: Facebook

Short Game

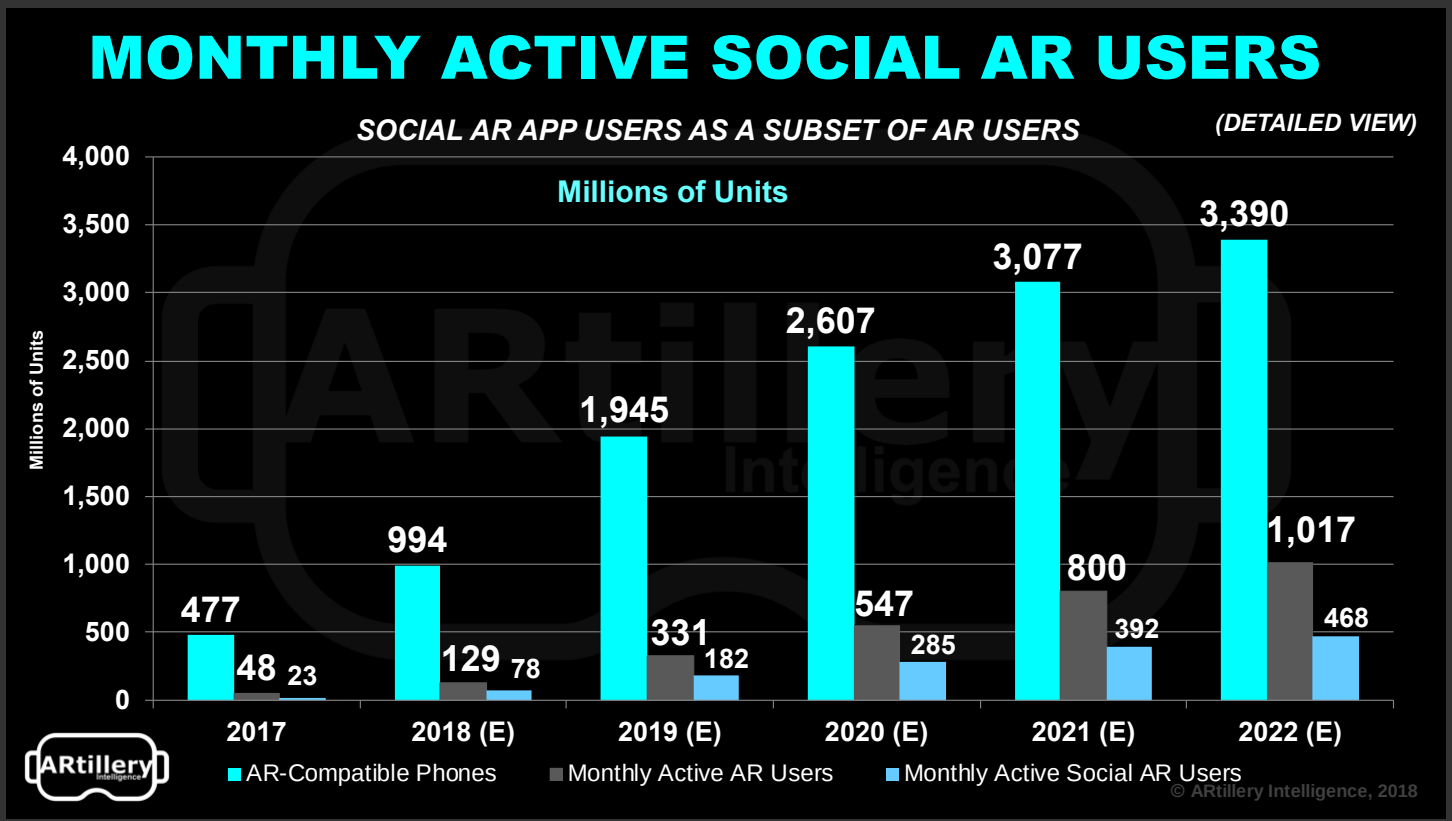
But focusing on today, Mobile AR is the play given zero-cost hardware: the smartphone you already own. There are 2.6 billion smartphones globally according to ARtillery Intelligence, with almost 1 billion of them AR compatible today. That will grow to 3.4 billion AR compatible devices by 2022.[ii]

Moreover, smartphones are where Facebook makes 92 percent of its revenue. So it's embraced forms of AR that align with its core business: mobile advertising. And it turns out, AR is great for advertising. This includes virtual product try-ons that are shared through the social graph.[iii]

As background, Facebook's ad revenue correlates to the time we spend in its walled garden. And AR creates sharable immersive content to keep us there longer. AR also directly produces revenue through ad formats that let consumers anchor and visualize products *in their space* or *on their face*.

As further background, Facebook's News Feed ads have grown stale and overcrowded so it's motivated to innovate new forms of user engagement. That could happen in two areas, both of which build on the smartphone camera's vaunted status among millennials: AR and Instagram.

With prime positioning on ubiquitous smartphones, Facebook has followed Snapchat in making AR lenses a currency in social sharing. Its Spark AR platform (examined below) opens that development to brands or individuals that want to build AR experiences across Facebook's mobile properties.



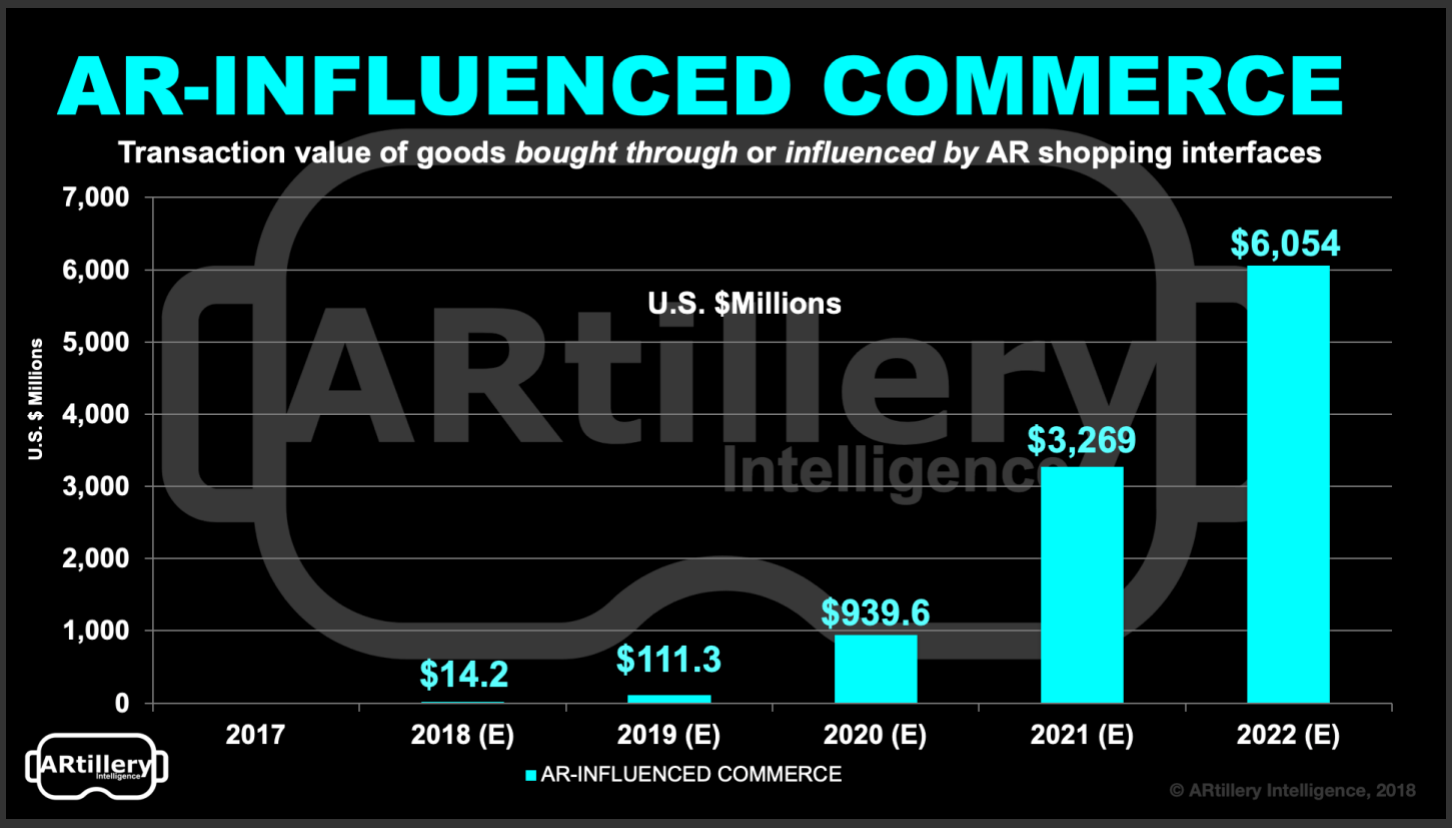
For example, using the platform, Michael Kors built a campaign that lets users jump from a News Feed ad to a front-facing camera activation to virtually try on sunglasses. Nike spotlighted a shoe release by letting users place it virtually in their space then walk around, and buy, the shoe.[iv]

"You can actually walk to the shoe, get up close and personal, take photos and videos and share them with friends," said Facebook's David Marcus at 2018's F8 conference. "When you're done and close the camera, you're back in the experience where you can buy the shoe right then and there."

This makes AR a rare "full funnel" ad format including brand awareness and direct-response (purchases). The latter demonstrates advertiser ROI through real conversions.[v] This importantly boosts Facebook's standing on Madison Avenue and its ability to grow its core advertising business.

This also flows into AR commerce, the next step in the consumer journey after ad engagement. It apples AR as a shopping and transactional tool, such as "try before you buy" product visualization. ARtillery Intelligence projects $6.1 billion in products to be purchased through AR interfaces by 2022

And next up is Instagram. Given Instagram Stories' 400 million active users, it's becoming a popular place for advertisers seeking premium ad inventory. And it's converging with AR, given that SparkAR is now available for developers to build on Instagram. This will be the next AR battleground.



Video Companion: AR Commerce Materializes

(click URL to open)

https://youtu.be/xNL6f9mStAU

Lowering Barriers

A big part of reaching all of the above goals is to empower developers to build AR experiences. Facebook's Spark AR platform is meant to lower barriers and accelerate AR adoption by seeding more experiences. And that's done by making it easier to develop AR on ubiquitous smartphones.

"Because it's delivered through the Facebook camera, you have potential to reach 1.5 billion people," said Elise Xu at AWE. "This year we want to expand that [by] growing the inventory of AR content and giving developers ability to make AR experiences [for] more people and more channels."

To clarify, 1.5 billion is an installed base for Facebook, not active AR users. But Facebook plans to penetrate deeper through three goals: easier AR creation, more capabilities and greater distribution. For creation, its Patch Editor utilizes a visual programming interface for drag & drop functionality.

This means programming such as JavaScript isn't required to make AR experiences on Spark AR Studio. And it's doubling down on that strategy by making it easier to import AR graphics. A partnership with Sketchfab for example will make it easy to import thousands of 3D objects.

"There's a library in Spark AR Studio that contains a collection of 3D models pre-made from Sketchfab," Xu said on stage. "We've already vetted them to make sure that they're compatible with [Spark] AR Studio and you can just browse them and add them directly into your projects."

Source: AWE, Facebook

As for the second goal – AR capabilities – Facebook is evolving its interactions for augmenting people (front-facing camera), and augmenting the world (rear facing camera). For the former, it's also making advertiser-friendly enhancements, such as better face tracking for trying on style items.

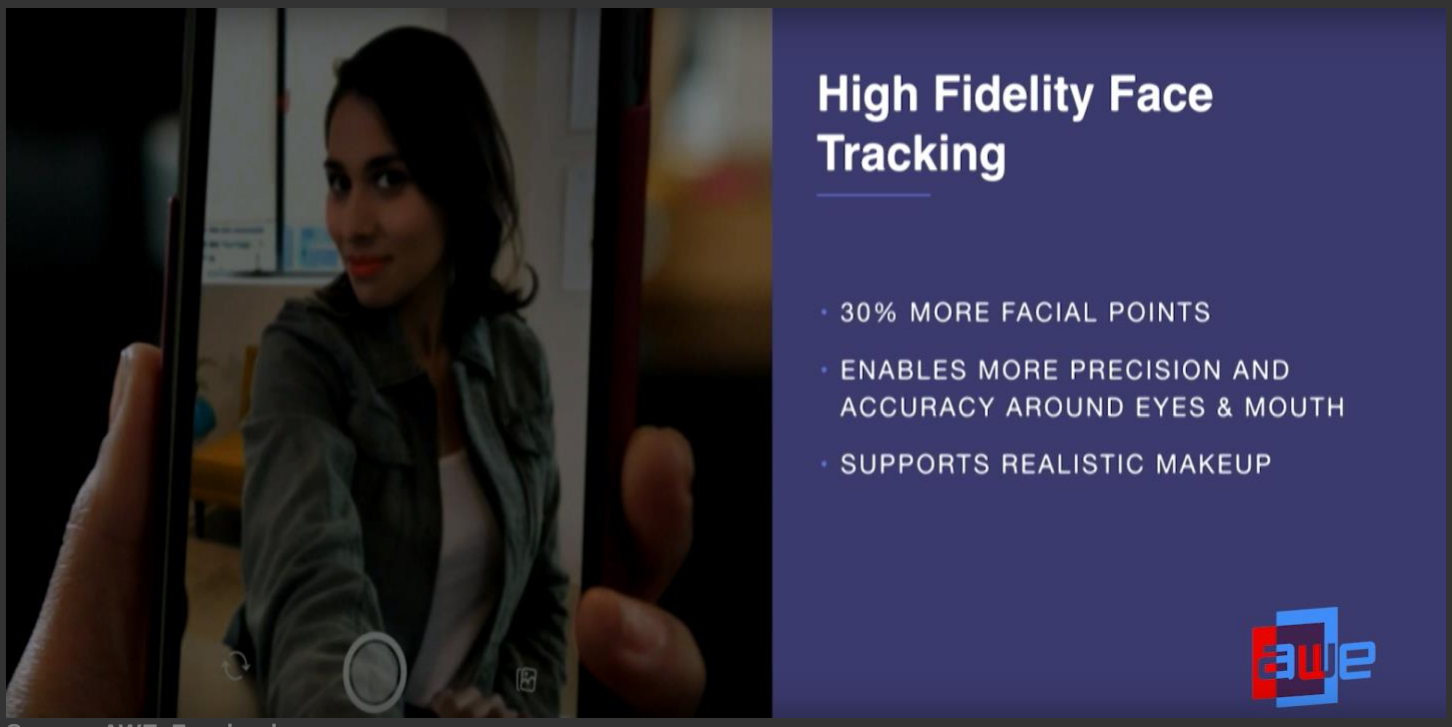
"We launched a high-fidelity tracker that tracks 30 percent more points on the face," said Xu. "It enables more precision accuracy around areas like the eyes and the mouth, and this is important for realistic makeup effects…. one of the major verticals we're tackling with that is cosmetics."

As for outward (rear-facing camera) effects for augmenting the world around us, Facebook's Target AR feature is a sort of marker-based approach to activate 3D content on any 2D plane. This is meant for things like pop-up animations on museum placards, or various ad-friendly use cases.

"The 2D planar object could be a sign… but it could also be product labels… it could be illustrations in books," said Xu. "Eventually we want the camera to be able to understand your world. And the more it's able to do that, the more it's able to give you context-aware experiences."

Facebook's Location AR meanwhile works towards geographically-anchored AR graphics that carry location relevance. This will be a key value-driver in AR, tied to the concept of geographic scarcity. And like the above moves, it's advertiser-friendly considering location-based marketing.[vi]

"As AR evolves and expands, it'll become more important for these experiences to be location relevant, and to be particularly tied to certain locations so they feel like they're part of that place," said Xu. "Location can be as broad as a country or as specific as a particular address."



Source: AWE, Facebook

Last among Facebook's over-arching AR initiatives is the third goal: broadening distribution. This is a numbers game to attract developers who are deciding where to apply resources. And the next untapped frontier for AR among Facebook's properties, as mentioned earlier, is the mighty Instagram.

"A big push this year has been bringing our AR platform to the Instagram camera," said Xu. "The next phase is opening it up to more creators … we're going to have our first batch of creators who are not already known brands or influencers and see what they come up with."

Clearly, the key theme through all these moves is lowering barriers to AR creation and distribution. That goes for both independent developers and advertisers. The former create content that grow Facebook usage and engagement, while the latter bring in the dollars. And it's working so far…

"When A/B tested against non-AR ads, [AR] drives significantly more conversions," said Xu. "The next step is making the creation of these assets far easier and cheaper. One potential way to do that a tool where advertisers simply upload 3D models and we auto-generate the AR effect for them."

Source: AWE, Facebook

Design Principles

Building on the above opportunities, Facebook is taking AR development seriously. That goes for the tools its building for developers in the Spark AR platform as just explored. But it also applies to the experiences its developing internally to inspire developers with use cases that work.

According to Facebook Camera lead Ficus Kirkpatrick, a platform like Facebook has to strike this balance between guiding developers with AR best practices, and letting them experiment. He says it does this by seeding the ecosystem with a few proven "lighthouse" AR experiences.

“It’s really important that we as the platform set examples of what can be done,” he told Techcrunch in an on-stage interview “It doesn’t foreclose any opportunity to do something new and creative, and it does maybe inspire people who need that initial push to start from a new jumping-off point.”

One example of a “lighthouse” is Story Time in Facebook Portal. It adds AR animations like selfie lenses for adults telling stories (think: grandparents) to children remotely. Super Ventures’ Tom Emrich heralds it as a “trojan horse” for AR in the home. Other lighthouses expand into commerce.[vii]

“In commerce in particular, we’re running some interesting tests where you can try on sunglasses before you buy them, and you can try on makeup before you buy it,” said Kirkpatrick. “Cases like that are interesting and solve problems for people and maybe save you a trip to the store.”

When working on lighthouse experiences or any Facebook-branded AR product, Kirkpatrick also has firmly held quality standards and design principles. This primarily includes building for native utility and repeat/active use as opposed to novelty. His team has specific protocols to achieve this.

“It’s about thinking ‘Is this something that someone will come back to or is it kind of a splashy thing?'” he said from the stage at TechCrunch Sessions AR/VR. “Then we do a ton of testing… internal testing… user research. At the end of the day, the test for us is if people are coming back to use it.”

In early days, these success factors are mostly unknown and it’s a game of feeling out what resonates with users. But as an industry, shared best practices are emerging — many based on physical realities of mobile AR. For example, design around the limitation of short sessions.

“There are a couple of things that are pretty different about a handheld device,” said Kirkpatrick. “Notions like going up and seeing an augmented street sign isn’t really going to work because nobody’s going to walk around with their hand out like this [gesturing] all day long.”

There's also the concept of "activation energy" which is the friction to launch an AR experience. For example, app downloads (as opposed to web AR) are an adoption barrier for this reason.[viii] In short, the appeal or utility of the AR experience has to outweigh the activation energy.

"[It's] use cases that are so valuable and promising that they're worth overcoming the friction of taking your phone out of your pocket and getting into an app." he said. "There are quite thin needles we need to thread in terms of finding cases that actually work like that on handhelds."

Video Companion: AR Advertising

(click URL to open)

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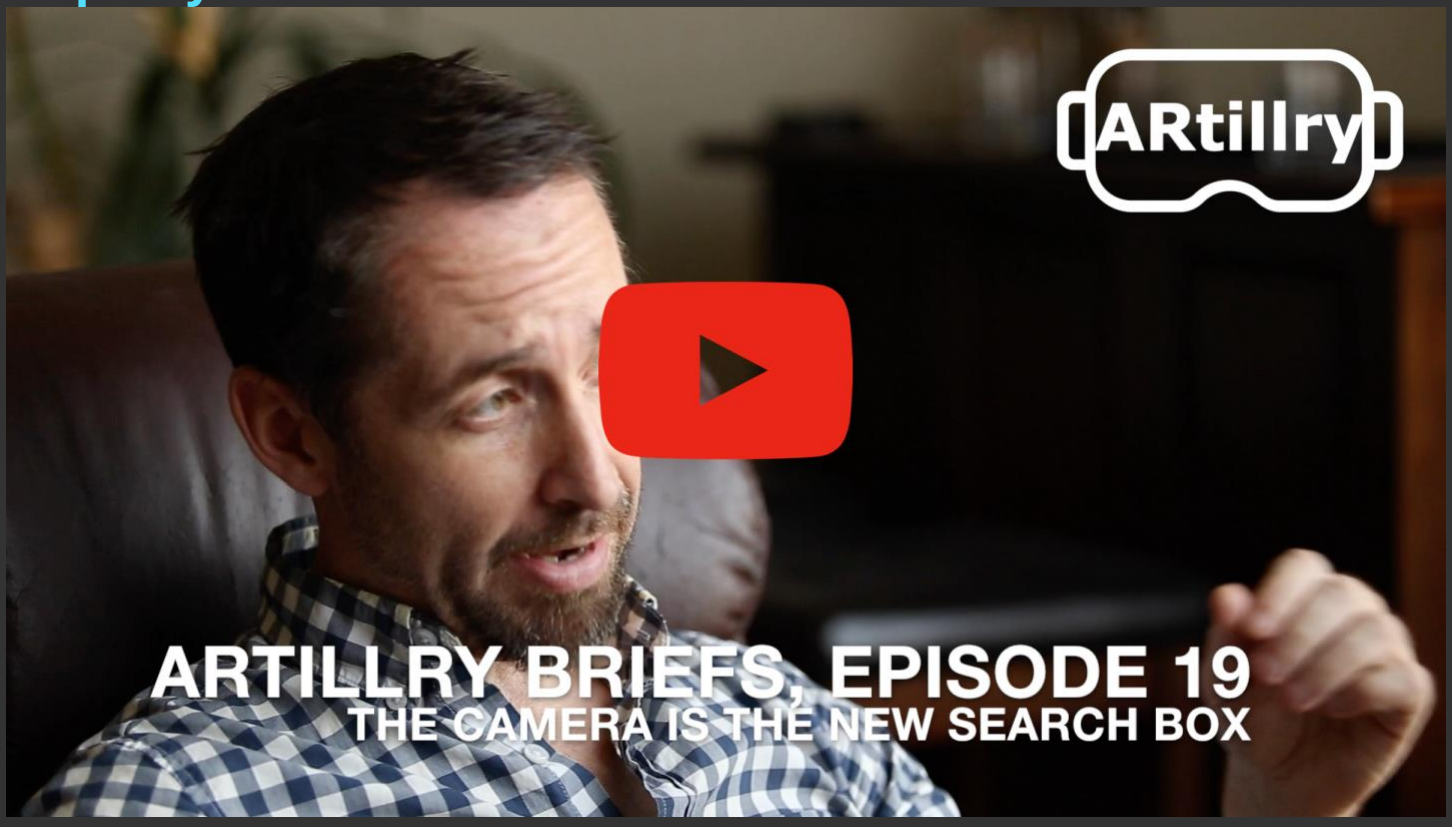


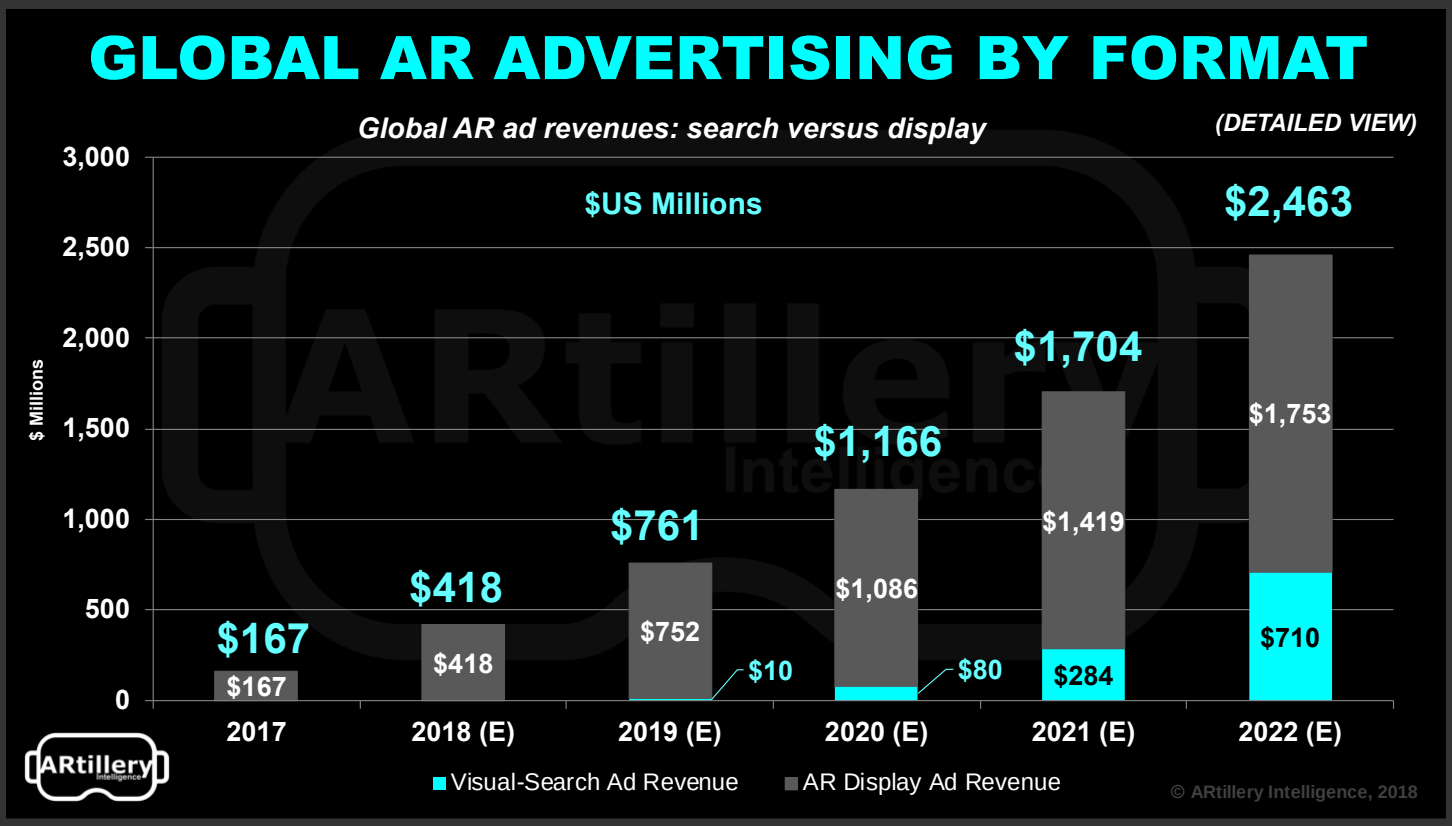
Snapchat

Among the early pioneers of mobile AR, Snap has been one of the most successful. Social lenses and selfie masks have become synonymous with AR. And though they get flak for not being "true AR," it doesn't matter: they've done AR a favor by acclimating the world as its "gateway drug."

Snapchat has intelligently treated that AR engagement as a monetization opportunity, such as branded AR Lenses. This has vaulted it as an early leader in AR monetization, in addition to penetration and usage. In fact, it currently holds a large share of mobile AR advertising revenues.

Segmenting AR revenue by company and applying our bottom-up forecasting methodology[ix] (which calculates industry revenues based on current spending and company revenues), we estimate Snapchat's AR ad revenue to be $236 million of the $408 million spent on AR ads last year.

Its market share is mostly due to an early lead. Facebook started a bit later with all of the efforts explored in the previous section, but we believe it will catch up. Due to Facebook's operational scale and installed base of global users, it will eventually dominate. But Snapchat is still worth examining.



Short Game

Similar to Facebook, Snapchat's AR play works on two levels. The first, is to boost its ad revenues by giving advertisers a more engaging format to capture user interest and conversions. And those campaign performance indicators are proving out, as explored further below.

The second level involves using AR to engage its user base to both attract new users and to grow session lengths for existing users. Those goals lead back to ad revenue, but also focus directly on its usage metrics at a time when Snapchat's user growth continues to slow.

Though Snapchat is an early leader among social networks integrating AR, it's subject to continued competition from Facebook. In the same style that Facebook copied key Snapchat formats like Stories, it's already doing the same with AR lenses, such as its Spark AR platform examined earlier.

Snapchat has responded by opening up its AR platform for developers: Lens Studio. Previously, it limited AR lens development to its own in-house development team. It's also moved towards more synchronous AR experiences[x] with Snappables, which add more social AR appeal and use cases.

Snapchat will have to maintain that open attitude if it's to compete with the volume of AR content and user engagement that Facebook is capable of. Just like Facebook's copying of other Snapchat formats, it can gain AR market share quickly based on its 1.5 billion global mobile users.

Meanwhile, one advantage Snapchat has over Facebook is its relative affinity among Millennials and Generation Z. Facebook, despite its global scale, faces daunting attrition among younger generations, while Snapchat remains strong. This could be where the battle is waged.

Source: Snap, Inc.

Proof Points

As an example of Snapchat's AR ads, Foot locker and Jordan Brand recently ran an AR campaign. Using Snapchat's "Ad to AR" format, users swiped up on a related story to reveal a branded lens. The lens featured an interactive 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 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 transactional functionality so users can purchase goods right within Snapchat, rather than being bounced to an app or website.

Validating the assertion made earlier that AR can influence "lower funnel" conversions, Snapchat boasts a 9 percent sales lift compared to non-AR benchmarks. This commerce infusion will be a key evolution in social AR advertising, given the potential for lower-funnel, high-intent interactions.

Source: Snap, Inc.

Long Game

Snap extended its AR playbook in September with a feature that lets users scan physical items or barcodes with their camera. It then overlays a card showing info about that item or similar ones. That can include price, reviews and a purchase button, all of which flow from Amazon.

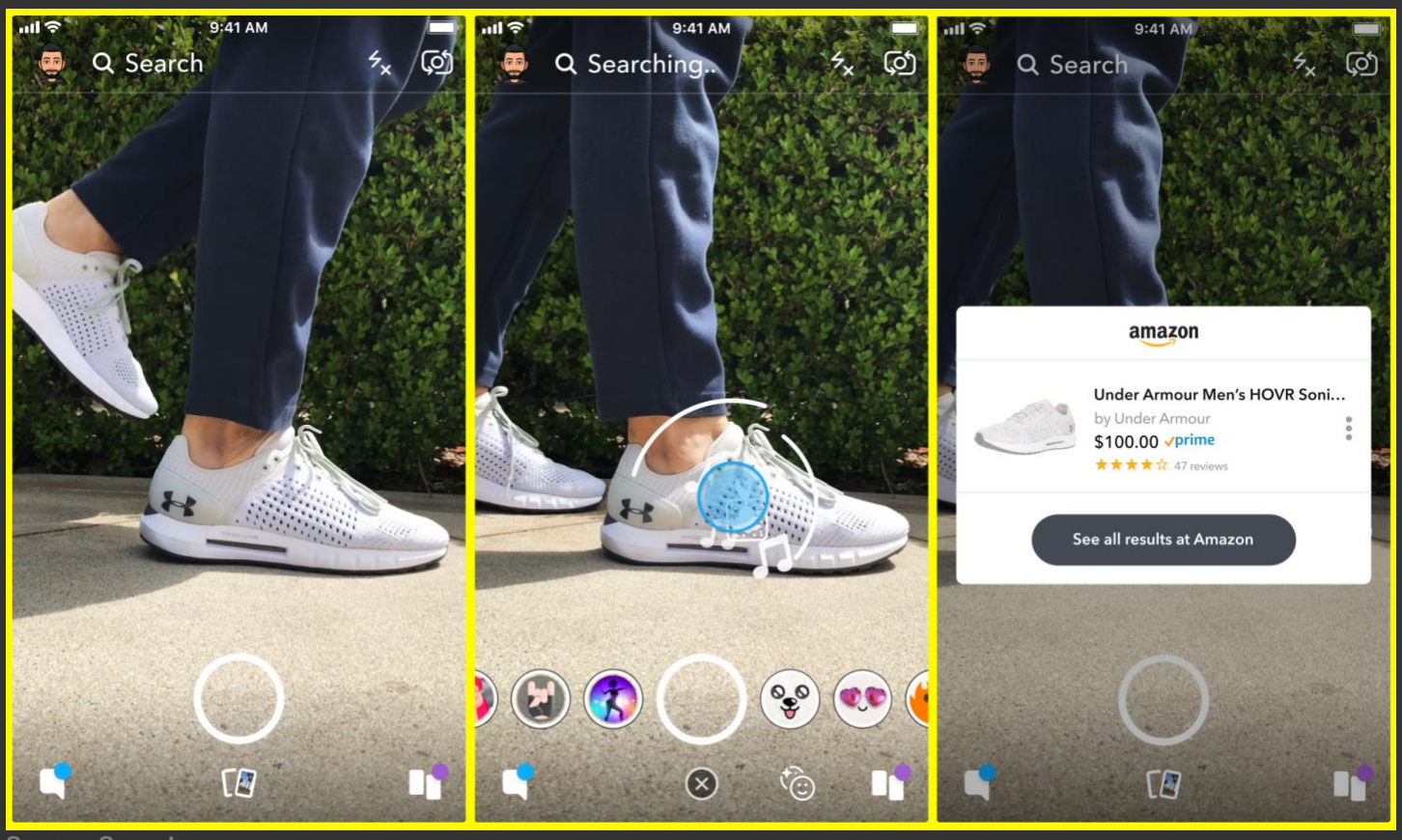
That last part is key, as Snapchat has intelligently partnered for better e-commerce functionality. But beyond just ability to transact, it also taps into Amazon's vast product image database for better object recognition, which means a more functional and robust user experience.

This brings Snap into visual search, a logical extension. It's already an early AR leader which has conditioned behavior within a younger user base that has a high affinity for the camera. Fashion is also in its DNA, making the style/product-hunting use case a natural one.

On the first point about alignment with Snapchat's user base, ViSenze reports that 62 percent of millennials are comfortable with visual search in digital shopping. Not only are millennials (and Gen Z) "XR-native," but they're oriented towards things that are tangible and visual.

But more importantly, visual search is a natural move because of its monetization potential. Driving commerce is something Snapchat continues to develop such as transaction-enabled AR lenses, and is central to its ability to grow revenue amidst volatile and sometimes-troubled stock performance.

Snapchat's AR-based revenue so far has been from branded AR lenses, a quickly-growing form of brand advertising, as explored above. But as illustrated in the chart above,[xi] visual search will begin to outpace AR lenses and other display-based AR ad formats in terms of revenue growth.



Source: Snap, Inc.

The longer-term play could also be glasses-based. Like Apple,[xii] Snapchat is likely planning for that time horizon. Also like Apple, its mobile efforts could be a training ground for AR glasses, for both users and developers. Though not AR, Snap Spectacles could have a "conditioning" effect.

"That's the secret strategy or the Trojan horse: How do you get enough sensors in people's hands at a cheap price or on their face," Ubiquity 6 CEO Anjney Midha said recently. "That sets them up for very immersive AR experiences or any kind of VR experiences a year or two years from now."

Synchronicity, Redux

In Part I of this report,[xiii] we examined that the next evolution of social AR will involve experiences that are participated with friends in a synchronous manner. In other words, the augmentation of faces or spaces happens live and can be seen by more than one person (with separate devices) at a time.

As background, Snapchat Lenses though popular, don't augment "reality" in real time. They rather augment photos and video as they're being recorded, which are then shared asynchronously. Technically, that makes it less augmented reality, and more augmented *media*.

Source: Snap, Inc.

But its new “Snappables” changes that by shifting the moment of augmentation to real time. For example, two users can play a game together while seeing their augmented faces live in the gameplay. This is trivial in one sense, but could be an important move for Snapchat’s AR strategy.

As examined in Part I, multi-player AR will fuel AR’s killer apps as it accelerates both their appeal and network effect. The real magic will be multi-player image persistence in real-world scenes, as opposed to Snappables’ live faces that are infused into casual games. But this is still a positive step.

For Snapchat, this also boosts its overall appeal as it competes with the likes of Facebook and Instagram for active usage, as explored above. It will continue to position AR as a differentiator in that battle, and has already followed Facebook’s lead in being more developer friendly with Lens Studio.

This means its full AR suite – Face Lenses, World Lenses, AR Geofilters and now Snappables – will benefit from third-party creativity and developer muscle. The downside, and reason it held out for so long, is the loss of quality control. But the tradeoff of capability for scale is a theme we keep seeing.

Though it will continue to represent AR’s simplest form, Snapchat is more penetrated than most AR — whether “true AR” or not — to date. With multi-player and synchronous capability, it could now get more mainstream users hooked on the gateway drug… which is good for everyone in AR.

Source: Snap, Inc.

Apple & Google Get on Board

Sticking with the theme of synchronous AR, Apple and Google have begun to recognize its importance. As the leaders in AR development kits, they have both recently advanced their capabilities through multi-player support. This allows for synchronous and persistent AR graphics.

Cloud Anchors

Google was first out of the gate with the Cloud Anchors addition to ARCore. They work similar to ARcore and ARkit's scene mapping in that they establish anchor points for graphics. But Cloud Anchors perform the additional work of sharing and syncing anchor points between multiple devices.

"The way we would do it in an AR app today is plant [graphics] as relative offsets from an anchor and that becomes your reference frame," said Google's James Birney at I/O 2018. "Anchors can't talk to each other, so this is what cloud anchors solve…We can have a common anchor in the middle."

Notably, cloud anchors operate across Android and iOS. ARCore developers integrate it, then their app users can share experiences with iPhone users. It's unclear what iPhone users need in order to join a given session and how frictionless it is, but this is nonetheless a positive step.

Source: Google

“Cloud anchors work on any ARCore-enabled Android device and any ARkit-enabled device,” said Birney from the Google I/O stage. “There’s no reason that we should discriminate which of our friends can play a game with us based on which operating system they run on their phone.”

This makes sense in early days of mobile AR adoption. Google knows that already-challenged usage growth will be further hobbled by platform fragmentation. So this is a necessary move to seed mobile AR usage across platforms, and bring it closer to ubiquity, where/when Google will monetize it.

Speaking of monetization, there are use cases Google has in mind beyond fun and games. As Amazon and IKEA have already done, AR will be a practical and monetizable tool for in-home product visualization.[xiv] Multi-player functionality can add new dimension to such scenarios.

“If I’m placing a speaker system here, I can have my wife also look at [it] from her phone,” said Birney. “There’s a certain feeling of consistency and trust if you’re the advertiser or ecommerce site if you have two users looking at it, and it shows up consistently for both of them.”

Ready Player Two

Meanwhile, Apple has done similar with multi-player support launched with ARkit 2 at its May WWDC conference. It works in tandem with the four-core GPU of the newly-announced batch of iPhones to render graphics that are anchored and persistent for several users. It’s a key addition to ARkit.

Source: Apple

But as a developer tool, multi-player support in ARkit only goes so far. The proof will be in what developers build with it. It will take time for developers to build native and compelling apps that do it justice. So far, we haven't really seen much created with it. And there are pros and cons.

Starting with the pros, multi-player AR could accelerate AR adoption through the principles of network effect, as mentioned. With multi-player AR, experience are enhanced through social connection, collaboration and competition. This gives more tools to developers to build compelling apps.

As for the cons, one challenge for multi-player AR is that it could actually be an adoption *barrier*. In other words, the need for several players — all in the same place no less — creates restrictions on AR multi-player apps or games. And those restrictions could work against adoption.

With the above pros and cons, the onus is on developers to tap into multi-player advantages while avoiding its scale-depleting tendencies. For example, is there potential for synchronous, on-site interaction plus place-shifted play (think: Words with Friends) to tap into the best of both worlds?

Another layer to this challenge is the AR delivery vehicle. Apps are the heir apparent vessel for AR, given their dominance in the smartphone era. But they could hobble multi-player experiences or "pick-up" sessions with strangers, due to download friction/latency. This is one argument for Web AR.

Lastly, it will be all about developers gaining native footing with multi-player AR. Since it's a new use case, it will take a few development cycles to create experiences that are compelling enough for killer-app status. And that killer app may or may not be built with ARCore and ARkit.

Source: Apple

Final Thoughts & Part III Preview

To synthesize themes from the above company profiles, there's a division between consumer-facing social AR players (Facebook, Snapchat) and enablers or "building blocks" (Google, Apple). And there are players that will do both (Google, Facebook). In short, an ecosystem is forming for Social AR.

There's also divergence in business models. Facebook and Snapchat – as a function of their legacy businesses – are pursuing advertising revenue for social AR engagement. Other players like Apple will rather pursue hardware revenue by seeding AR development that makes devices more attractive.

As this ecosystem comes together, gaps will form between the above players, which represents opportunities and points of entry for smaller players. The key will be identifying those gaps and doing so with the right timing. There are already startups and mid-market players emerging to do just that.

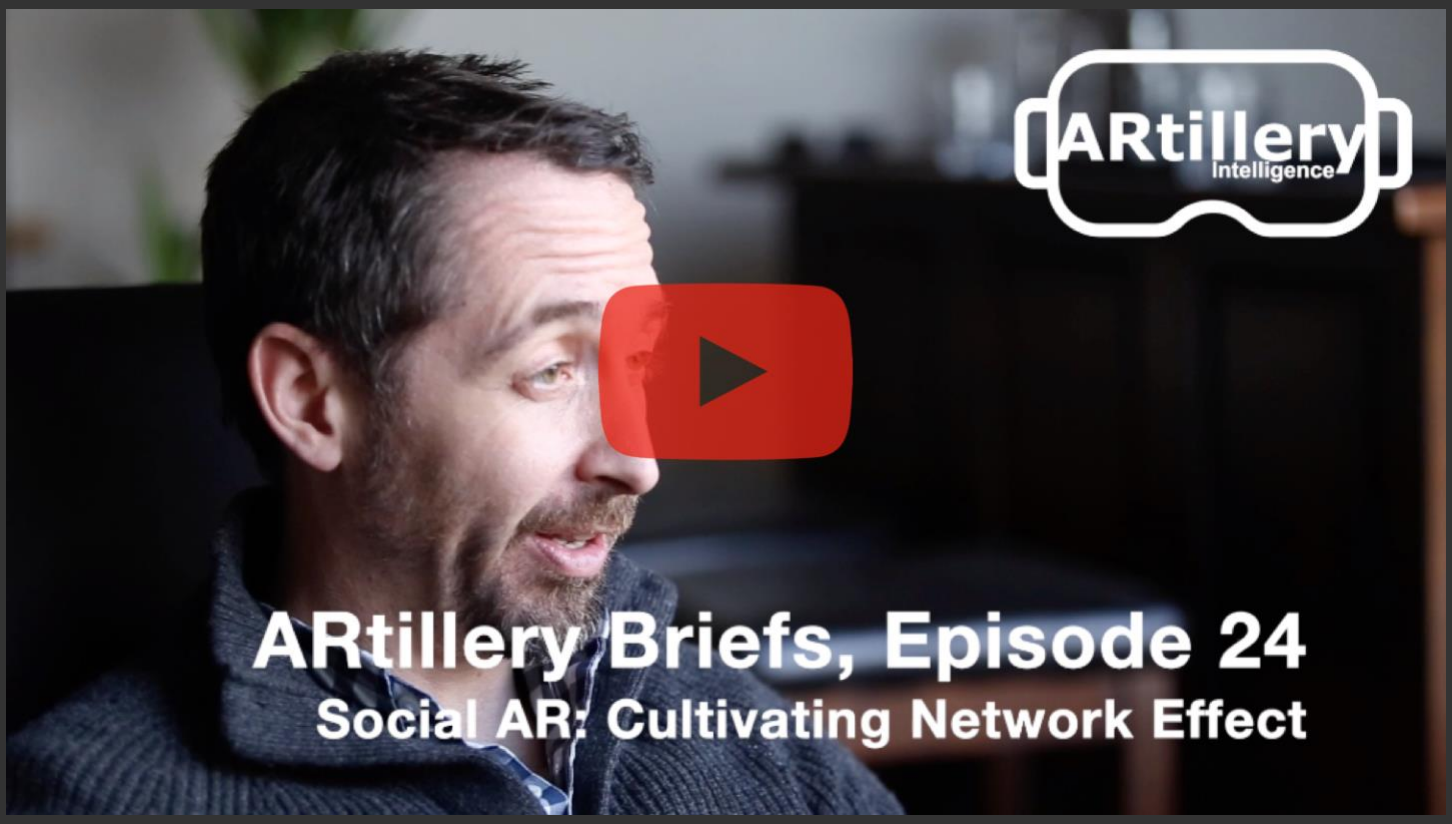
This is where we'll pick up the discussion in Part III of this series. We'll go "down market" to look at players such as Niantic, Ubiquity 6, and 6D.ai. What are their product focuses and business models (spoiler: not advertising)? We'll take a deep dive into these nimbler, but more risk-prone, startups.

Stay tuned…

Video Companion: The Social AR Opportunity

(click URL to open)

https://youtu.be/naJ9MEeb0Ws



Key Takeaways (redux)

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

- Social engagement is an early leader among AR use cases, mostly through AR lenses.
  - Snapchat alone has 70 million daily active users for its AR Lenses.
  - Active social AR users will grow to 468 million by 2022 according to ARtillery Intelligence data.

- Along with Pokémon Go, this social use case has validated AR's mass appeal
  - Though not "true AR" these early AR successes have served as a key "gateway drug."
  - Snapchat has also validated an ad revenue model, with more than $400 million in 2018.
  - Though it has a later start, Facebook will eclipse Snapchat as a social AR powerhouse.

- ARtillery Intelligence survey data further indicate demand for social AR.
  - 45 percent of AR users report that they actively engage with social AR, such as lenses.
  - One third of AR users choose social as a top AR use case for the future.

- Social AR's potential is grounded in an innate human need to connect with others.
  - Historical evidence points to social infusion as a technology accelerant (e.g. web 2.0).
  - Mobile AR could counteract social media isolation due to an upheld/outward focus.

- Social AR will also benefit from the principles of network effect.
  - Connections, value and utility grow with each person added to a given social graph.
  - Social interactions fuel any technology's growth through virality.

- Social AR so far lacks meaningful interaction because it is asynchronous
  - Social AR lenses are recorded in isolation then shared for remote consumption.
  - True potential will be reached with more synchronous (same time and place) interaction.
  - This involves technical challenges of the AR cloud such as multi-player functionality.
  - Google and Apple have built multi-player support into ARkit and ARcore.
  - Focused startups like Ubiquity6, 6D.ai and YouAR are taking the technology further.

- Though synchronous AR will unlock new experiences, it's not a silver bullet.
  - Syncronicity in both time and space can limit scalability by forcing spatial presence.
  - The magic formula will combine synchronous and time/place-shifted play.
  - Apps will diminish multi-player interaction due to download friction. Look to WebAR.

- The AR Cloud will be the great enabler for building meaningful social AR
  - Multiplayer, image persistence and localization are all key tenets of the AR cloud.
  - The AR cloud will be a "plurality" that maps to the strengths of participating companies.
  - Social players like Facebook will build social identity layers for dynamic AR interactions.

- Tech giants could be disadvantaged by data collection conflicts and legacy business models.
  - Nimbler startups could have an edge in native focus and lack of conflicts.
  - After exploring Social AR's dynamics and drivers in Part I, we'll now go deeper into case studies.

About ARtillery Intelligence

ARtillery Intelligence chronicles the evolution of augmented reality (AR) and virtual reality (VR). Through writings and multimedia, it provides deep and analytical views into the industry's biggest players, opportunities and strategies. It's about insights, not cheerleading.

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 AR & VR, long-term cultural, technological and financial implications are primary.

Products include the *AR Insider* publication and the *ARtillery PRO* research subscription, which together engender a circular flow of knowledge. Research includes monthly Intelligence Briefings, market-sizing forecasts and consumer survey data, all housed in a robust intelligence vault.

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

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 at:

https://artillry.co/about/

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 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 *ARtillery 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 *ARtillery Intelligence* original data, as well as that of third parties. Data sources are attributed in each case.

For market sizing and forecasting, *ARtillery Intelligence* follows disciplined best practices, developed and reinforced through its principles' 15 years in tech sector research and intelligence. This includes the past 3 years covering AR & VR exclusively, as seen in research reports and daily reporting.

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 *ARtillery Intelligence's* market-sizing methodology, see the explanations at the following link.

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

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 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] See ARtillery Intelligence Report, *AR Business Models: The Top of the Food Chain*: **https://artillry.co/artillry-intelligence/ar-business-models-the-top-of-the-food-chain-part-i/**
[ii] See ARtillery Intelligence Report, *XR Global Revenu Forecast, Fall Edition*: **https://artillry.co/artillry-intelligence/forecasts/2018-xr-global-revenue-forecast-fall-edition/**
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[v] See ARtillery Intelligence Report, *AR Commerce: Monetization Comes Into View:* **https://artillry.co/artillry-intelligence/ar-commerce-monetization-comes-into-view/**
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[viii] See ARtillery Intelligence Report, *2018 Lessons, 2019 Outlook:* **https://artillry.co/artillry-intelligence/xr-2018-lessons-2019-outlook/**
[ix] See methodology section above
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