



ARtillery Intelligence

ARtillery Intelligence Briefing

Mobile AR Global Revenue Forecast, 2019-2024

July 2020

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Introduction

Like many research & intelligence firms, one of the things that ARtillery Intelligence does is market sizing. A few times per year, we go into isolation and bury ourselves in deep financial modeling. This takes the insights and observations we accumulate throughout the year and synthesizes them into hard numbers for the current and future spatial computing industry (methodology details [here](#)).

In covering spatial computing for five years, our sector knowledge base and perspective continue to improve. That occurs on several levels, including insight and access to insider information, all of which informs our forecast models and inputs. Further reinforcing that knowledge position, the daily rigors of editorial production at our sister publication *AR Insider* emboldens our market insights.

Beyond knowledge position and market-sizing process, the focus of these forecasts likewise continues to evolve. Our first market forecast four years ago examined AR, VR and all their revenue subsegments. Last year, we began to produce separate forecasts for AR and VR. Though they share technical underpinnings, their nuanced market dynamics deserve deeper and focused treatment.

In this forecast, we're doubling down on that principle once again and sub-dividing the focal range. Given its leading revenue position among AR segments, and its hardware installed base, we're zeroing in on *mobile AR*. This allows us to go deeper on key revenue sources like consumer, corporate & industrial, advertising and commerce. We'll do the same later this year for head-worn AR.

So what did we find out? Our outlook continues to be best characterized as *cautiously optimistic*, especially when compared to several large research firms that turn attention to AR occasionally to publish eyepopping revenue estimates in the hundreds of billions of dollars. We're still comfortably and confidently in the low tens-of-billions range for aggregate AR spend (less in many revenue sub-categories).

The burning questions: How is mobile AR pacing? Which subsectors are most opportune? And how will a global pandemic impact revenue? We answer these questions through numbers & narrative in this slide-based report. The goal, as always, is to empower you with a knowledge position.

What's Included in *Mobile AR Revenues*?

This forecast focuses on mobile AR and its revenue subcategories. These include consumer spending (e.g. in-app-purchases); and enterprise spending (e.g. industrial visualization, advertising & commerce enablement). Key inclusions and exclusions exist throughout these categories.

For example, we track transaction value of physical goods that are visualized and purchased through AR interfaces, such as cosmetics and shoes. However we do not include these transactions as *AR revenue*. Software that enables such AR commerce is conversely counted as AR revenue. [See more examples below.](#)

All revenue figures correlate to the full-year (end of year) total of the identified year.

Included

Consumer AR Digital Goods: e.g. in-app purchases

Corporate & Industrial AR: e.g. software for mobile AR-assisted assembly, maintenance and tech support

Content & Media Creation: e.g. AR developer platforms

Advertising: e.g. Snapchat paid lens campaigns

Commerce Enablement: e.g. Product visualization software for physical goods.

Not Included

Physical Goods: transaction value of goods bought through AR interfaces (e.g. footwear, furniture).*

Smartphone Sales: e.g. iPhone to run ARkit apps

Network Data: e.g. Telco-delivered data usage for AR

Professional Services: e.g. Enterprise AR consulting

App & Advertising Creation Overhead: e.g. Developer salaries, agency fees

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Key Takeaways

Global Mobile AR Revenue

Global mobile AR revenue will grow from U.S. \$3.98 billion in 2019 to U.S. \$21 billion in 2024, a 39 percent compound annual growth rate (CAGR). This sum consists of mobile AR consumer and enterprise spending and their revenue subsegments. Enterprise productivity is the leading revenue category in 2020 (\$2.58 billion), followed by AR advertising (\$1.41 billion) and consumer in-app purchases (\$1.38 billion). Advertising will be the leading mobile AR revenue category by 2024. Some of these subcategories worth noting include enterprise AR productivity, media & content creation, and commerce enablement, which collectively represent *AR as a Service* (ARaaS). These platforms enable companies to build AR for internal productivity (B2B), or for consumer-facing experiences (B2B2C). These “picks & shovels” will represent a large opportunity to meet the demand for democratized AR creation, and accelerated time to market. As is the case across the global economy, mobile AR subsectors will be impacted unevenly by the ongoing global pandemic. Given that software and digital products fare well in global lockdowns, the impact on mobile AR will be mostly positive. For example, quarantine-friendly consumer AR like social lenses are trending up; and social distancing compels enterprise remote-AR support. These factors will cause near term adoption inflections while also exposing the technology which in-turn supports its longer-term sustained adoption.

Key Takeaways

Mobile AR Devices

The large installed base of smartphones lays the groundwork for mobile AR's opportunity. More specifically, AR enabled mobile devices continue to grow in number as the smartphone replacement cycle phases them into the mobile base. This total has traditionally been cited as one monolithic figure (e.g. "one billion"). This framing is no longer relevant nor sufficient because the landscape of AR-enabled devices is increasingly fragmented by several platforms. The greatest AR compatibility is currently held by Web AR (3.04 billion units), followed by Facebook's Spark AR (1.58 billion) and Apple's ARKit (1.19 billion). TikTok is the latest entrant with promising reach but underdeveloped AR. But more important than compatible AR mobile devices is the number of active users. Adding up each platform's users is misleading due to multi-platform users, so we've de-duplicated that total to calculate global AR active users. That de-duplicated sum is estimated to be 598 million by the end of 2020, growing to 1.73 billion by year-end 2024. Facebook's Spark AR has the most active users, followed by Snapchat. Facebook's lead will continue into 2024, followed by visual search (Google & Pinterest), ARCore apps and TikTok. Facebook's lead is owed partly to its use across Facebook properties including Instagram and Messenger. The former will grow rapidly. Snapchat has the highest ratio of AR users per compatible device. Early-stage web AR has the lowest users per device, but the greatest growth potential.

Key Takeaways

Consumer Spending

Consumer mobile AR spending includes any mobile AR software and experiences that consumers pay for (excluding mobile devices themselves). Consumer Mobile AR spending is subdivided by digital and physical goods. Digital goods involve software to obtain or enhance a digital experience, including in-app purchases (e.g. Pokémon Go) and premium apps. These were **U.S. \$1.16 billion** in 2019, growing to **U.S. \$3.99 billion** in 2024, a **28 percent** compound annual growth rate (CAGR). This is led mostly by Niantic and in-app purchases (IAP) – a payment model that benefits from comfort and acclimation from its prevalence in mobile gaming. Mobile AR IAP spending will be driven by Pokémon Go's continued success post-pandemic, and the proliferation of Niantic's Real World Platform that brings IAP-producing location based capability to other titles. Meanwhile, physical goods include consumer product purchases that are informed or influenced through AR product visualization. These will grow from **U.S. \$2.4 billion** in 2020 to **U.S. \$36.6 billion** by 2024, driven by social lenses, visual search and Web AR. The latter will grow rapidly due to low-friction and signals from Apple and others about web AR and micro-app prevalence in retail settings. The transaction value of physical goods purchased using AR don't count towards AR revenue. We instead attribute AR's proportionate role in the value chain by counting the money spent on AR commerce enablement software (examined later in this report).

Key Takeaways

Enterprise Spending: Corporate & Industrial Productivity

Mobile AR enterprise productivity is defined by software that enterprises deploy to gain operational efficiencies and effectiveness. This includes visualization software that provides line-of-sight or live-guided support for assembly, maintenance or tech support. It also includes software that helps enterprises (or software vendors that serve them) author AR experiences that fit the above description. Spending will grow from **U.S. \$1.95 billion** in 2019 to **U.S. \$3.78 billion** in 2024, a **14 percent** compound annual growth rate (CAGR). This growth slows in latter years as the field transitions to head-worn AR (note: these values and others in this report apply only to smartphone-based AR). This area's strength and growth potential stems from its broad applicability. It can include everything from assembly to heavy-equipment maintenance to IT support. These functions cut across several industries and verticals, causing a sizeable addressable market. Growth so far has been slowed by typical adoption barriers and organizational inertia, but case studies continue to validate strong ROI, indicating that cultural resistance will eventually give way. Meanwhile, another adoption accelerant looms: Like many areas of mobile AR, Covid-era constraints compel enterprise AR productivity as remote AR support aligns with social distancing. This will boost short-term traction, while exposing the technology and accelerating its longer-term sustained adoption.

Key Takeaways

Enterprise Spending: Mobile AR Media & Content Creation

Mobile AR content & media creation will grow from U.S. \$290 million in 2019 to U.S. \$3.5 billion in 2024, a 65 percent compound annual growth rate (CAGR). This includes software that enables enterprises or developers to create consumer-based AR experiences such as games, ads & entertainment. Buyers of this technology (software license or SaaS) include end users (B2B) or companies that wish to develop AR for *their* customers and constituents (B2B2C). The latter will be an opportune subsegment of the broader AR industry, as it will represent the proverbial “picks and shovels” that democratize advanced AR experience creation. These functions will grow in demand as AR itself does, as they can lower barriers to creation and accelerate time to market. It most notably includes tools such as Unity, as well as several other platforms in the expanding AR creation value chain. As for outputs and areas of spending, it’s fairly-even across the primary content-creation areas of media, advertising and gaming. Advertising leads these categories slightly, due to brand advertiser AR adoption (explored later), and a strong business case with demonstrable ROI. Spending on Mobile AR media and content creation software is also driven by, and correlated to, the growing addressable market of AR developers and creatives, which will reach 1.91 million this year. AR creatives include a large global base of creative professionals that could convert to AR, given low-friction tools such as Adobe Aero.

Key Takeaways

Enterprise Spending: Mobile AR Advertising

Mobile AR advertising will grow from U.S. \$509 million in 2019 to U.S. \$8.02 billion in 2024, a 74 percent compound annual growth rate (CAGR). This includes paid AR lenses or visual search ad campaigns. Growth is driven by advertiser interest in immersive product demonstrations. This not only resonates with advertisers' creative sensibilities, but it shows a strong business case through high performing ads*. In terms of formats, AR lenses lead today in both engagement and revenue, including selfie filters from Snapchat, Instagram and others. Among Social AR lens players today, Snapchat has the revenue lead. This comes despite Facebook's greater global scale, and results from greater levels of lens engagement (and monetization) per user. Snapchat will maintain the ad revenue lead of any one AR app, however Facebook will surpass it if adding up all its properties including Instagram. TikTok is the wild card, with rapidly growing usage but underdeveloped AR. Visual search will gain ground in later years, driven by a utilitarian and frequent use case that's naturally monetizable (like web search). Mobile AR advertising could have mixed results from Covid-era dynamics. AR lenses are trending up, due to a quarantine friendly use case. But advertising is a famously recession-prone spending category. Mobile AR advertising will ultimately benefit because recessions cause advertisers to rethink and redeploy budget to more effective and cost-efficient formats, thus exposing AR advertising to a larger demand base.

Revenue Overview

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Mobile AR Revenue Overview

Global mobile AR revenue will grow from **U.S. \$3.98 billion** in 2019 to **U.S. \$21 billion** in 2024, a **39 percent** compound annual growth rate (CAGR).

This sum consists of mobile AR consumer and enterprise spending.

- Consumer spending includes digital goods, consisting primarily of in-app purchases and premium app purchases.

- Enterprise spending includes mobile AR software that businesses and developers pay for, including AR-guided enterprise productivity, AR ad campaigns, AR media & content production, and commerce enablement.

Enterprise productivity is the leading revenue category in 2020 (**\$2.6B**), followed by AR advertising (**\$1.4B**) and consumer in-app purchases (**\$1.3B**).

- Advertising will be the leading mobile AR revenue category by 2024.

- Enterprise productivity growth will slow as it transitions to AR headsets.

Mobile AR Revenue Overview (cont'd)

Enterprise AR Productivity, Media & Content Creation, and Commerce Enablement collectively represent *AR as a Service (ARaaS)*.

- These platforms enable companies to build AR for internal productivity (B2B), or for consumer-facing experiences (B2B2C).

- These “picks & shovels” will represent a large opportunity to meet the demand for democratized AR creation, and accelerated time to market.

As is the case across the global economy, mobile AR subsectors will be impacted unevenly by the ongoing global pandemic, as of this writing.

- Given that software and digital products fare well in global lockdowns, the impact on mobile AR will be mostly positive.

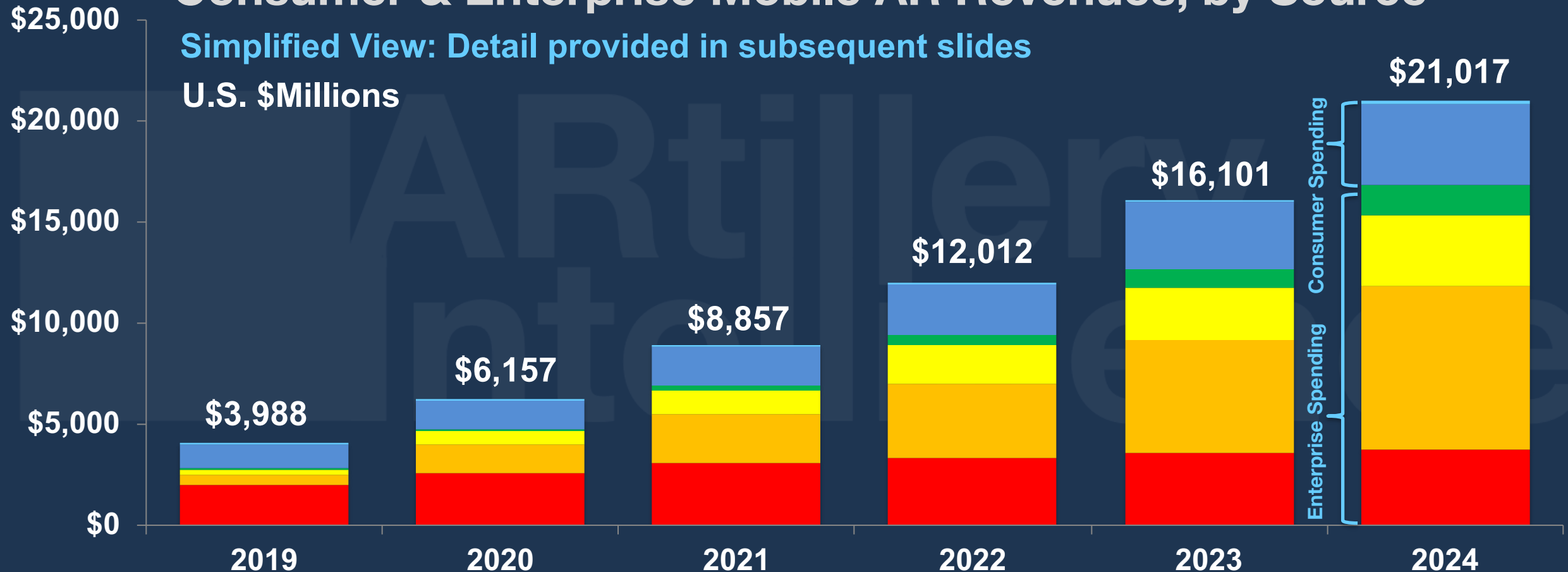
- For example, quarantine-friendly consumer AR like social lenses are trending up; and social distancing compels enterprise remote-AR support.

Mobile AR Revenue Overview

Consumer & Enterprise Mobile AR Revenues, by Source

Simplified View: Detail provided in subsequent slides

U.S. \$Millions



Enterprise Productivity

AR Advertising

Media & Content Creation

Retail & eCommerce Enablement

In-App Purchases

Premium Apps

*Includes SaaS and affiliate revenue for AR-influenced eCommerce, not transaction value of goods purchased.

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Mobile AR Revenue

U.S. \$Millions

Consumer & Enterprise Mobile AR Revenues, by Source

	Enterprise Productivity	AR Advertising	Media & Content Creation	Commerce Enablement (eCommerce)*	Commerce Enablement (Retail)*	In-App Purchases	Premium Apps	Total
2019	\$1,955	\$509	\$290	\$14	\$51	\$1,159	\$11	\$3,988
2020	\$2,580	\$1,413	\$652	\$39	\$96	\$1,357	\$21	\$6,157
2021	\$3,100	\$2,383	\$1,182	\$100	\$164	\$1,887	\$42	\$8,857
2022	\$3,330	\$3,704	\$1,900	\$232	\$276	\$2,503	\$67	\$12,012
2023	\$3,559	\$5,572	\$2,596	\$501	\$434	\$3,315	\$125	\$16,101
2024	\$3,780	\$8,020	\$3,543	\$879	\$622	\$3,988	\$187	\$21,017

Enterprise Spending

Consumer Spending

*Includes SaaS and affiliate revenue for AR-influenced eCommerce, not transaction value of goods purchased.

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Mobile AR Devices

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Mobile AR Device Outlook

■ The large installed base of smartphones lays the groundwork for mobile AR's opportunity.

■ More specifically, AR-enabled mobile devices continue to grow in number as the smartphone replacement cycle phases them into the mobile base.

■ This total has traditionally been cited as one monolithic figure (e.g. “one billion”).

■ This framing is no longer relevant nor sufficient because the landscape of AR-enabled devices is increasingly fragmented by several platforms.

■ The greatest AR compatibility is currently held by Web AR (3.04 billion units), followed by Facebook's Spark AR (1.58 billion) and Apple's ARkit (1.19 billion).

■ TikTok's is the latest entrant with promising reach but underdeveloped AR.

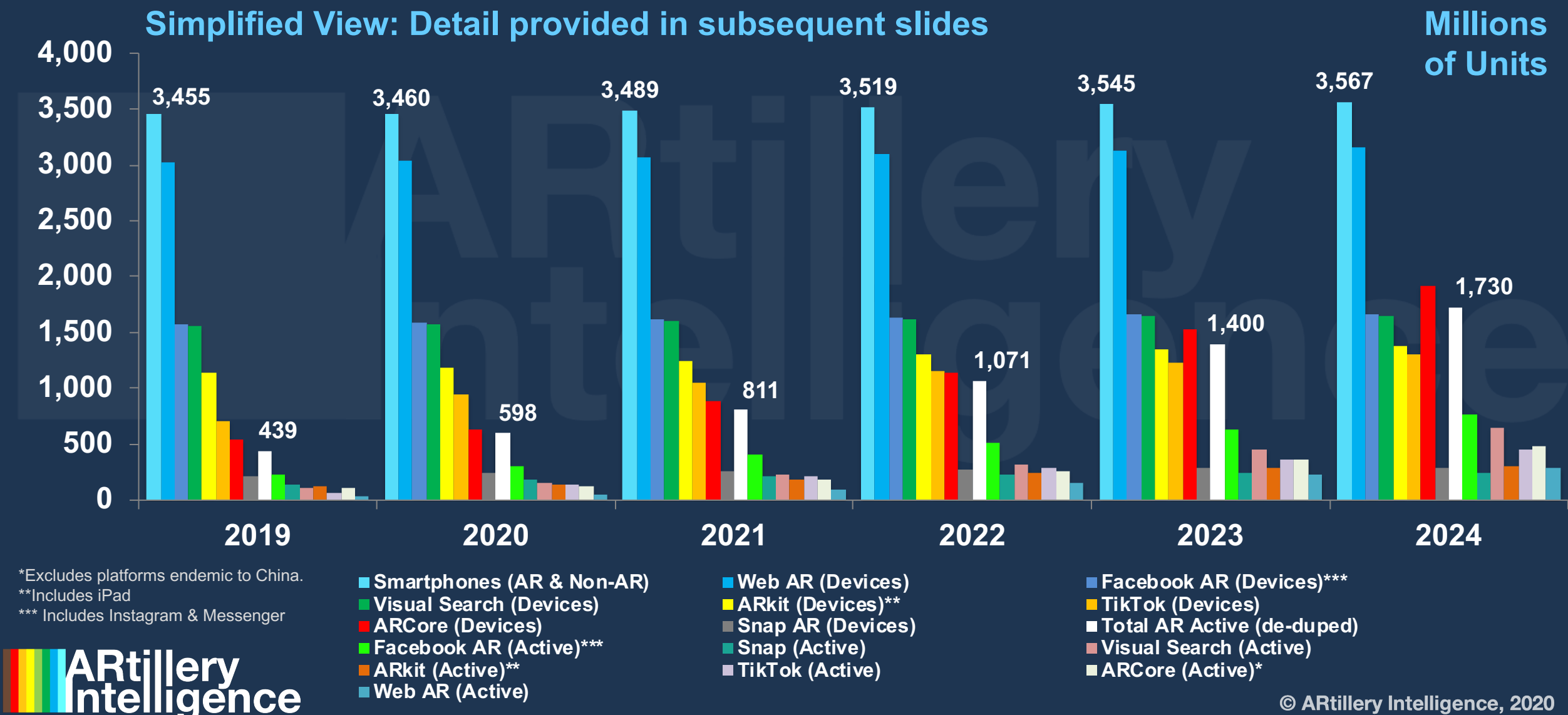
■ Differences from last year's forecast are mostly due to TikTok's entrance.

Mobile AR Device Outlook (contd')

- More important than compatible AR mobile devices is number of active users.
 - Adding up each platform's users is misleading due to multi-platform users, so we've de-duplicated that total to calculate global AR active users.
 - That de-duplicated sum is estimated to be **598 million** by the end of 2020, growing to **1.73 billion** by year-end 2024.*
- Facebook's Spark AR has the most active users, followed by Snapchat.
 - Facebook's lead will continue into 2024, followed by visual search (Google & Pinterest), ARCore apps and TikTok.
 - Facebook's lead is owed partly to its use across Facebook properties including Instagram and Messenger. The former will grow rapidly.
- Snapchat has the highest ratio of AR users per compatible device.
 - Early-stage web AR has the lowest ratio, but greatest growth potential.

Mobile AR Global Penetration

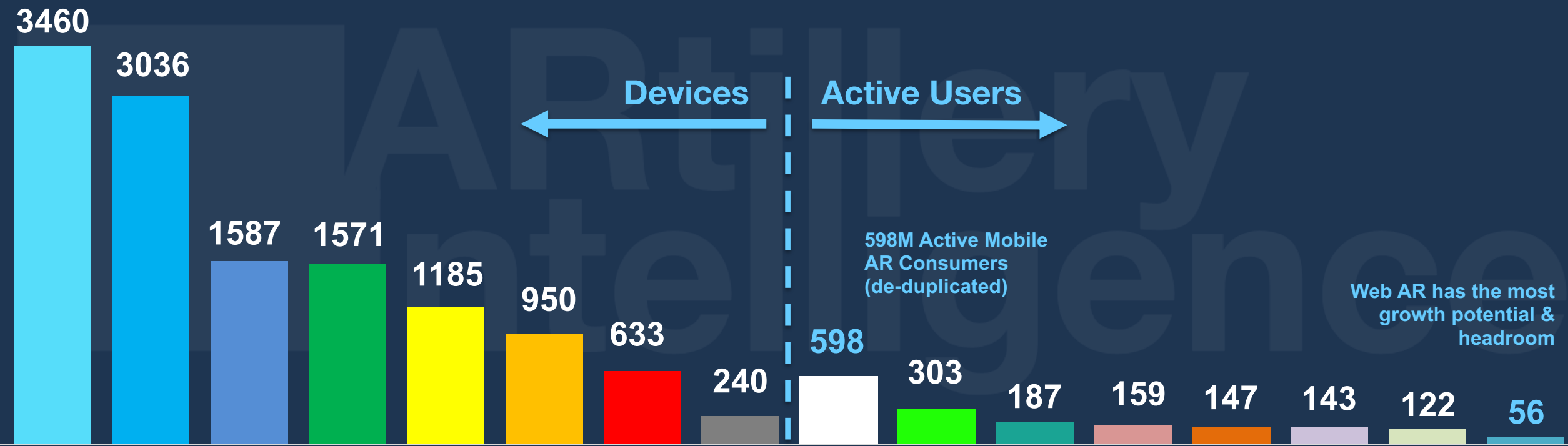
2020 AR-Compatible Devices & Active Users, Across Platforms*



Mobile AR Global Penetration

2020 AR-Compatible Devices & Active Users, Across Platforms*

Millions of Units



*Excludes platforms endemic to China.
**Includes iPad
*** Includes Instagram & Messenger



- Smartphones (AR & Non-AR)
- Visual Search (Devices)
- ARCore (Devices)
- Facebook AR (Active)**
- ARkit (Active)**
- Web AR (Active)
- Web AR (Devices)
- ARkit (Devices)**
- Snap AR (Devices)
- Snap (Active)
- TikTok (Active)
- Facebook AR (Devices)
- TikTok (Devices)
- Total AR Active (de-duped)
- Visual Search (Active)
- ARCore (Active)*

Mobile AR Global Penetration

AR-Compatible Devices Across Platforms*

Millions of Units

	Smartphones (AR & Non-AR)	Web AR (Devices)	Facebook AR (Devices)***	Visual Search (Devices)	ARkit (Devices)**	TikTok (Devices)	ARCore (Devices)	Snap AR (Devices)
2019	3,455	3,025	1,575	1,559	1,139	700	550	215
2020	3,460	3,036	1,587	1,571	1,185	950	633	240
2021	3,489	3,062	1,625	1,609	1,250	1,050	891	260
2022	3,519	3,099	1,634	1,618	1,311	1,150	1,148	275
2023	3,545	3,132	1,660	1,643	1,356	1,225	1,533	285
2024	3,567	3,161	1,670	1,653	1,383	1,300	1,920	290

*Excludes platforms endemic to China.

**Includes iPad

*** Includes Instagram & Messenger

Mobile AR Global Penetration

AR-Active Users Across Platforms*

Millions of Units

	Facebook AR (Active)***	Snap (Active)	Visual Search (Active)	ARkit (Active)**	TikTok (Active)	ARCore (Active)*	Web AR (Active)	Total AR Active (de- duplicated)
2019	236	146	109	126	70	104	34	439
2020	303	187	159	147	143	122	56	598
2021	403	208	225	192	210	182	93	811
2022	508	226	324	238	288	257	149	1,071
2023	635	239	461	285	368	371	229	1,400
2024	769	247	647	304	455	484	284	1,730

*Excludes platforms endemic to China.

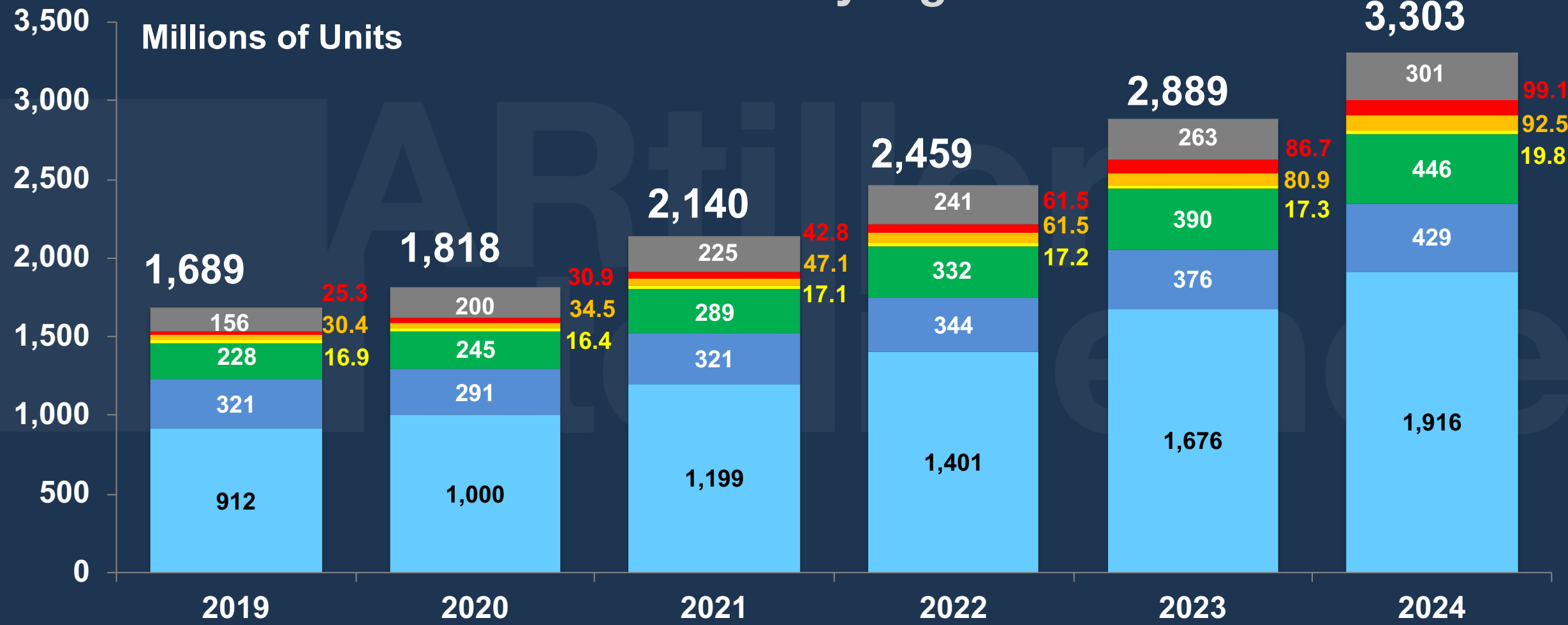
**Includes iPad

*** Includes Instagram & Messenger

Mobile AR Global Penetration

ARkit* & ARCore Penetration by region**

Millions of Units



Asia North America Europe Australia South America Middle East Africa

*Includes iPad

**Country-specific breakdowns are available for ARtillery PRO subscribers

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Consumer Mobile AR Spending

- Consumer mobile spending includes any mobile AR software and experiences that consumers pay for (excluding mobile devices themselves).
- Consumer Mobile AR spending is subdivided by digital and physical goods.
 - Digital goods* include software to obtain or enhance a digital experience, including in-app purchases (e.g. **Pokémon Go**) and premium apps.
 - Physical goods* include consumer products purchases that are informed and influenced through AR (3D product visualization).
- Both are evaluated in this section but only digital goods count as *AR revenue*.
 - AR-assisted physical goods purchases inflate AR's value if one were to count a product's transaction value (e.g. a couch) as AR revenue.
 - We instead attribute AR's proportionate role in the value chain by counting the money spent on AR commerce enablement software (examined later).

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Mobile AR: Consumer Digital Goods

Mobile AR digital goods include software purchases to obtain or enhance an AR experience – consisting of in-app purchases (IAP) and premium apps.

Revenue will grow from **\$1.2 billion** in 2019 to **\$4.1 billion** by 2024.

IAP has a commanding share of this total with **\$1.15 billion** in 2019.

IAP's dominance is due to low friction, as well as consumer acclimation and comfort from the model's prevalence in mobile gaming.

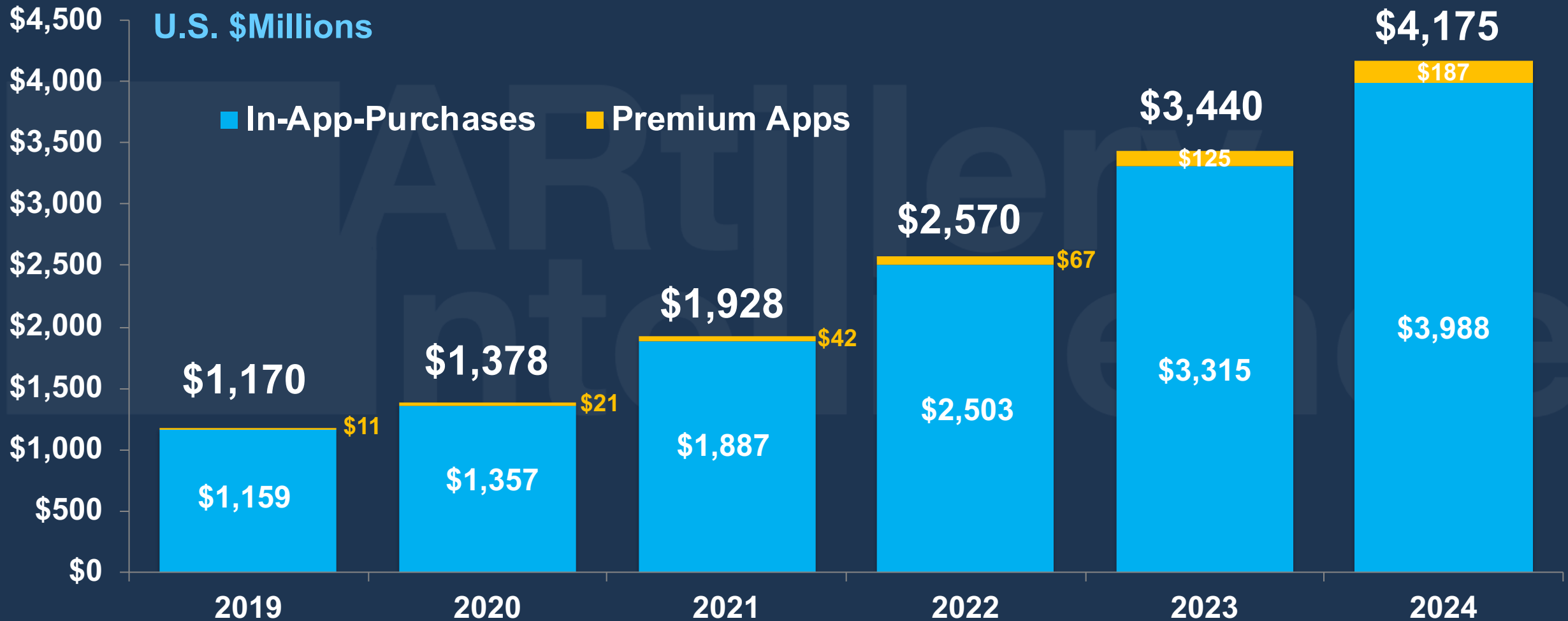
AR is also too early and unproven to get consumers to pay upfront for premium apps. IAP eases them in with less upfront commitment/cost.*

Within IAP revenue, the vast majority of revenue is attributed to Pokémon Go, which has derived an estimated **\$3.2 billion** in lifetime revenue for IAP

Pokémon Go is slowed by Covid-era lockdowns, but Niantic's Real World Platform will extend the IAP revenue opportunity to other titles, long term.

Consumer Mobile AR

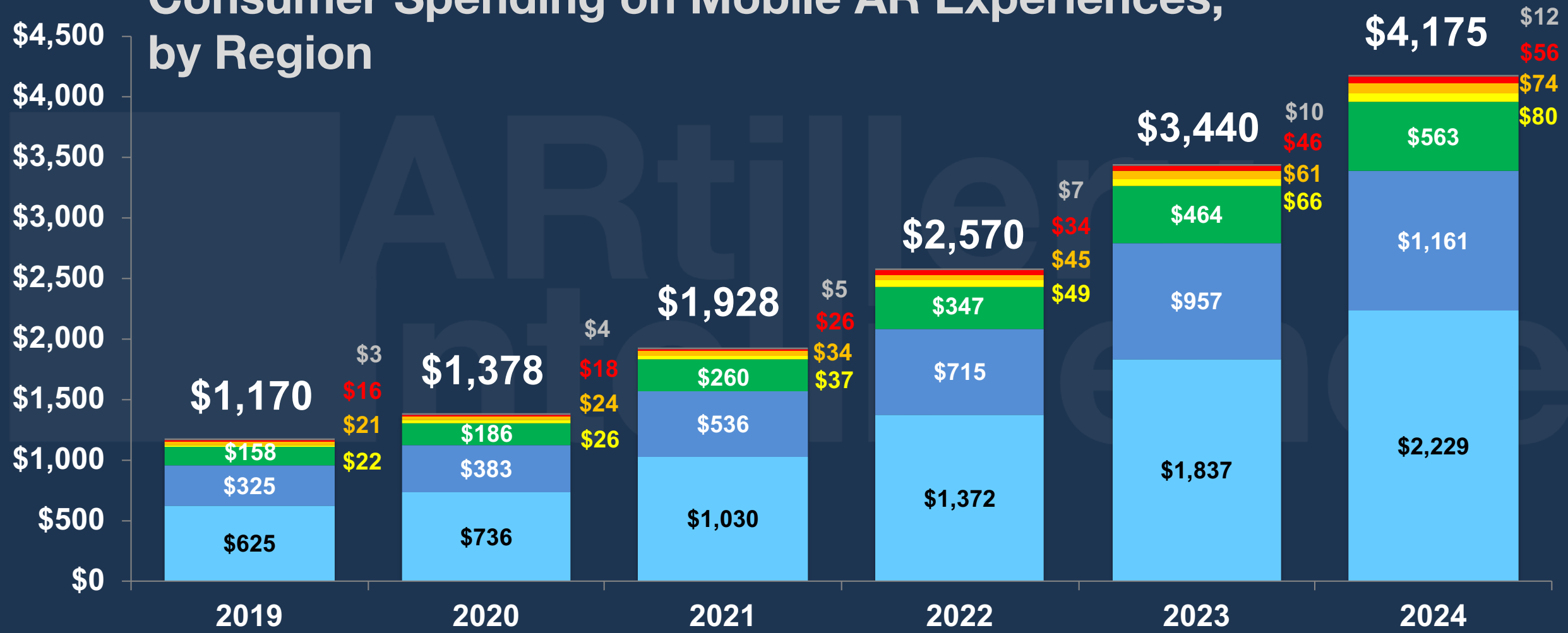
Consumer Spending on Mobile AR Experiences



Consumer Mobile AR

U.S. \$Millions

Consumer Spending on Mobile AR Experiences, by Region



Asia North America Europe Australia South America Middle East Africa

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Mobile AR: Consumer Physical Goods

- AR-assisted purchases of physical goods will grow from **\$721 million** in 2019 to **\$36.5 billion** in 2024 – the fastest growing segment in this forecast.
 - Steep growth is due to its small starting base and rapid expansion that's driven by cultural acclimation to AR visualization in the shopping flow.
 - To reiterate, these revenues are tracked here for perspective, but aren't counted towards "AR revenue" totals (see inclusions & exclusions).
- AR-assisted physical goods purchases include both eCommerce and physical retail purchases.
 - *AR eCommerce* ends in an online order for shipped merchandise.
 - *AR retail commerce* happens through retailers' in-store AR activations.
 - Offline spending normally outnumbered eCommerce 10-1. But this is flipped in AR, where product visualization adds more value to remote purchases.

Mobile AR: Consumer Physical Goods

- Among mobile AR platforms, social lenses drive the most commerce today, followed by web AR and visual search.
- Web AR will lead in later years due to lower friction to launch AR experiences; and signals from Apple regarding web AR and micro-app use in retail.
- Among product categories, cosmetics leads AR commerce followed by clothing, jewelry & watches, furniture and home appliances.
- AR-assisted commerce is accelerated by Covid-era lockdowns, when product visualization brings in-person benefits to eCommerce transactions.
- This factor resonates with shelter-in-place consumers as well as brands and retailers motivated to reconcile physical retail revenue declines.
- This forced adoption will expose the technology and drive its sustained adoption post pandemic

AR-Influenced Commerce

Spending on Physical Goods, Influenced By AR Visualization*



*Includes smartphone and tablet-based AR product visualization that results in the purchase of physical goods.

*Includes transaction value of goods purchased, not AR technology to develop shopping experiences.

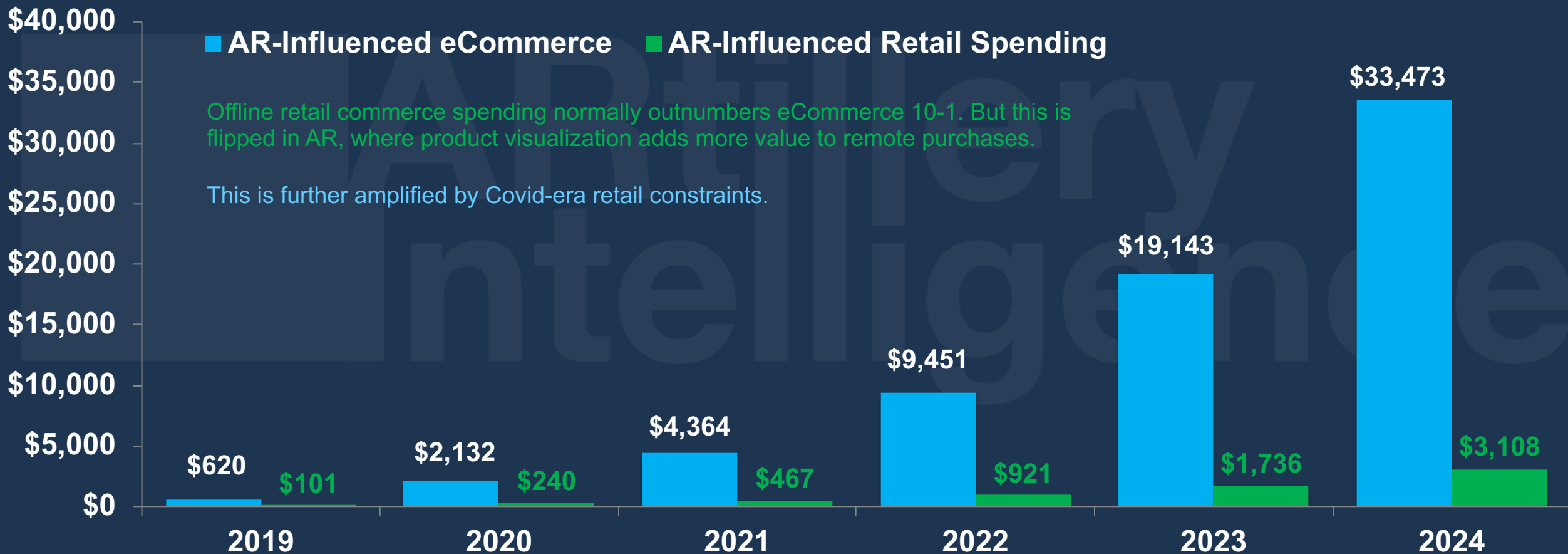
*These figures are not counted towards "AR Revenue" as they don't represent industry income (enabling software is rather included).

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AR Commerce Revenue

U.S. \$Millions

Spending on Physical Goods, Influenced By Mobile AR Visualization*



*Includes smartphone and tablet-based AR product visualization that results in the purchase of physical goods.

*Includes transaction value of goods purchased, not AR technology to develop shopping experiences.

*These figures are not counted towards "AR Revenue" as they don't represent industry income (enabling software is rather included).

AR-Influenced Commerce

AR Visualization-Influenced Purchases, by Platform*

Simplified View: Detail provided in subsequent slides



*Includes smartphone and tablet-based AR product visualization that results in the purchase of physical goods.

*Includes transaction value of goods purchased, not AR technology to develop shopping experiences.

*These figures are not counted towards "AR Revenue" as they don't represent industry income (enabling software is rather included).

AR-Influenced Commerce

AR Visualization-Influenced Purchases, by Platform*

U.S. \$Millions

	Web AR	Social Lenses	Visual Search	AR Visualization Apps	In-Game	Total
2019	\$184	\$368	\$95	\$70	\$4	\$721
2020	\$569	\$1,346	\$238	\$209	\$9	\$2,372
2021	\$1,523	\$2,129	\$577	\$584	\$18	\$4,831
2022	\$3,644	\$3,959	\$1,338	\$1,399	\$31	\$10,372
2023	\$7,991	\$6,779	\$2,991	\$3,068	\$51	\$20,878
2024	\$13,493	\$10,853	\$6,416	\$5,742	\$77	\$36,581

*Includes smartphone and tablet-based AR product visualization that results in the purchase of physical goods.

*Includes transaction value of goods purchased, not AR technology to develop shopping experiences.

*These figures are not counted towards "AR Revenue" as they don't represent industry income (enabling software is rather included).

AR-Influenced Commerce

Mobile AR-Influenced Commerce, by Vertical*

Simplified View: Detail provided in subsequent slides

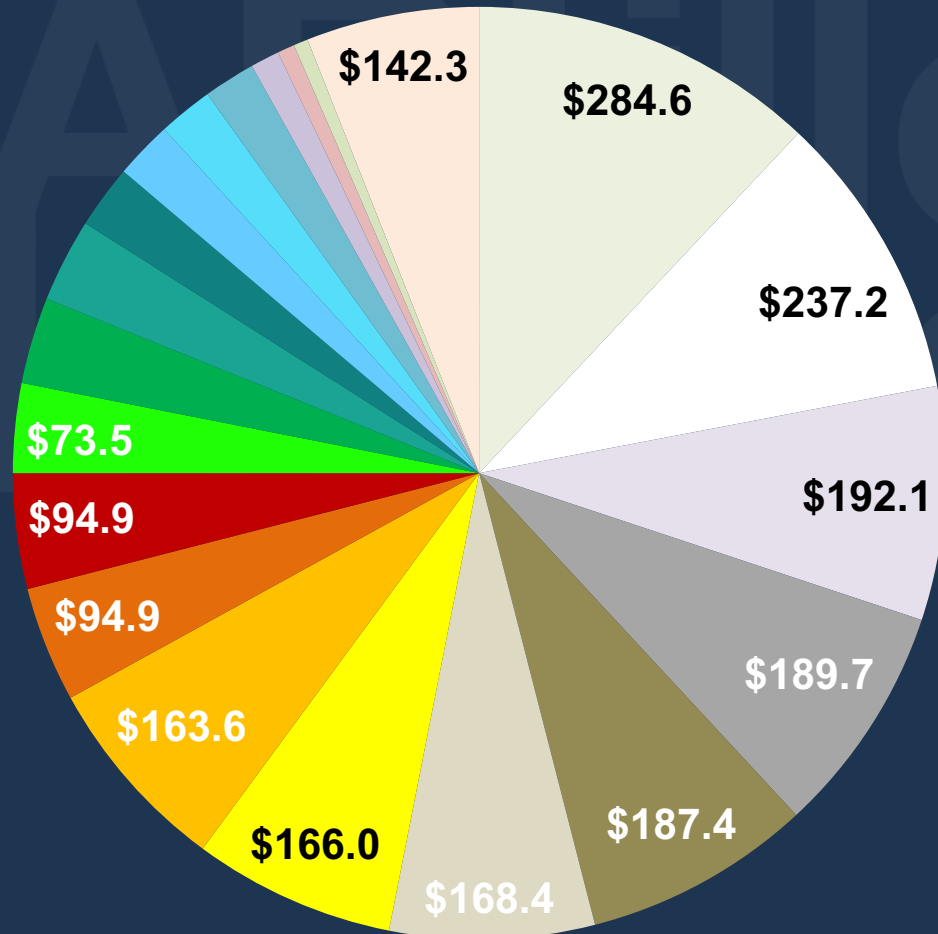
2020

U.S. \$Millions

*Includes smartphone and tablet-based AR product visualization that results in the purchase of physical goods.

*Includes transaction value of goods purchased, not AR technology to develop shopping experiences.

*These figures are not counted towards "AR Revenue" as they don't represent industry income (enabling software is rather included).



- Cosmetics & Personal Care
- Clothing (sans footwear)
- Jewelry & Watches
- Bags & Accessories
- Footwear
- Furniture & Home Goods
- Home Appliances
- Consumer Electronics
- Cars & Auto Supplies
- Computers & Telecom
- Travel & Events
- Food, grocery & restaurant
- Toys & Hobbies
- Sports, Fitness & Outdoor
- Industrial equipment
- Consumer Packaged Goods
- Books & Media
- Flowers & Gifts
- Home Improvement & Garden
- Office & Stationary
- Other

AR-Influenced Commerce

Mobile AR-Influenced Commerce, by Vertical*

U.S. \$Millions

	Cosmetics & Personal Care	Clothing (sans footwear)	Jewelry & Watches	Bags & Accessories	Footwear	Furniture & Home Goods	Home Appliances	Consumer Electronics	Cars & Auto Supplies	Computers & Telecom	Travel & Events	Food, Restaurant & Grocery	Toys & Hobbies	Sports, Fitness & Outdoor	Industrial equipment	Consumer Packaged Goods	Books & Media	Flowers & Gifts	Home Improvement & Garden	Office & Stationary	Other	Total
2019	\$87	\$72	\$58	\$58	\$57	\$51	\$50	\$50	\$29	\$29	\$22	\$22	\$21	\$16	\$14	\$14	\$13	\$7	\$4	\$4	\$43	\$721
2020	\$285	\$237	\$192	\$190	\$187	\$168	\$166	\$164	\$95	\$95	\$74	\$71	\$69	\$52	\$47	\$45	\$43	\$24	\$14	\$12	\$142	\$2,372
2021	\$580	\$483	\$391	\$387	\$382	\$343	\$338	\$333	\$193	\$193	\$150	\$145	\$140	\$106	\$97	\$92	\$87	\$48	\$29	\$24	\$290	\$4,831
2022	\$1,245	\$1,037	\$840	\$830	\$819	\$736	\$726	\$716	\$415	\$415	\$322	\$311	\$301	\$228	\$207	\$197	\$187	\$104	\$62	\$52	\$622	\$10,372
2023	\$2,505	\$2,088	\$1,691	\$1,670	\$1,649	\$1,482	\$1,461	\$1,441	\$835	\$835	\$647	\$626	\$605	\$459	\$418	\$397	\$376	\$209	\$125	\$104	\$1,253	\$20,878
2024	\$4,390	\$3,658	\$2,963	\$2,926	\$2,890	\$2,597	\$2,561	\$2,524	\$1,463	\$1,46	\$1,134	\$1,097	\$1,061	\$805	\$732	\$695	\$658	\$366	\$219	\$183	\$2,195	\$36,581

*Includes smartphone and tablet-based AR product visualization that results in the purchase of physical goods.

*Includes transaction value of goods purchased, not AR technology to develop shopping experiences.

*These figures are not counted towards "AR Revenue" as they don't represent industry income (enabling software is rather included).

Enterprise Spending

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Resources &
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Mobile AR Enterprise Revenue

- Spending will grow from **\$2.8 billion** last year to **\$16.8 billion** in 2024.
 - This includes any enterprises-purchased AR software – for internal use (B2B) or to develop AR for customers and constituents (B2B2C).
 - This deviates from common industry connotations with “enterprise AR” which is often narrowly defined by *industrial* AR use cases.
 - We track such industrial use, including productivity and visualization software; but apply “enterprise AR” to *all* organizational AR purchases.
 - This is congruent with broader connotations of “enterprise software.”
- Categories include corporate & industrial productivity, AR media & content creation platforms, commerce enablement software and AR advertising.
 - Productivity software currently leads the way, followed by advertising.
 - Advertising will pull into the lead in later years, as it continues to attract brand advertisers through high-performing immersive ad formats*

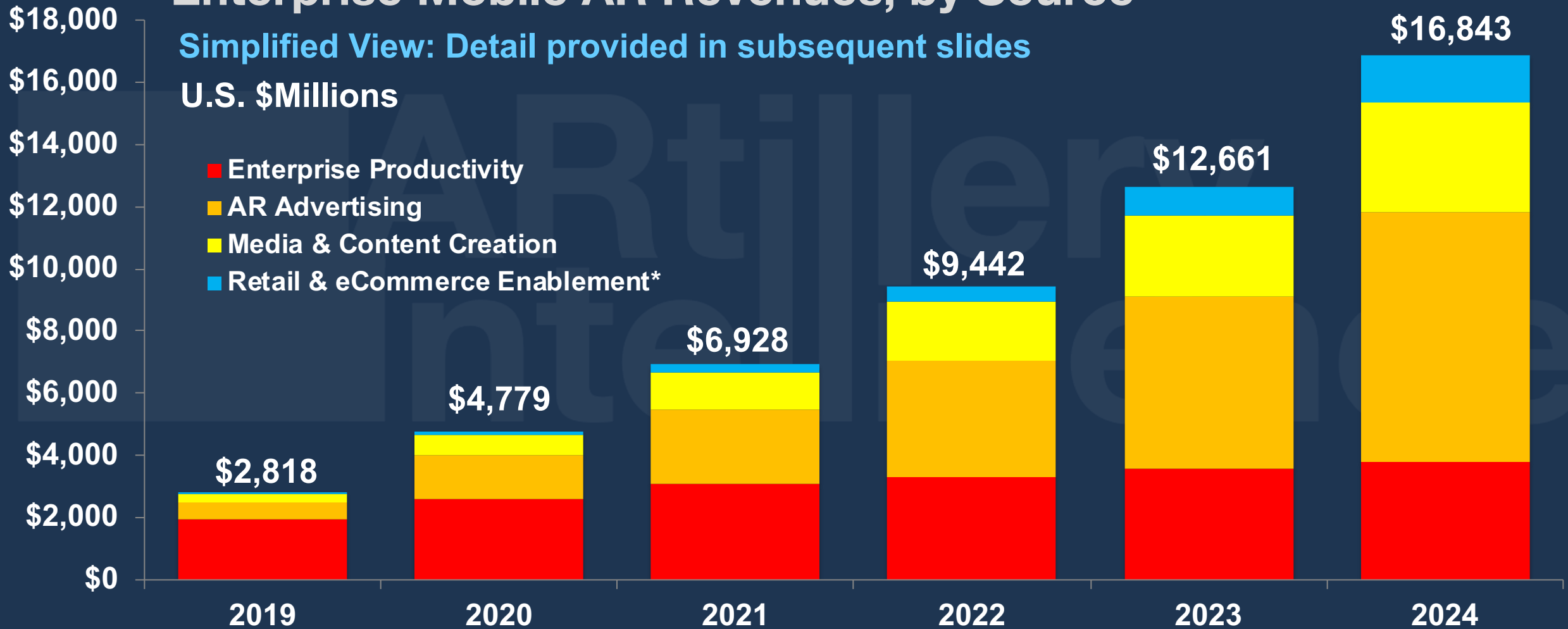
Mobile AR Enterprise Spend

Enterprise Mobile AR Revenues, by Source*

Simplified View: Detail provided in subsequent slides

U.S. \$Millions

- Enterprise Productivity
- AR Advertising
- Media & Content Creation
- Retail & eCommerce Enablement*



Enterprise Spending

Corporate & Industrial

Productivity

Intro & Exec
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Mobile AR Corporate & Industrial

■ Spending will grow from **\$1.95 billion** last year to **\$3.78 billion** in 2024.

■ This growth slows in latter years as the field transitions to head-worn AR

■ This category consists of software that enterprises deploy to improve productivity and operational efficiencies.

■ This includes visualization software that brings line of sight or live guided support to functions such as assembly, maintenance and IT support.

■ It also includes software that helps enterprises (or software vendors that serve them) author AR experiences that fit the above descriptions.

■ Like many areas of mobile AR, Covid-era constraints compel enterprise AR productivity, as remote AR support aligns with social distancing.

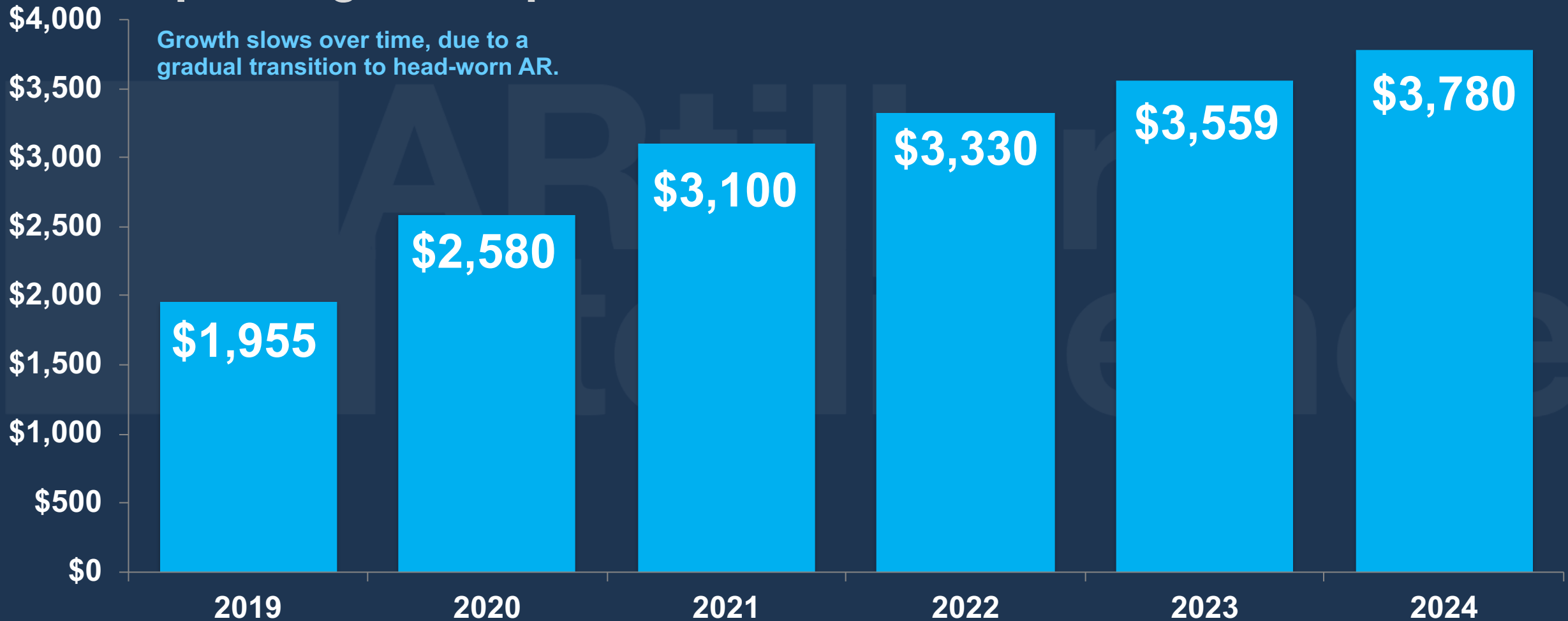
■ This will boost short-term traction, while exposing the technology and accelerating its longer-term sustained adoption.

Enterprise Mobile AR

U.S. \$Millions

Spending on Corporate & Industrial Mobile AR Software*

Growth slows over time, due to a gradual transition to head-worn AR.



Enterprise Spending

Content & Media

Creation

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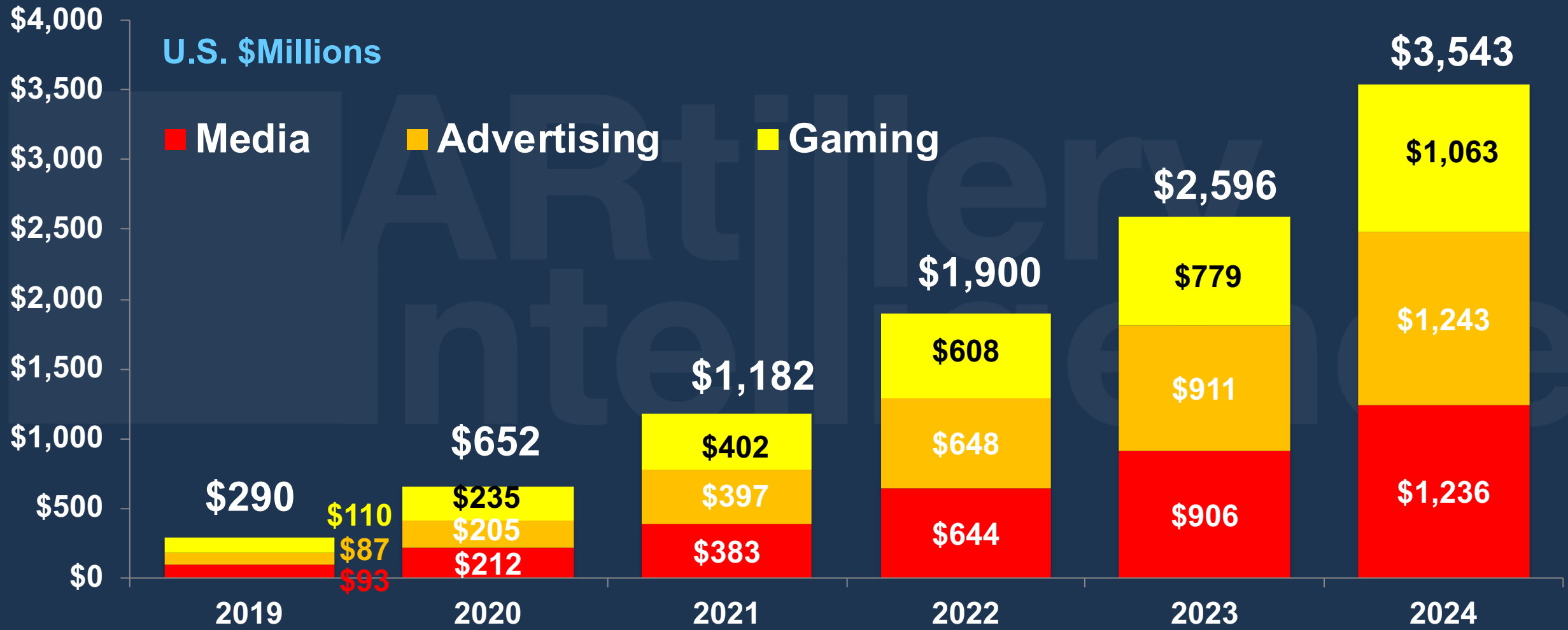
Resources &
Reference

Mobile AR Content & Media Creation

- Mobile AR content & media creation will grow from **\$290 million** in 2019 to **\$3.5 billion** in 2024, a **65 percent** compound annual growth rate (CAGR).
- This includes software that enables enterprises or developers to create consumer-based AR experiences such as games, ads & entertainment.
- Buyers of this technology (software license or SaaS) include end users (B2B) or to develop AR for their customers and constituents (B2B2C).
- There are fairly-even spending levels across media, advertising and gaming.
- Advertising leads slightly, due to brand-advertiser AR adoption (explored later), given a strong business case and demonstrable ROI.
- AR content & media creation is also correlated to the addressable market of AR developers and creatives, which will reach **1.91 million** this year.
- Potential AR creatives include a large global base of creative professionals that could convert to AR, given low-friction tools such as Adobe Aero.

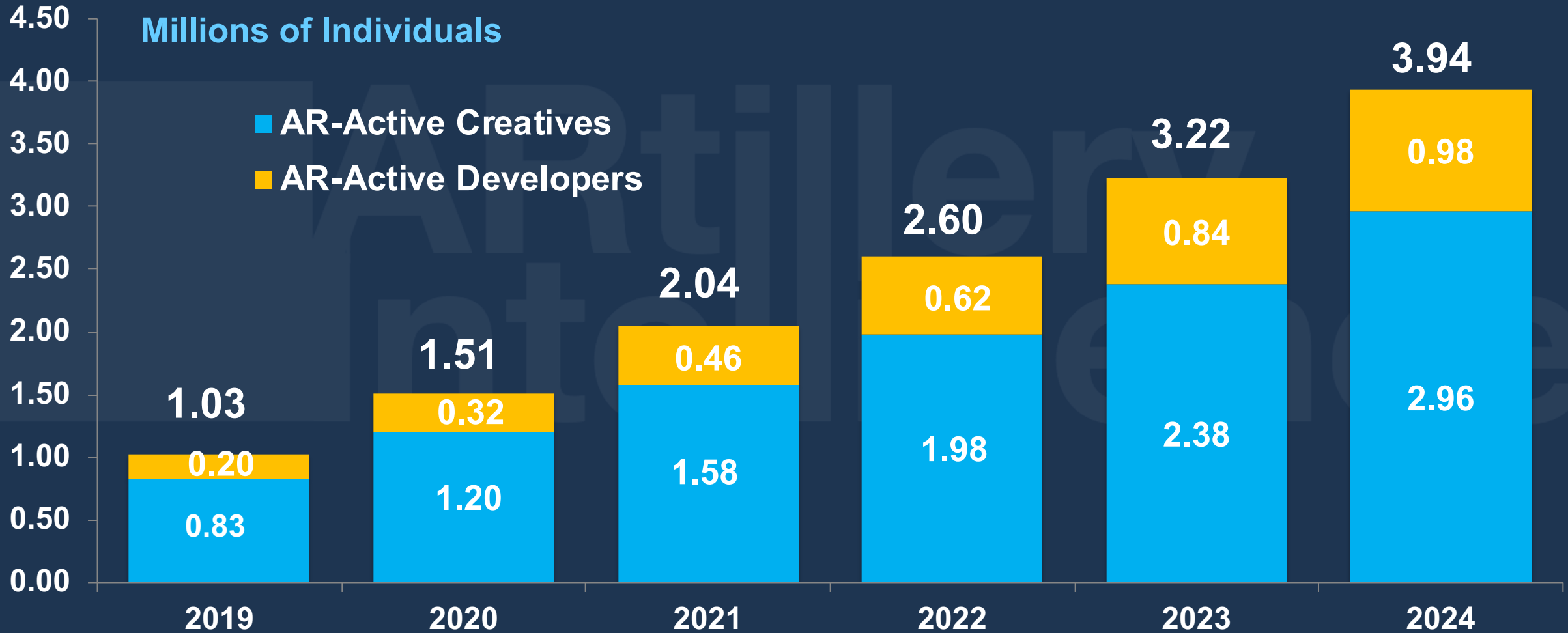
Mobile AR Media Creation

Spending on AR Creation & Development Software*



AR Developers & Creatives

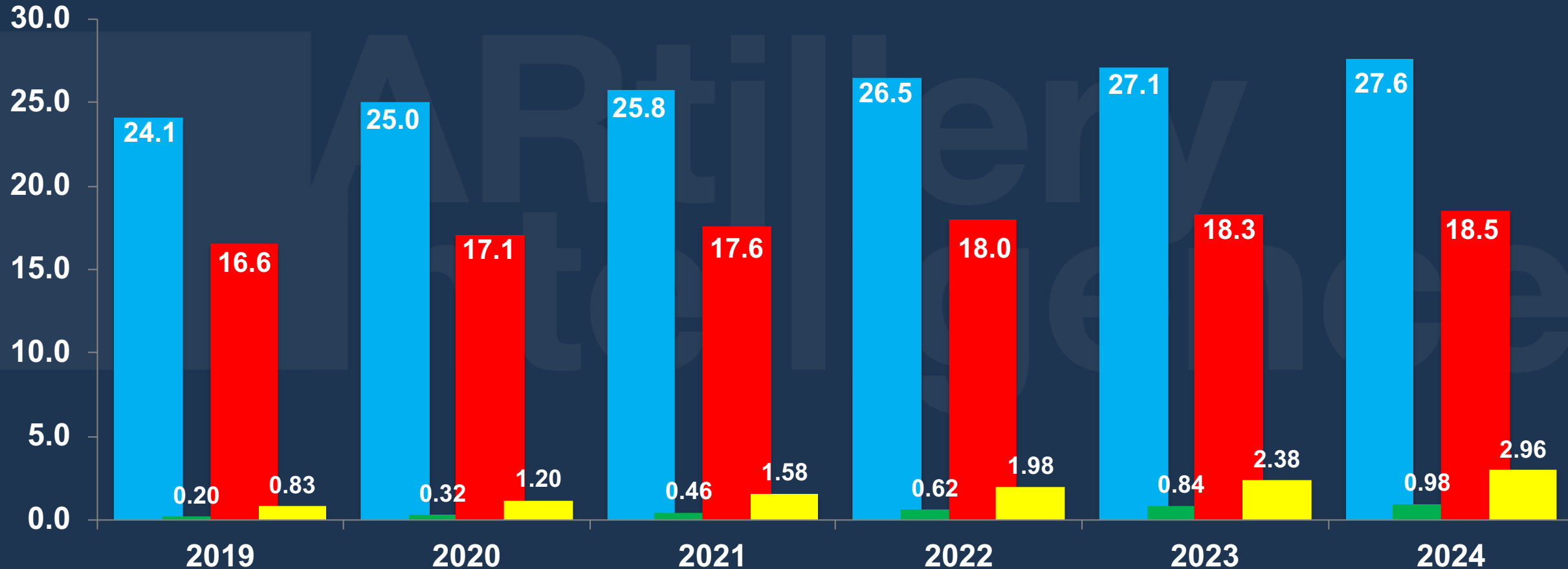
Addressable Market of AR Creators* (Media, Lenses, Ads & Games)



AR Developers & Creative Pros

Addressable Market of AR Creators, Relative to Total Universe

Millions of Individuals



Enterprise Spending

AR Advertising

Intro & Exec
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Resources &
Reference

Mobile AR Advertising

- Mobile AR advertising will grow from **\$509 million** in 2019 to **\$8.2 billion** in 2024, a **74 percent** compound annual growth rate (CAGR).
- This includes paid AR lenses and visual search ad campaigns, such as sponsored lens options offered by **Snapchat** and **Facebook**.
- It does not include non-advertising marketing spend such as self-distributed brand apps and experiences (e.g. **IKEA Place** app)
- Growth is driven by advertiser interest in immersive product demonstrations.
- This not only resonates with advertisers' creative sensibilities, but it's showing a strong business case through high-performing ads.*
- AR lenses lead all AR ad formats today in both engagement and revenue, including selfie filters from **Snapchat**, **Facebook** and others.
- Despite pandemic-driven retractions, AR advertising's growth in 2020 is accelerated by the introduction of **Instagram** and **TikTok's** AR ad programs.

Mobile AR Content & Media Creation

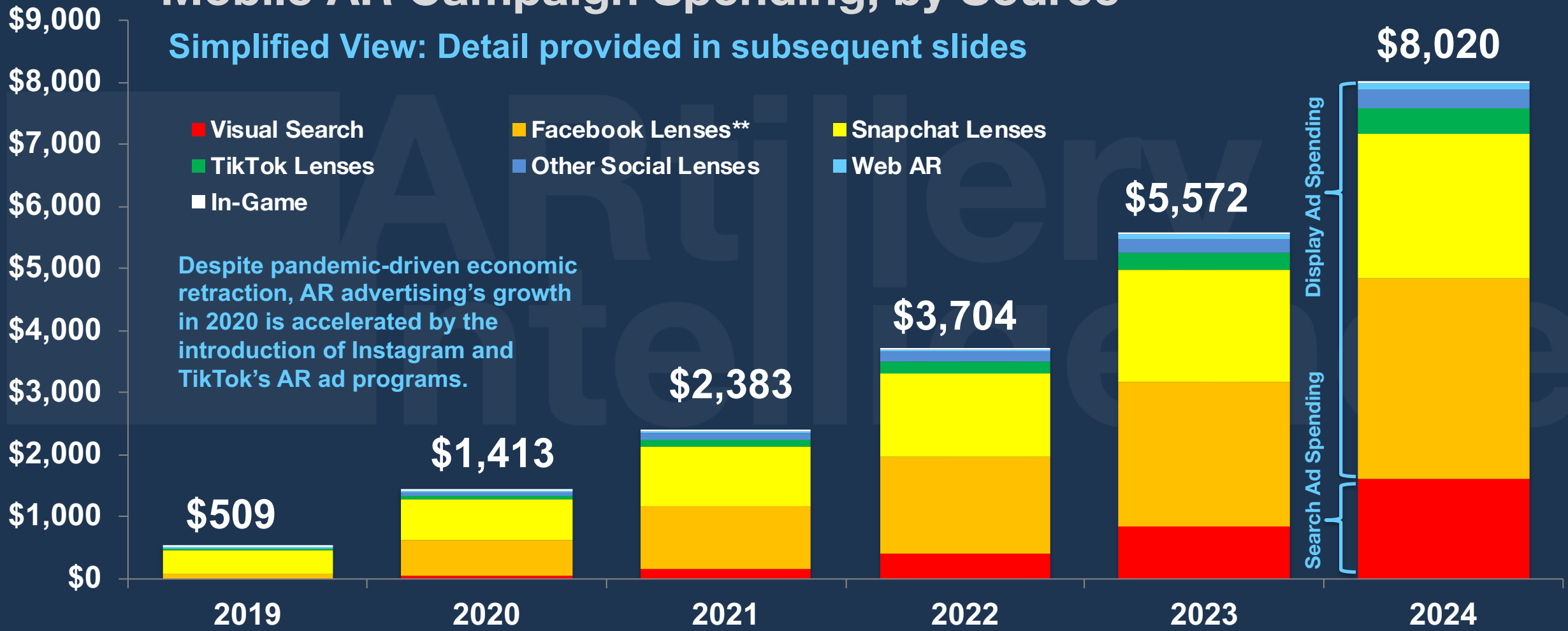
- Among Social AR lens players today, Snapchat has the revenue lead.
 - This comes despite Facebook's greater global scale, and results from higher levels of lens engagement (and monetization) per Snapchat user.
 - Snapchat will maintain the revenue lead of any one AR app, however Facebook will surpass it if adding up all its properties including Instagram.
 - Visual search will gain ground in later years, driven by a utilitarian and frequent use case that's naturally monetizable (like web search).*
 - TikTok is the wild card, with rapidly growing usage but underdeveloped AR.
- Mobile AR advertising could have mixed results from Covid-era dynamics.
 - AR lenses are trending up, due to a quarantine-friendly use case.
 - But advertising is a famously recession-prone spending category.
 - Mobile AR advertising could benefit because recessions cause advertisers to rethink and redeploy budget to more effective and cost-efficient formats.

Mobile AR Ad Revenue

U.S. \$Millions

Mobile AR Campaign Spending, by Source*

Simplified View: Detail provided in subsequent slides



*Doesn't include platforms endemic to China

**Doesn't include non-advertising marketing spend such as self-distributed brand apps and experiences

**Includes Instagram, Messenger and all Facebook properties that distribute AR lenses

Mobile AR Ad Revenue

U.S. \$Millions

Mobile AR Campaign Spending, by Source*

	Visual Search	Facebook Lenses**	Snapchat Lenses	TikTok Lenses	Other Social Lenses	Web AR	Gaming	Total
2019	\$0	\$72.0	\$396	\$10.0	\$25.2	\$3.7	\$1.7	\$509
2020	\$50.8	\$586	\$651	\$44.2	\$67.4	\$9.1	\$3.8	\$1,413
2021	\$167	\$1,002	\$965	\$113	\$110	\$20.2	\$6.3	\$2,383
2022	\$398	\$1,562	\$1,346	\$185	\$163	\$40.1	\$9.6	\$3,704
2023	\$833	\$2,341	\$1,801	\$277	\$233	\$74.3	\$13.8	\$5,572
2024	\$1,602	\$3,241	\$2,337	\$399	\$315	\$108	\$18.9	\$8,020

*Doesn't include platforms endemic to China

*Doesn't include non-advertising marketing spend such as self-distributed brand apps and experiences

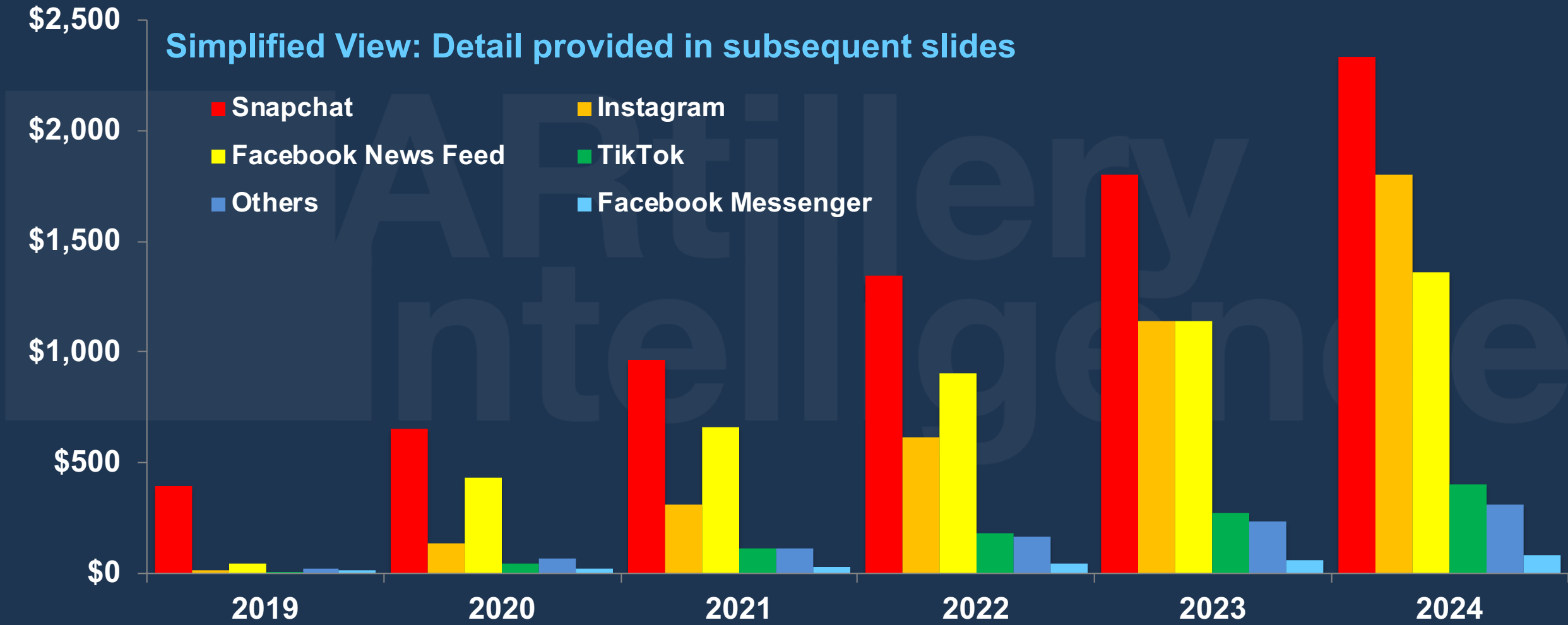
**Includes Instagram, Messenger and all Facebook properties that distribute AR lenses

Social Mobile AR Ad Revenue

How Do Social Lens Platforms Stack Up?

U.S. \$Millions

Simplified View: Detail provided in subsequent slides



*Doesn't include platforms endemic to China
*Doesn't include non-advertising marketing spend such as self-distributed brand apps and experiences

Social Ad Revenue Breakdown

How Do Social Lens Platforms* Stack Up?

U.S. \$Millions

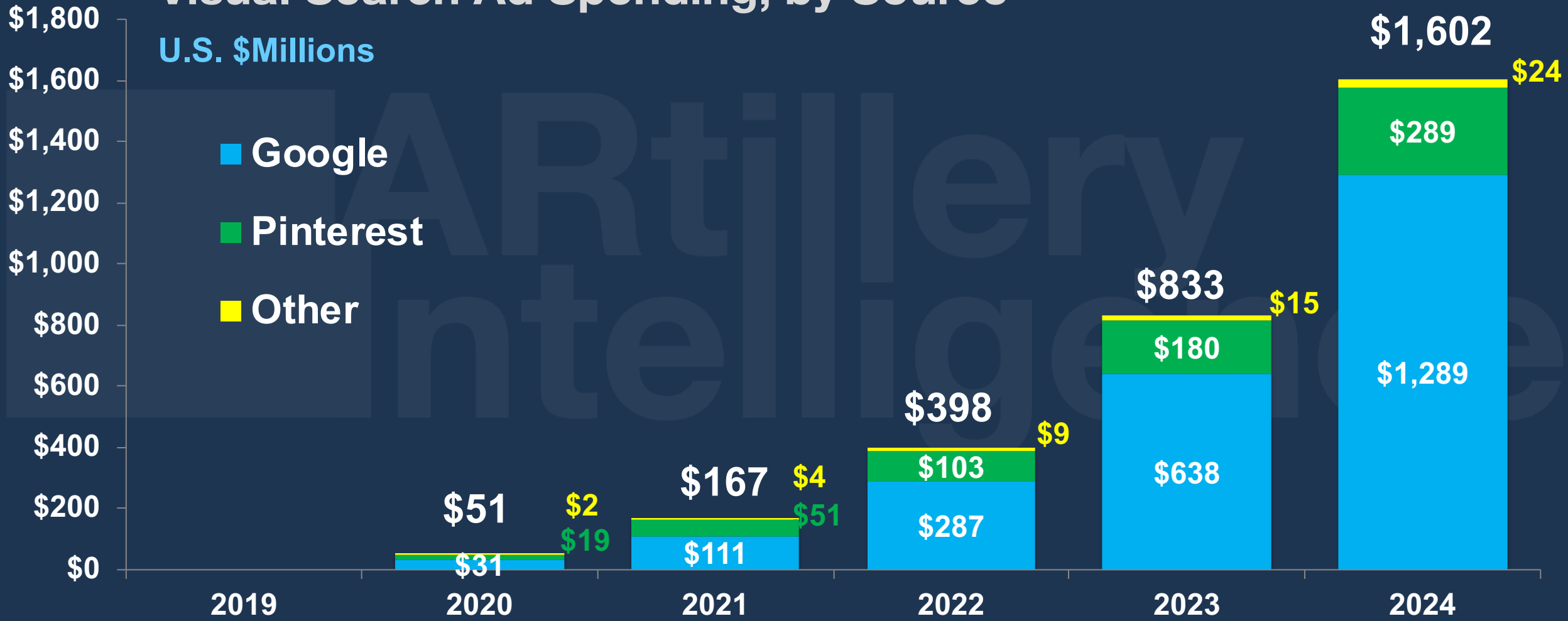
	Snapchat	Instagram	Facebook News Feed	TikTok	Others	Facebook Messenger	Total
2019	\$396	\$12	\$45	\$10	\$25	\$15	\$503
2020	\$651	\$133	\$434	\$44	\$67	\$19	\$1,349
2021	\$965	\$314	\$659	\$113	\$110	\$30	\$2,190
2022	\$1,346	\$618	\$901	\$185	\$163	\$43	\$3,256
2023	\$1,801	\$1,142	\$1,139	\$277	\$233	\$60	\$4,651
2024	\$2,337	\$1,798	\$1,361	\$399	\$315	\$81	\$6,291

Visual Search Breakdown

Visual Search Ad Spending, by Source

U.S. \$Millions

- Google
- Pinterest
- Other



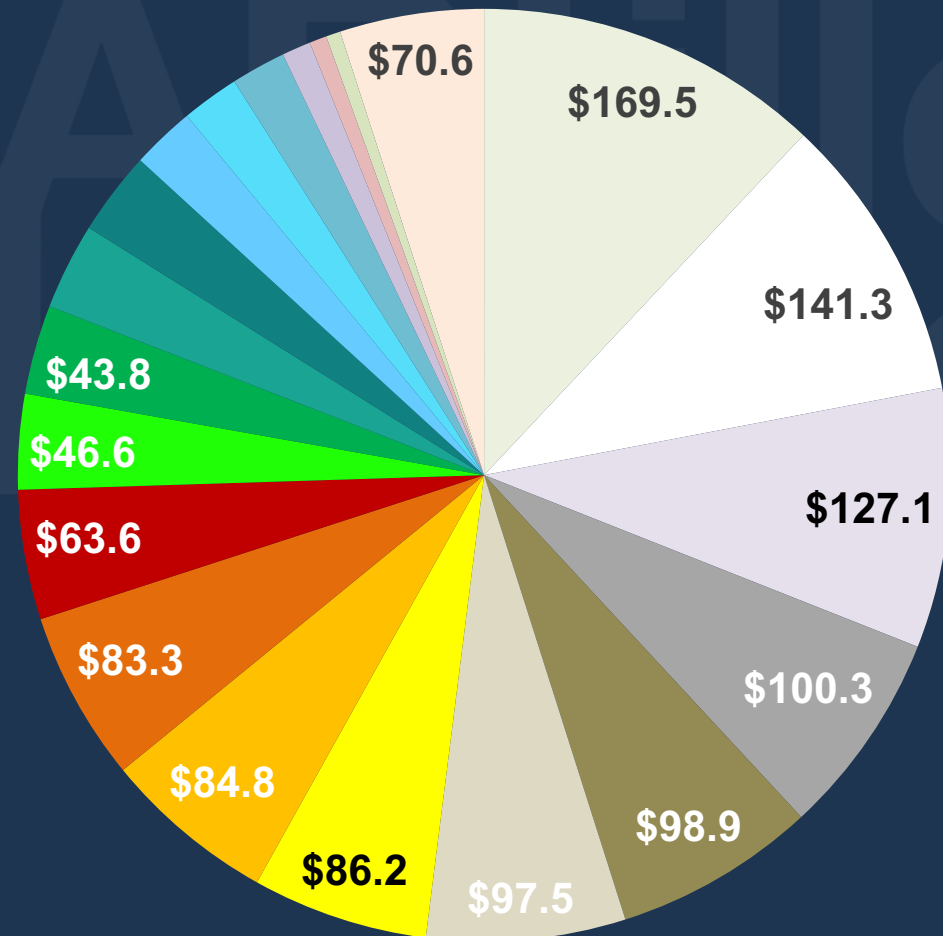
Mobile AR Ad Revenue

U.S. \$Millions

Mobile AR Campaign Spending, by Vertical*

Simplified View: Detail provided in subsequent slides

2020



*Doesn't include non-advertising marketing spend such as self-distributed brand apps and experiences

- Cosmetics & Personal Care
- Clothing (sans footwear)
- Media & Entertainment
- Jewelry & Watches
- Bags & Accessories
- Footwear
- Furniture & Home Goods
- Home Appliances
- Consumer Electronics
- Cars & Auto Supplies
- Computers & Telecom
- Travel & Events
- Food, Grocery & Restaurant
- Toys & Hobbies
- Sports, Fitness & Outdoor
- Industrial Equipment
- Consumer Packaged Goods
- Flowers & Gifts
- Home Improvement & Garden
- Office & Stationary
- Other

Mobile AR Ad Revenue

U.S. \$Millions

Mobile AR Campaign Spending, by Vertical*

	Cosmetics & Personal Care	Clothing (sans footwear)	Media & Entertainment	Jewelry & Watches	Bags & Accessories	Footwear	Furniture & Home Goods	Home Appliances	Consumer Electronics	Cars & Auto Supplies	Computers & Telecom	Travel & Events	Food, Restaurant & Grocery	Toys & Hobbies	Sports, Fitness & Outdoor	Industrial equipment	Consumer Packaged Goods	Flowers & Gifts	Home Improvement & Garden	Office & Stationary	Other	Total
2019	\$61.1	\$50.9	\$45.8	\$36.1	\$35.6	\$35.1	\$31.0	\$30.5	\$30.0	\$22.9	\$16.8	\$15.8	\$15.3	\$14.8	\$11.2	\$10.2	\$9.7	\$5.1	\$3.1	\$2.5	\$25.4	\$509
2020	\$169.5	\$141.3	\$127.1	\$100.3	\$98.9	\$97.5	\$86.2	\$84.8	\$83.3	\$63.6	\$46.6	\$43.8	\$42.4	\$41.0	\$31.1	\$28.3	\$26.8	\$14.1	\$8.5	\$7.1	\$70.6	\$1,413
2021	\$286.0	\$238.3	\$214.5	\$169.2	\$166.8	\$164.4	\$145.4	\$143.0	\$140.6	\$107.2	\$78.6	\$73.9	\$71.5	\$69.1	\$52.4	\$47.7	\$45.3	\$23.8	\$14.3	\$11.9	\$119.2	\$2,383
2022	\$444.4	\$370.4	\$333.3	\$263.0	\$259.3	\$255.6	\$225.9	\$222.2	\$218.5	\$166.7	\$122.2	\$114.8	\$111.1	\$107.4	\$81.5	\$74.1	\$70.4	\$37.0	\$22.2	\$18.5	\$185.2	\$3,704
2023	\$668.6	\$557.2	\$501.5	\$395.6	\$390.0	\$384.5	\$339.9	\$334.3	\$328.7	\$250.7	\$183.9	\$172.7	\$167.2	\$161.6	\$122.6	\$111.4	\$105.9	\$55.7	\$33.4	\$27.9	\$278.6	\$5,572
2024	\$962.4	\$802.0	\$721.8	\$569.4	\$561.4	\$553.4	\$489.2	\$481.2	\$473.2	\$360.9	\$264.6	\$248.6	\$240.6	\$232.6	\$176.4	\$160.4	\$152.4	\$80.2	\$48.1	\$40.1	\$401.0	\$8,020

Enterprise Spending

Commerce Enablement

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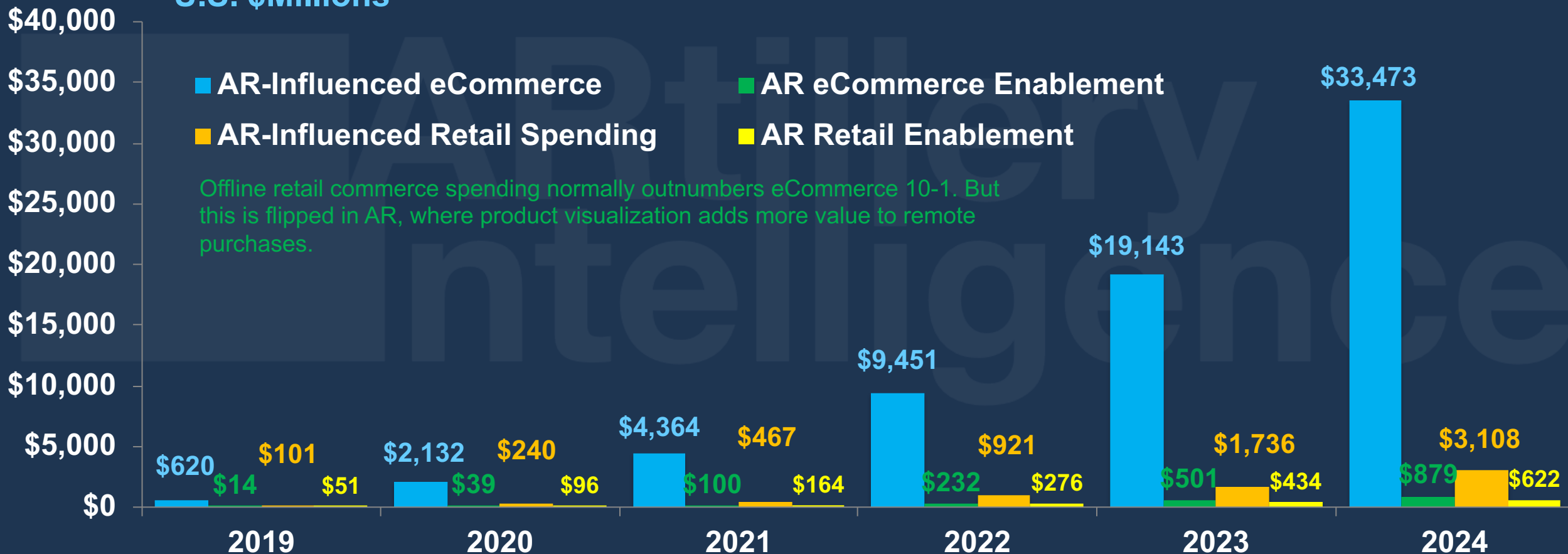
Mobile AR Commerce Enablement

- Mobile AR commerce enablement will grow from **\$64 million** in 2019 to **\$1.4 billion** in 2024, an 88 percent compound annual growth rate (CAGR).
 - This stems from the area covered earlier in this report: AR-influenced consumer purchases for physical goods.
 - The figures examined in this section are for the software that enables the product visualization and “try-ons” that drive those transactions.
 - Mobile AR commerce-enablement can have endpoints in all the channels examined in this report: social lenses, native apps, web AR, AR ads, etc.
- Mobile AR commerce-enablement is split between eCommerce and retail.
 - As examined earlier, eCommerce will lead in the long term, given that AR adds more value to remote shoppers who can't see and feel the product.
 - Retailer and brand adoption will map to vertical-specific factors such as spending power, motivation and product-fit with remote visualization.

AR Commerce Revenue

Mobile AR-Influenced Spending* & Enabling-Tech Revenue

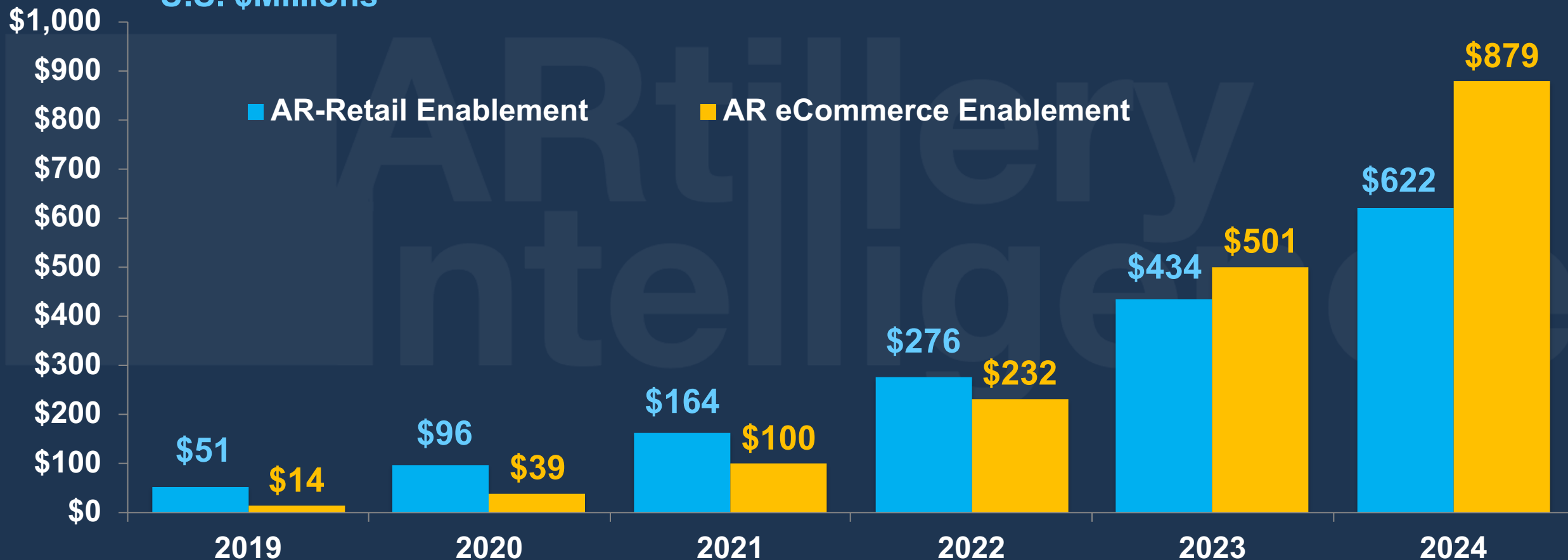
U.S. \$Millions



AR Commerce Revenue

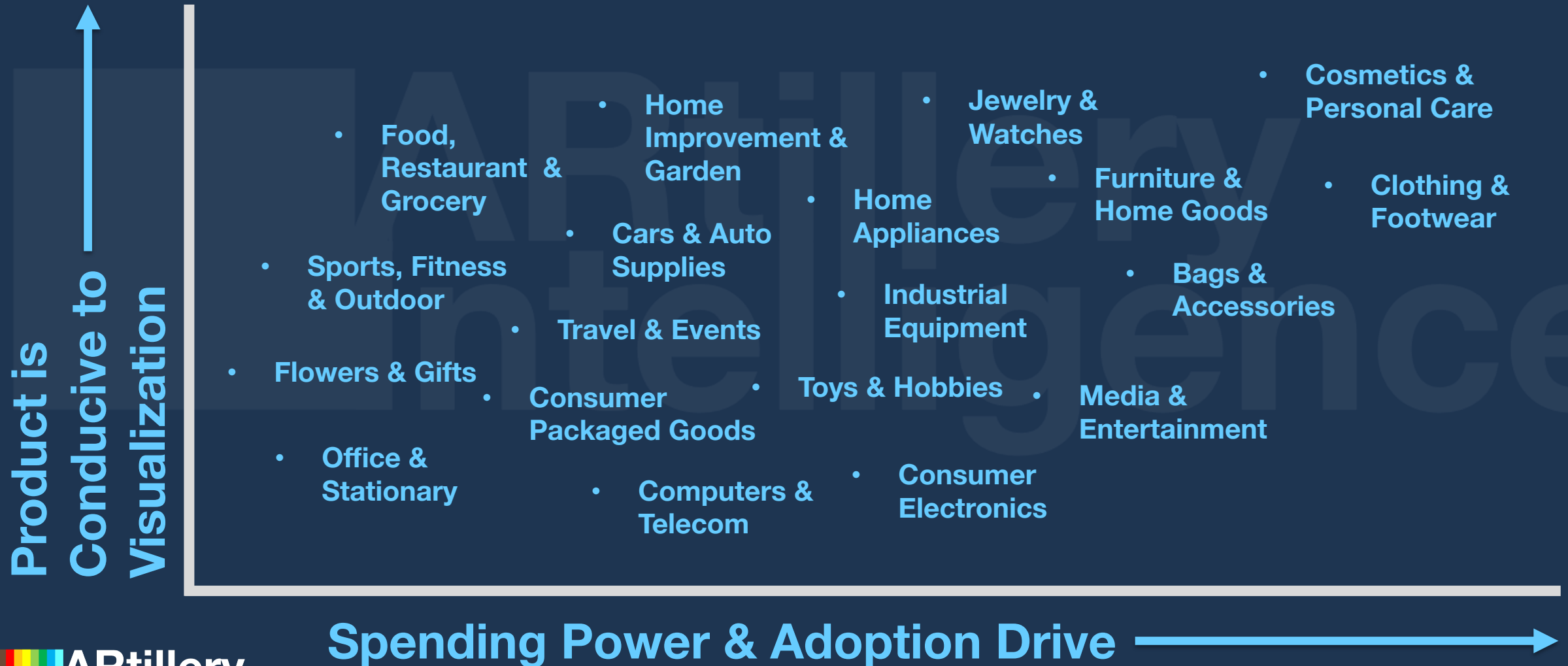
Mobile AR Commerce*: Enabling-Tech Revenue

U.S. \$Millions



Brand & Retailer Adoption Drivers

Factors Influencing Vertical-Specific AR Advertising & Commerce



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Next Steps

In addition to standalone and self-contained orientation, this forecast lays the groundwork for continued ARtillery Intelligence narratives.

With the foundation of this data set, several subsequent reports and articles will be developed in the coming months that each drill down into the dynamics and drivers of the revenue categories quantified in this report. The story is not over...

Speaking of which, work now begins on the next forecast in our coverage of the spatial computing spectrum, including head worn AR and VR. These forecasts are interlinked and strengthen each other, where the *whole is greater than the sum of its parts*.

We encourage questions and coverage suggestions [here](#).

About ARtillery Intelligence

ARtillery Intelligence chronicles the evolution of spatial computing. Through writings and multimedia, it provides deep and analytical views into the industry's biggest players, opportunities and strategies.

Run by analysts and former journalists, coverage is grounded in a disciplined and journalistic approach. It also maintains a business angle: Though there are lots of fun and games in spatial computing, 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 narrative reports, market-sizing forecasts, consumer survey data and multimedia, all housed in a robust intelligence vault. Learn more [here](#).

About Intelligence Briefings

ARtillery Intelligence Briefings are monthly installments of spatial computing data and analysis. They synthesize original data to reveal opportunities and dynamics of spatial computing sectors. In addition to data, a layer of insights is applied to translate market events and raw figures into prescriptive advice.

More information, past reports and editorial calendar can be seen [here](#).

About the Author

Mike Boland was one of Silicon Valley's first tech reporters of the Internet age, as a staff reporter for Forbes (print) starting in 2000. He has been an industry analyst covering mobile and social media since 2005, and is now Chief Analyst of *ARtillery Intelligence* and Editor-in-Chief of *AR Insider*.

Mike is a frequent speaker at industry conferences such as AWE, VRLA and LeadsCon. He has authored more than 150 reports and market-sizing forecasts on the tech & media landscape. He contributes regularly to news sources such as *TechCrunch*, *Business Insider* and *Huffington Post*.

A trusted source for tech journalists, his comments have appeared in A-list publications, including *The New Yorker*, *The Wall Street Journal* and *The New York Times*.

Further background, history and credentials can be read [here](#).

Forecast Methodology

ARtillery Intelligence follows disciplined best practices in market sizing and forecasting, developed and reinforced through its principles' 15 years in research and intelligence in tech sectors. This includes the past 5 years covering AR & VR as a main focus.

This report focuses on AR revenue projections in various sub-sectors and product areas. *ARtillery Intelligence* has built financial models that are customized to the specific dynamics and unit economics of each. These include variables like unit sales, company revenues, pricing trends, market trajectory and several other micro and macro factors that *ARtillery Intelligence* tracks.

This approach primarily applies a *bottom-up* forecasting methodology, which is secondarily vetted against a *top-down* analysis. Together, confidence is achieved through triangulating revenues and projections in a disciplined way. For more information on what's included and not included in the forecast (a key consideration when evaluating the figures) see slide 5.

More about ARtillery Intelligence's market-sizing methodology can be seen [here](#) and more on its credentials can be seen [here](#).

Disclosure & Ethics Policy

ARtillery has no financial stake in the companies mentioned in this report, nor received payment for its production. Similarly with 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's disclosure and ethics policy can be seen in full [here](#).

What's Included in *Mobile AR Revenues*?

This forecast focuses on mobile AR and its revenue subcategories. These include consumer spending (e.g. in-app-purchases); and enterprise spending (e.g. industrial visualization, advertising & commerce enablement). Key inclusions and exclusions exist throughout these categories.

For example, we track transaction value of physical goods that are visualized and purchased through AR interfaces, such as cosmetics and shoes. However we do not include these transactions as *AR revenue*. Software that enables such AR commerce is conversely counted as AR revenue. [See more examples below.](#)

All revenue figures correlate to the full-year (end of year) total of the identified year.

Included

Consumer AR Digital Goods: e.g. in-app purchases
Corporate & Industrial AR: e.g. Mobile AR-assisted assembly or maintenance software
Content & Media Creation: e.g. AR developer platforms
Advertising: e.g. Snapchat paid lens campaigns
Commerce Enablement: e.g. Product visualization software for physical goods.

Not Included

Physical Goods: transaction value of goods bought through AR interfaces (e.g. footwear, furniture).^{*}
Smartphone Sales: e.g. iPhone to run ARkit apps
Network Data: e.g. Telco-delivered data usage for AR
Professional Services: e.g. Enterprise AR consulting
App & Advertising Creation Overhead: e.g. Developer salaries, agency fees

Video Companion

[\(Click to Play\)](#)



ARTILLERY MARKET SIZING HOW DO WE COME UP WITH OUR FIGURES?



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