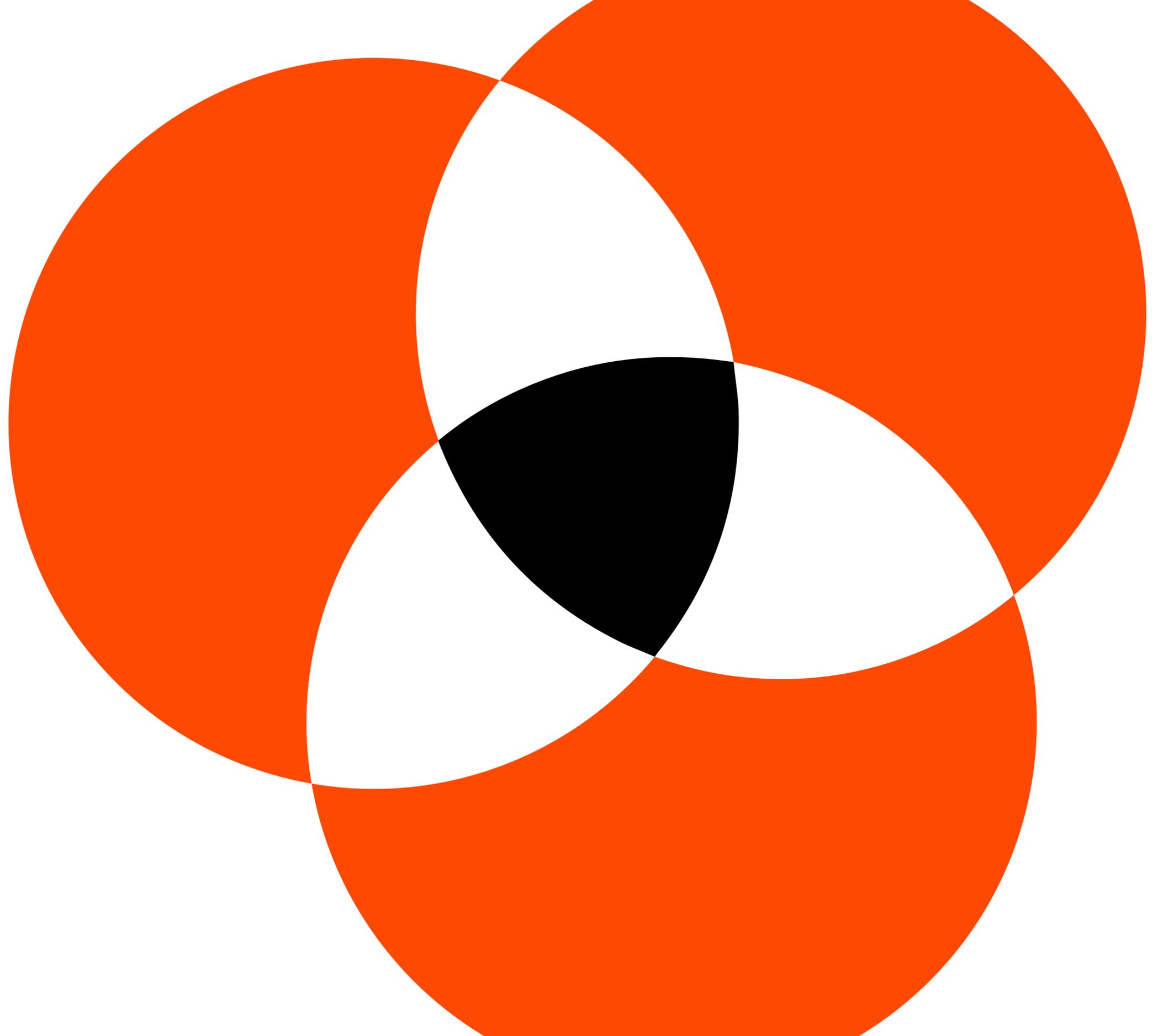


# Extended Reality (XR) Playbook



**isobar**

“Creative Experience and the intersection of data, creativity and technology will transform every organisation. You need to satisfy your customer in a beautiful way to win in this new economy — Extended Reality (XR) is key to delivering on that promise.”

• Jean Lin, Isobar Global CEO

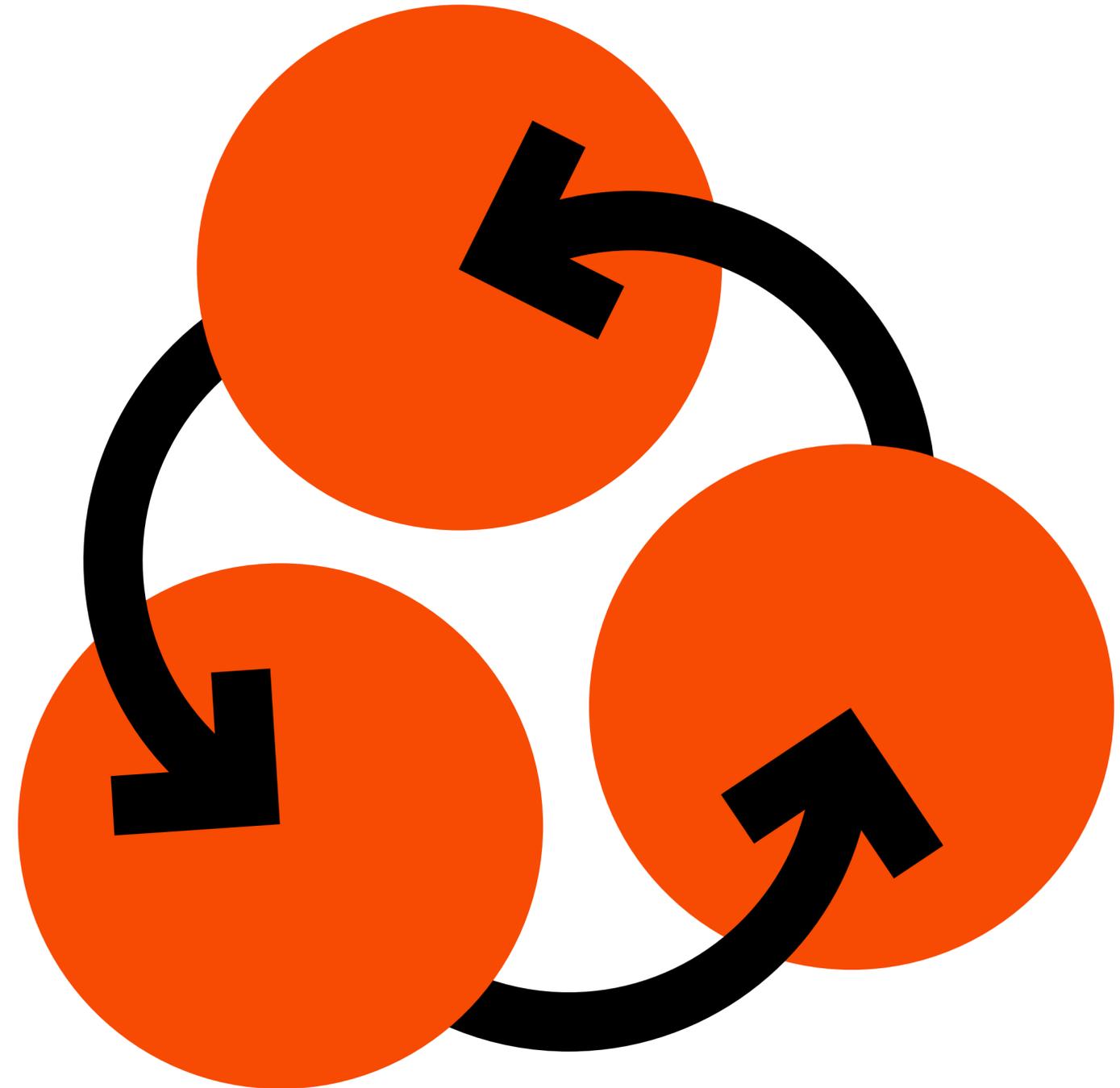
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## Introduction

In our lifetime we've seen seismic changes from PC to web, to mobile and cloud. In 2019 we are headed towards an exponential shift from Virtual Reality & Augmented Reality to Extended Reality and fully immersive, transformative experiences.

This XR Playbook looks at the history of technology and shares our view of the entire XR landscape and the opportunities it provides to both businesses and brands today, and in the future. This is a critical time for CEOs and marketers to develop and leverage this opportunity as its ecosystem is still being constructed.

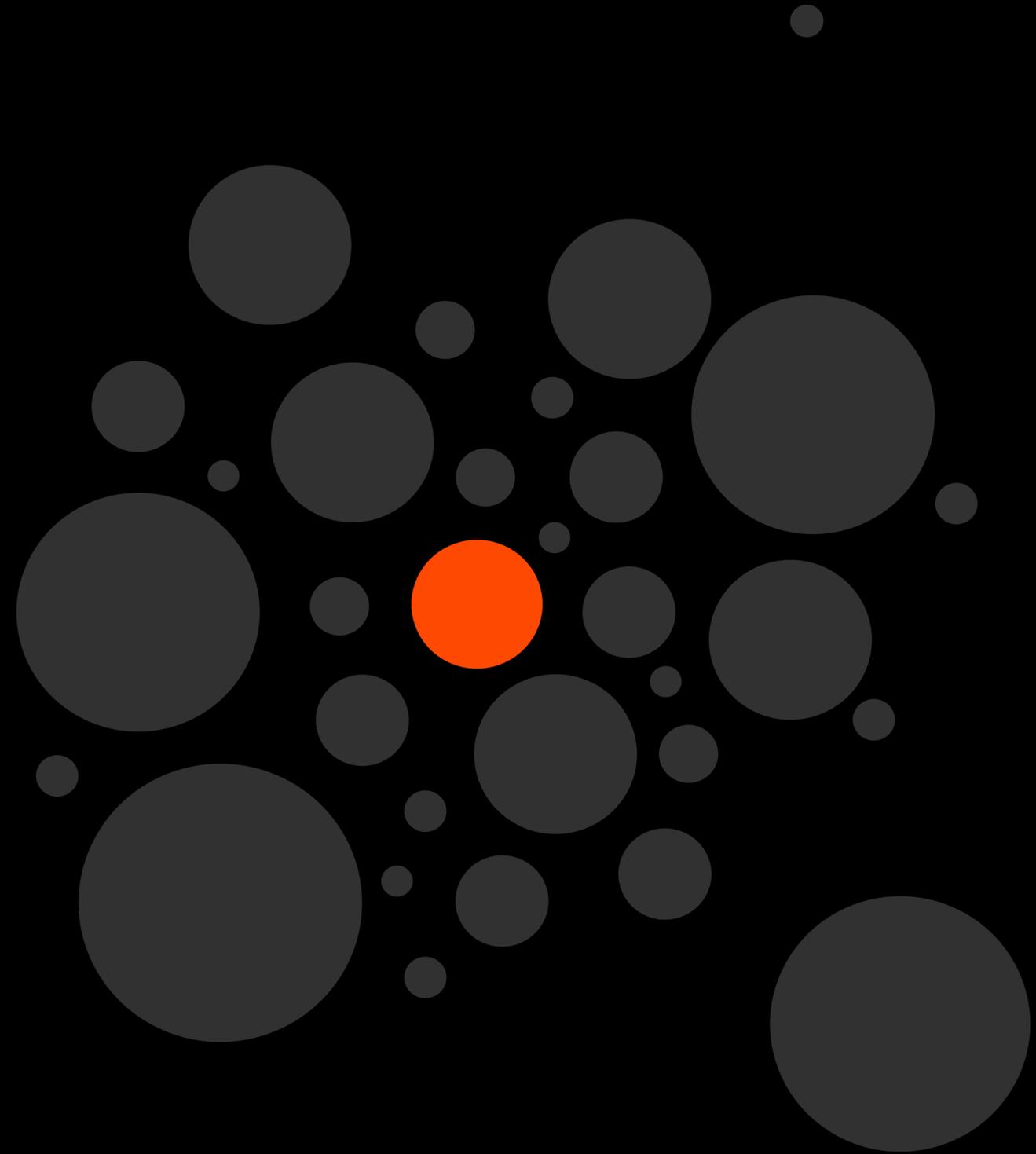
We also look at the role of data and measurement, as tools such as [MindSight®](#) will be fundamental to XR's success in the short and long term. Data aids marketers in understanding how the realtime emotions of customers can be quantified through XR experiences and ensures they lead to sales.



## We believe 2020 will be the year that XR explodes into the public consciousness.

While VR uses a device to place the user ‘within’ an experience, AR enables the placement of virtual objects onto ‘real’ environments. Mixed Reality (MR) further combines the real and virtual worlds enabling both realities to interact with each other. XR is the convergence of AR, VR and MR, further accelerating the potential to create wholly new environments in combination with artificial intelligence, machine learning, haptics, biometrics, and spatial computing. The opportunity of integrating technologies and platforms is much bigger than the sum of their parts.

This means being able to create digital experiences where the content is aware of your surroundings—from enabling a user to drop a virtual object into their home to see if it matches their decor—to content being customized in real-time based on one’s physiological response to what they are doing (e.g. heart rate, pupil activity, respiration, etc).



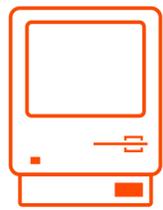
XR experiences will bring personalisation and customisation to a new level, becoming more real than any type of digital experiences we've been able to previously deliver.

XR has a clear place in gaming and entertainment as well as education experiences. In fact, all future computing will eventually leverage personalisation and VR, AR & MR tactics to deliver content, both in consumer (B2C) as well as in enterprise applications.

**We are moving towards a future where we will no longer need to distinguish between the unique features of AR, VR, and MR.**

Instead we will simply know that content, location, physical objects, and users will be linked in a symphony of interactions, and where Spatial Computing is the new, and accepted, paradigm.





## 1980s

Computing goes personal



## 1990s

Web, OS, SaaS, Enterprise takes notice



## 2000s

Cloud, Web 2.0 and Facebook

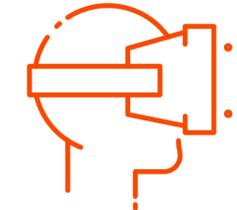


iPhone launches followed by App Store



## 2010s

'Dumb' feature phones outsold by smartphones



Oculus Rift showcased at E3



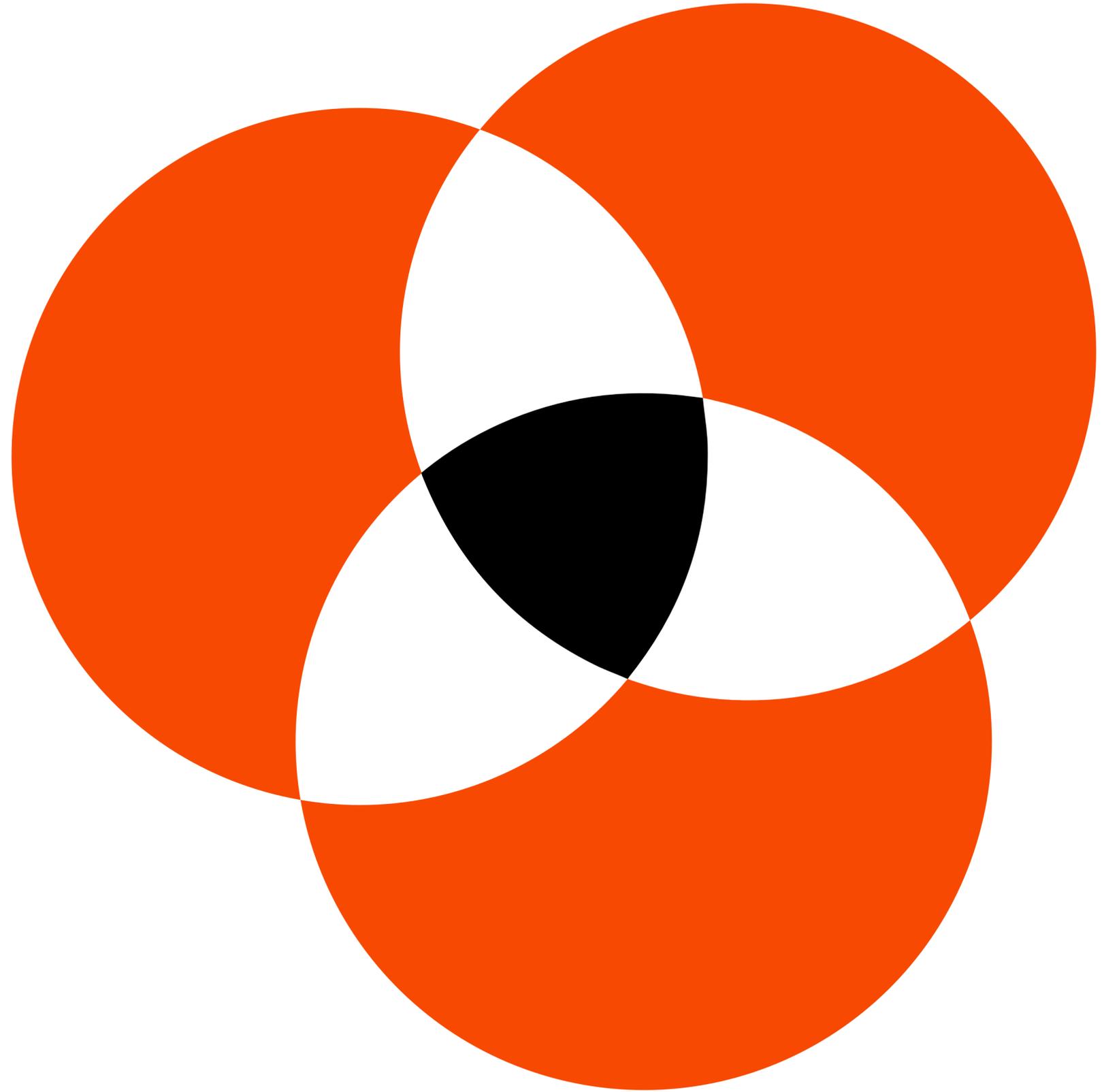
## 2020s

Major US cellular network continue 5G rollout

For the past four decades we've seen computing platforms shift about once every 10 years. The 1980s welcomed the birth of the IBM-PC and the Apple Macintosh computer, making the computer truly 'personal.' The 1990s saw the explosion of the Internet and the beginning of the democratisation of information. Web2.0 made its debut in the early 2000s, followed by cloud computing, and the launch of Amazon. When the iPhone came on the scene in 2007, it was a watershed moment leading the way for mass smartphone adoption and changing mobile to a primary—and increasingly social—computing platform.

# 01

What is XR?



## What is XR?

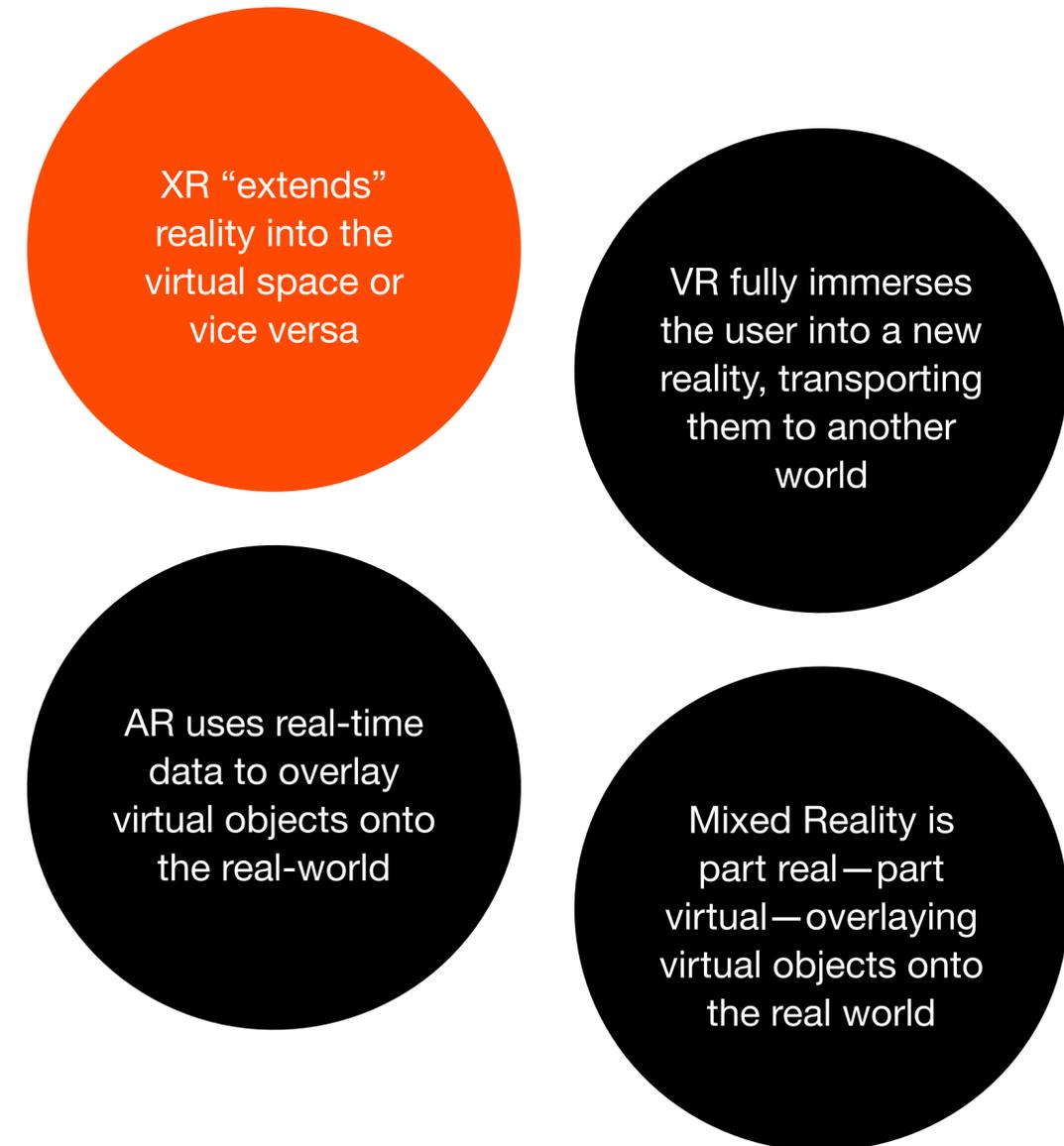
As Augmented Reality (AR,) Virtual Reality (VR,) and Mixed Reality (MR) have become more mainstream, we now use the term Extended Reality (XR) to capture the possibilities offered by combining these technologies.

Extended reality (XR) is a term referring to all real-and-virtual combined environments and human-machine interactions generated by computer technology and wearables.

It includes representative forms such as Augmented Reality, Augmented Virtuality and Virtual Reality. XR encompasses virtual and augmented reality and “extends” reality into the virtual space or takes virtual content and extends it into the physical space.

This showcases the power of technologies to augment our realities and enables people to temporarily inhabit and experience worlds that may normally be closed to them—or indeed be impossible to imagine otherwise.

From a creative perspective, this is revolutionary, opening up the possibility to truly augmented art forms and brand experiences beyond the screen.



## Why is XR such a big deal?

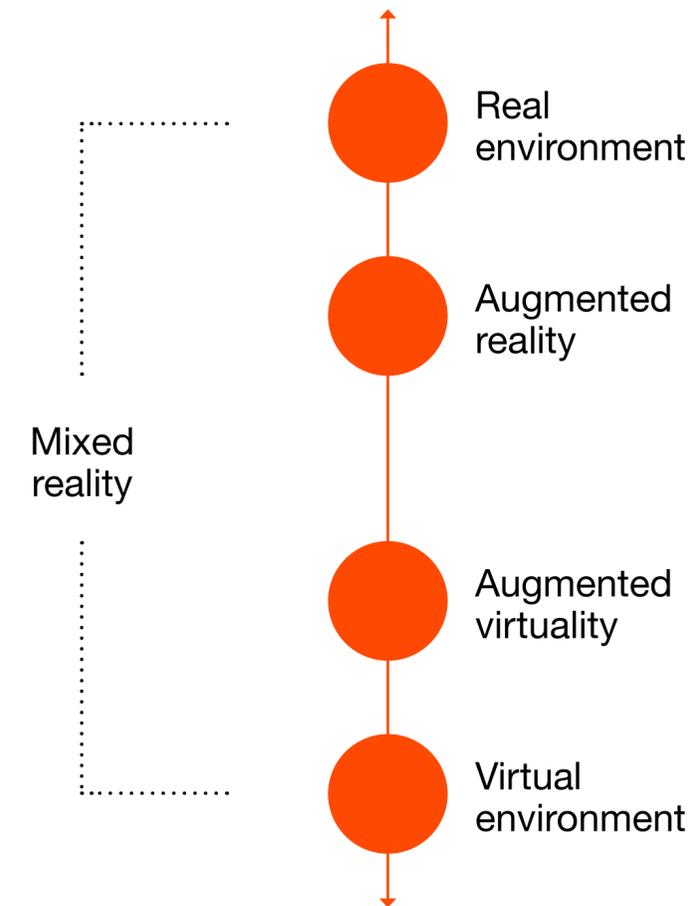
The last several years have seen advancements across various emerging technologies. From optics and graphics processing chip technology to 3D content creation techniques and more broad concepts like Machine Learning—a lot has happened that is making the promise of ubiquitous XR much more realistic than it was, even a year ago.

Graphics processing and the creation of 3D content directly impacts the evolution of XR. From a hardware perspective, the cost reduction in biometric sensors (EEG, ECG, GSR, etc.) and the increase in computing (CPU/GPU) power, allow marketers to design and build the next wave of digital experiences: ones that are smarter, more engaging, and less expensive.

## The advances in Machine Learning and Artificial Intelligence will further transform XR.

Marketers will be able to leverage user's captured behavioral, biometric, demographic and survey data, enabling apps to become smarter and more aware of the intricacies of each user's preference and impressionability.

The marketplace is growing fast. [Statista](#) forecasts the global AR and VR market will grow from \$12 billion USD in 2018 to \$192+ billion USD in 2022. The global market for consumer AR and VR content was predicted to reach \$3.5 billion for 2018 with an increase in apps growth of 72 percent, according to [IHS Markit](#).



The **reality-virtuality continuum** is used as a scale to visualise possible real and virtual environments, with MR combining the two.

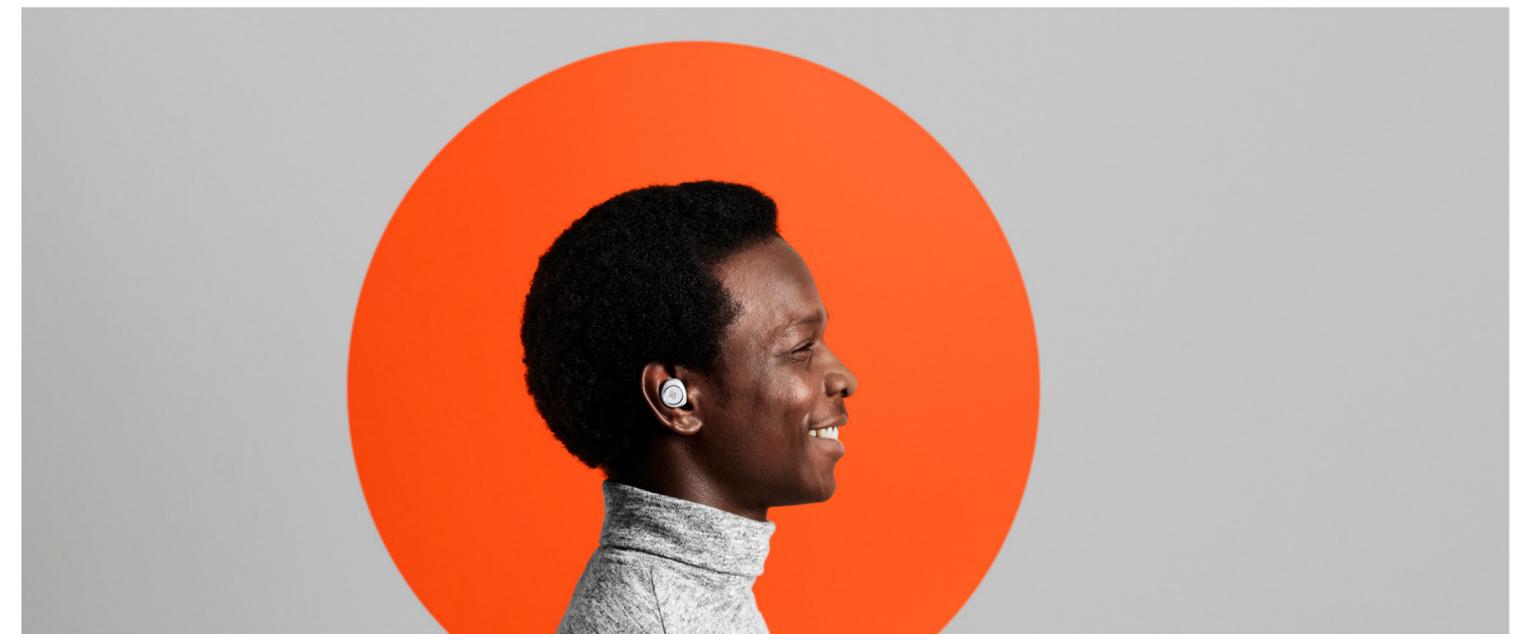
## Combining sound and sight

XR is not just visual. The advantage of XR lies in its ability to personalise experiences for all through sight, sound, speech, movement, and touch and at scale. XR moves beyond mono (providing one-directional sound) and stereo (using two or more independent left or right audio channels), to something called ‘ambisonic audio’. It provides adaptive sound around, above, and below the listener, adjusting as the user ‘travels’ within the XR visual environment and providing truly full-sphere surround sound audio.

Aural advances in technology focus on both the ear and the voice—sound and speech—and seamless connections between the two. In-ear devices or those featuring the human ear as an access point are on the rise. For example, the Bose® Smart Sunglasses include embedded motion sensors to connect to your Smartphone’s GPS via Bluetooth. Imagine having a virtual tour guide who can provide information about your location based on GPS data—this is the power of connected technologies.

Another example is Vigo Technologies Inc. that are now offering Vue smart glasses for pre-order. Available in non-corrective, prescription or sunglass versions, the glasses use bone conduction technology to combine the benefits of a fitness tracker, phone, and music headset into one device along with gesture control and app integration. Similarly, Apple’s 2nd Gen wireless AirPods now include voice-activated Siri access and Cortana, Microsoft’s digital assistant, is making a name for itself via the new Surface headphones. This ear-voice revolution is an obvious progression of how we might best communicate with artificial intelligence (AI) in our own natural language (speech). This is particularly important considering nearly 40 percent of global internet users report using voice-controlled functionality across all devices.

For marketers and innovators, this means an entirely new ‘hearables’ landscape is on the horizon, where brands will need to prioritise sight and sound of the consumer experience equally. This goes far beyond music in retail spaces, and towards creating brand ‘worlds’ that help provide products and services. For example, imagine an in-ear device that can improve sound quality, as well as capture biometrics, providing real-time user data to measure things like heart rate, body temperature, blood pressure, etc. This type of implementation can extend beyond biometric capture. Onboard sensors could also be used to understand a user’s activity, work to translate different languages, and link with a user’s smartphone to extend the mobile experience. This type of sound interface works like a computer you wear in the ear, and Motorola with their “Moto Hint” earpiece and Bose with their “AR” headphones are great examples of smart technologies augmenting our senses.



## Which hardware?

In real life, a human body is able to rotate in three dimensions and move freely in any direction.

In an XR environment, users' movements are restricted to the number of axes provided by technological hardware and this will determine the depth and quality of their experience (this is commonly referred to as 'degrees of freedom' - DOF). 3DOF is largely seen as the lowest acceptable level and refers to rotation-only experiences.

While 6DOF, the preferred standard for convincing immersivity, refers to six-degrees-of-freedom and is often referred to as 'roomscale' or 'worldscale' depending on the HMD being tethered or not.

At Isobar we believe that XR experiences can be categorised into three tiers:

### Tier 1

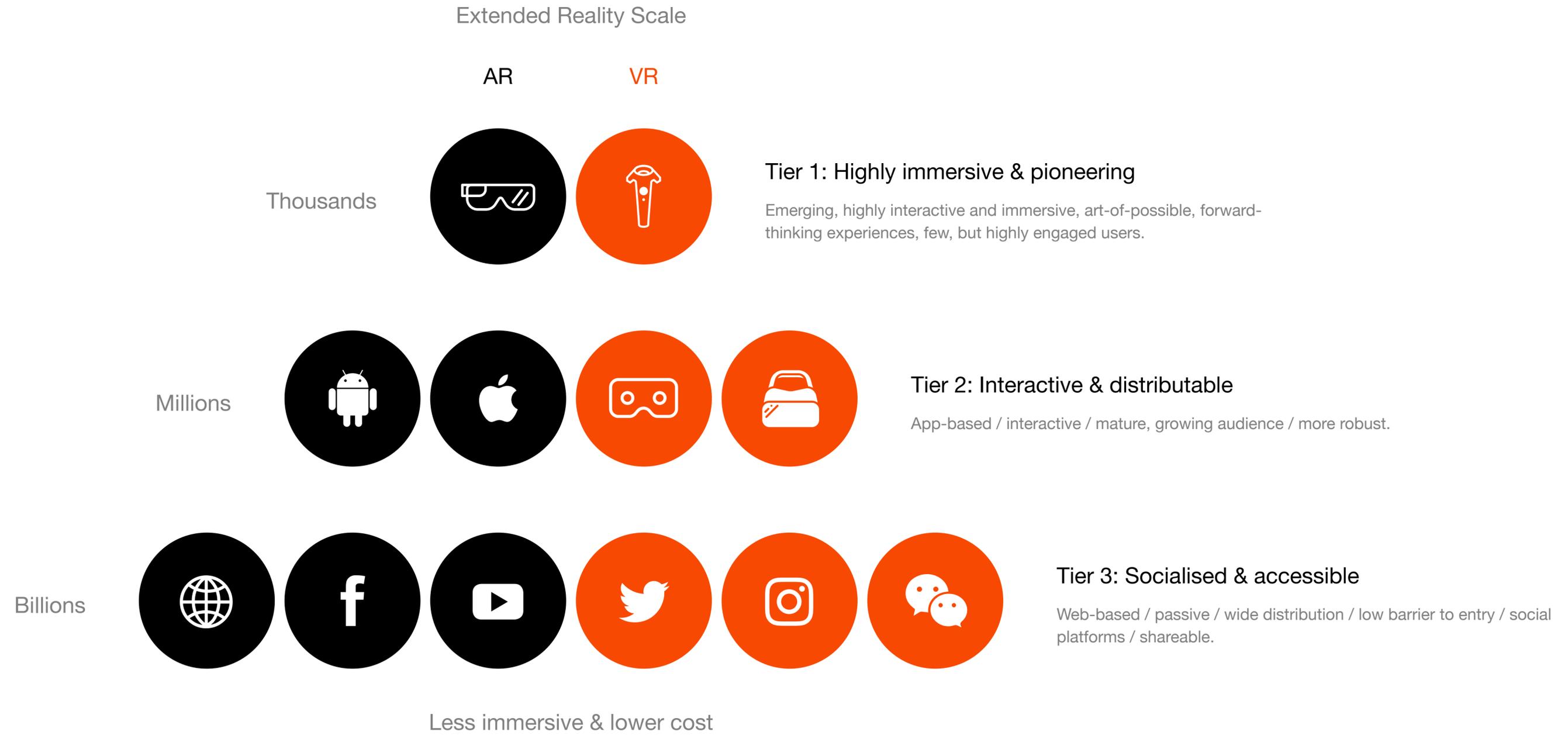
PC and console-based Head Mounted Displays such as HTC Vive/Pro, Oculus Rift and Sony PlayStation VR. Recent additions to this tier include MR headsets such as Magic Leap One, the Samsung HMD Odyssey+ - Windows Mixed Reality Headset and standalone VR headsets such as Oculus Quest and HTC Vive Focus Plus—6DOF+ experiences.

### Tier 2

Mobile 3D 'trackable' content enabled by ARKit, ARcore and WebAR—6DOF experiences.

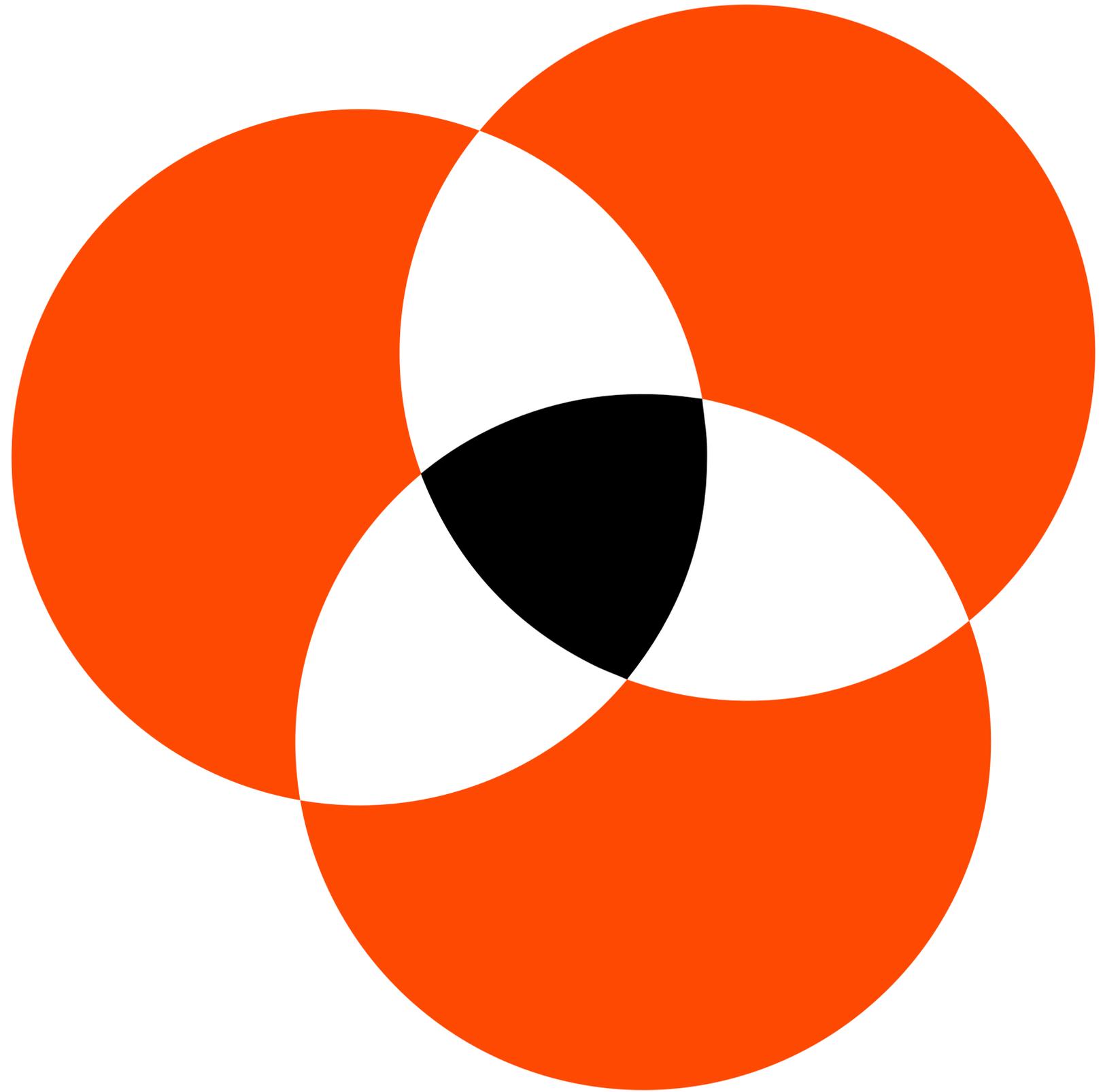
### Tier 3

Embedded 3D and 360 video content on Facebook, Instagram and YouTube—3DOF lowest acceptable experience. 360 HMD enables a more immersive experience than the 360 video content, however many manufacturers are no longer refreshing their platforms in favor of 6DOF.



# 02

## The VR & AR landscape



## Technology constraints

While XR offers exciting possibilities for consumer and enterprise engagement, adoption and growth has been slower than initially anticipated, most notably in the consumer landscape. Unsurprisingly, VR uptake rates have been slower than tablets and smartphones. There are a number of factors that hold back VR far more than mobile touch-screen computing. While we see continued traction for VR hardware amongst consumers, the needs for behavioural change with donning a headset, etc.

### Graphics processing unit (GPU) hardware

The major limiting factor for compelling VR has been GPU hardware requirements. In addition to prices being artificially high in 2017 and most of 2018 due to cryptocurrency mining, GPUs can only improve so fast.

Tremendous leaps are required in order for prices to drop while at the same time increasing resolution, fields of view, and frame rates.

### Lack of content

High-end content makers have been waiting on the sidelines for GPUs and head mounted displays (HMDs) to improve before attempting to create the ‘Killer VR app.’

### Bulky hardware

Many users shy away from VR due to the large, comical, and bulky headsets. The ability to streamline the design of the physical headset is unlikely at the moment due to the multiple components needed to ensure optimum performance. As we continue to invent new ways to achieve the same results, we will see headsets become beautifully designed devices in more manageable dimensions.

### Lack of reliable high-bandwidth wireless VR hardware

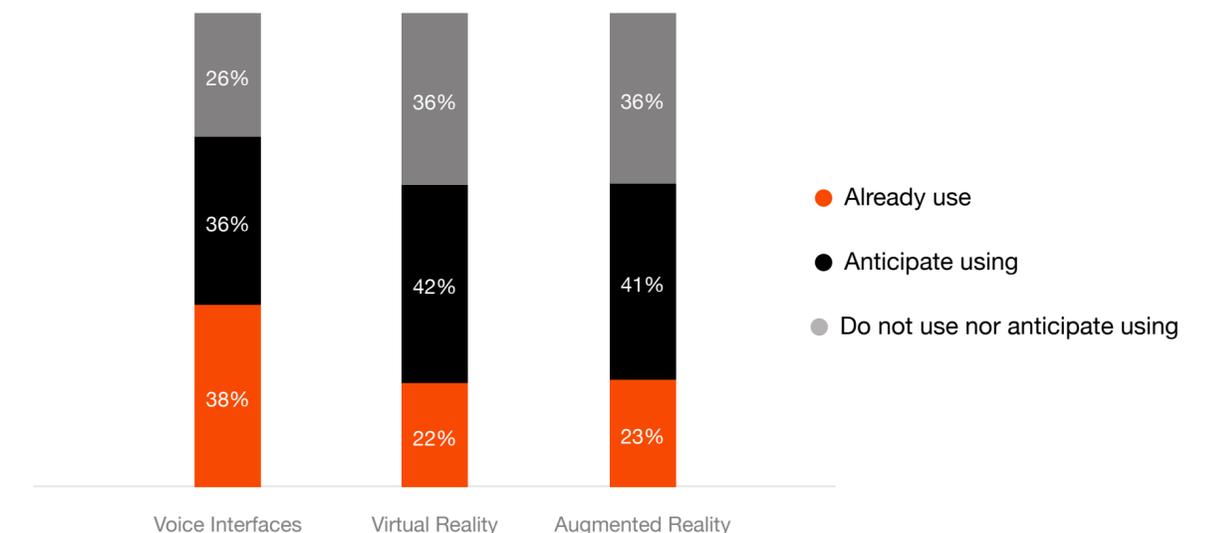
Until this year, the best VR systems all had cords, and it was nearly impossible to get rid of them without negative side effects. This is rapidly changing as fully untethered, wireless headsets come to market like the recently released Oculus Quest and HTC Vive Focus Plus.

Upgrades to existing Oculus Rift or HTC Vive headsets are also now an option with a new wireless adapter from TPCAST, eliminating the need for cables. Qualcomm is expected to debut a headset in Asia later this year that can be used as a standalone unit or connect wirelessly to a PC.

### Friction fallout

From higher than desired latency to being tethered to a device, the user experience for VR has had multiple challenges. Whether a smartphone or PC is used for VR, the user must commit to the experience on that device, and therefore preventing it from any other activity. In addition, the need to be tethered in place or moving to a specific physical location (where the PC is located, for example), or adding additional devices for optimal encounter (like adding a headset, docking a phone to prevent battery depletion), make the experience far less than ideal.

### What emerging technologies do you already use and anticipate using to deliver a better Customer Experience?



## Consumer adoption of VR

Without more and varied types of VR gear to choose from and experiences to discover, many consumers are biding their time before investing in another expensive early generation technology.

**We expect consumer interest to hold even among early adopters and grow slowly but steadily with new users as more applications become available and the cost of entry decreases.**

We've seen regular bursts of VR uptake due to the consumer novelty of trying low resolution and low cost 3DOF VR for the first time. But these spikes in demand tend to fade quickly as the novelty wears off.

Many early adopters of 3DOF VR who were exposed to the much higher resolution and frame rate 6DOF VR with the HTC Vive and the Oculus Rift, realized how lacking their 3DOF systems were. Once they discovered the cost to upgrade their VR rig was \$3,000+ USD for the headset and the PC and GPU, they decided to stick to their consoles and PC 'flatscreen' games instead. Breakthroughs in VR hardware are being introduced roughly once or twice per year, and with each new product introduction, demand for VR seems to surge.

We believe the next big breakthrough will be 'worldscale' 6DOF VR with the advent of the HTC Vive Focus Plus and the Oculus Quest that hit the market this past April/May.

The cost of these state-of-the-art systems has drastically decreased since 2018 to nearly a quarter of the price, with costs reported at \$799 and \$399 USD respectively. Since 3DOF VR systems are often erroneously categorised together with 6DOF systems, the growth curves have looked artificially bleak. 6DOF systems continue to sell well:

- VR headsets doubled in 2018.
- IDF predicts that 9 million VR headsets will be sold in 2019 (54% yoy growth).
- The total number of active VR users was expected to reach 171 million for 2018.
- Standalone VR headsets will take over.
- Sony has sold 4.2 million PlayStation VR headsets.

We expect total daily active 6DOF (roomscale and worldscale) users to nearly double due to continued adoption of tethered systems as well as the advent of many new standalone VR models in 2019 like the HTC Vive Focus and Oculus Quest. This is supported by the [International Data Corporation \(IDC\)](#) prediction that sales of both VR/AR headsets will increase more than 54.1% in 2019 compared with last year.

## The AR landscape

While 6DOF VR continues to experience steady growth, AR capabilities on mobile phones increased dramatically in 2018. AR was enabled on 500 million devices worldwide in 2018 with more than 2,000 apps available to download and the number of smartphone users is forecast to exceed 2.7 billion in 2019.

Nintendo's Pokemon Go, holds the record with a reported 1 billion downloads since its 2016 release and 12 million daily active users as of April 11, 2019. The majority of the success of the original Pokemon Go was due to the novelty of geolocation gaming mixed with a prestigious global brand. In fact, the first, and most successful, version of Pokemon Go didn't even make use of modern 6DOF tools such as ARKit and ARCore.

The main limiting factor that is holding AR back seems to be a lack of commitment from brands aiming to repeat or exceed the success of Pokemon Go. Many brands are waiting for smartphones to improve to enable AR games to be more feasible in terms of storage and battery demands. There is also a possibility that consumers simply won't tolerate the relatively tiny field-of-view that is intrinsic to smartphone-based AR. Only AR HMDs (MR headsets) can solve this problem. The much anticipated Harry Potter: Wizards Unite AR game was released recently, co-Developed by WB Games San Francisco and Niantic, Inc. (the creators of Pokemon Go), initial reviews are enthusiastic and the experience is one for brand marketers to watch.

Thousands of consumer brands are adapting AR for multiple uses in a variety of interesting apps designed to connect, collaborate, and coach customers.

Vuforia Chalk provides users a link to remote service repair personnel to fix problems together, SunSeeker Sun Tracker Compass uses an AR camera 3D view to determine the solar path at any given day, time or location, IKEA Place enables the placement of the popular Swedish furniture in a user's own location to 'try before you buy,' and Dance Reality takes the embarrassment out of trying new dance moves with virtual dance lessons. Leveraging AR for innovative and immersive brand engagement is limitless, industry-agnostic and in its infancy. Google has recently announced AR enhancements to both Google Maps and Google Search. In Maps, it will superimpose walking directions over real-world streets via the user's smartphone (available first on Google Pixel.) The enhanced features of Search will enable a user to view found items alongside another in AR, such as the perfect side table paired with a particular lamp, a pair of shoes and trousers etc.

### Magic Leap

The boom-bust cycles of 3DOF VR, 6DOF VR, smartphone AR, and 360 Video can be used to predict the bursting of the hype bubble when it comes to the Magic Leap HMD (and its closest competitors). While the Magic Leap One headset is more compelling than anything else on the market today, it was nearly impossible for it to live up to the years of hype it received as VC investments added up to over \$1 billion over the years. Only a few thousand Magic Leap HMDs have been sold to date, but this was deliberate as the company tries to overcome the chicken-and-egg content problem. The Magic Leap One Creator's Edition is available for \$2,295. The question is, what will the final price point be on the larger commercial release and will they have enough buyers at that price? The greatest challenge for Magic Leap One right now is the necessity of building a developer ecosystem. It's recent partnership announcement with NTT Docomo, Inc., Japan's largest mobile operator, and United States AT&T flagship stores in Boston, Chicago and San Francisco may help pave the way to greater adoption.

## Mobile VR

Wireless, standalone powered and/or phone powered

- 

**Google Cardboard**  
Free to \$15 + phone
- 

**Google Daydream**  
\$69 + phone
- 

**Samsung Gear**  
\$30 to \$50 + phone
- 

**Oculus Go**  
\$199 to \$299
- 

**Lenovo Mirage**  
\$399

## Premium VR

PC powered Wired or Wireless

- 

**Oculus Rift-S**  
\$399 to \$499 + PC
- 

**HTC Vive**  
\$499 + PC
- 

**Valve Index**  
\$999 + PC
- 

**Samsung Odyssey**  
\$299 + PC
- 

**Sony Playstation VR**  
\$199 + PlayStation 4

## AR

- 

**iPhone by Apple**  
\$650 to \$1,000
- 

**Android by Google**  
\$500 to \$1,000
- 

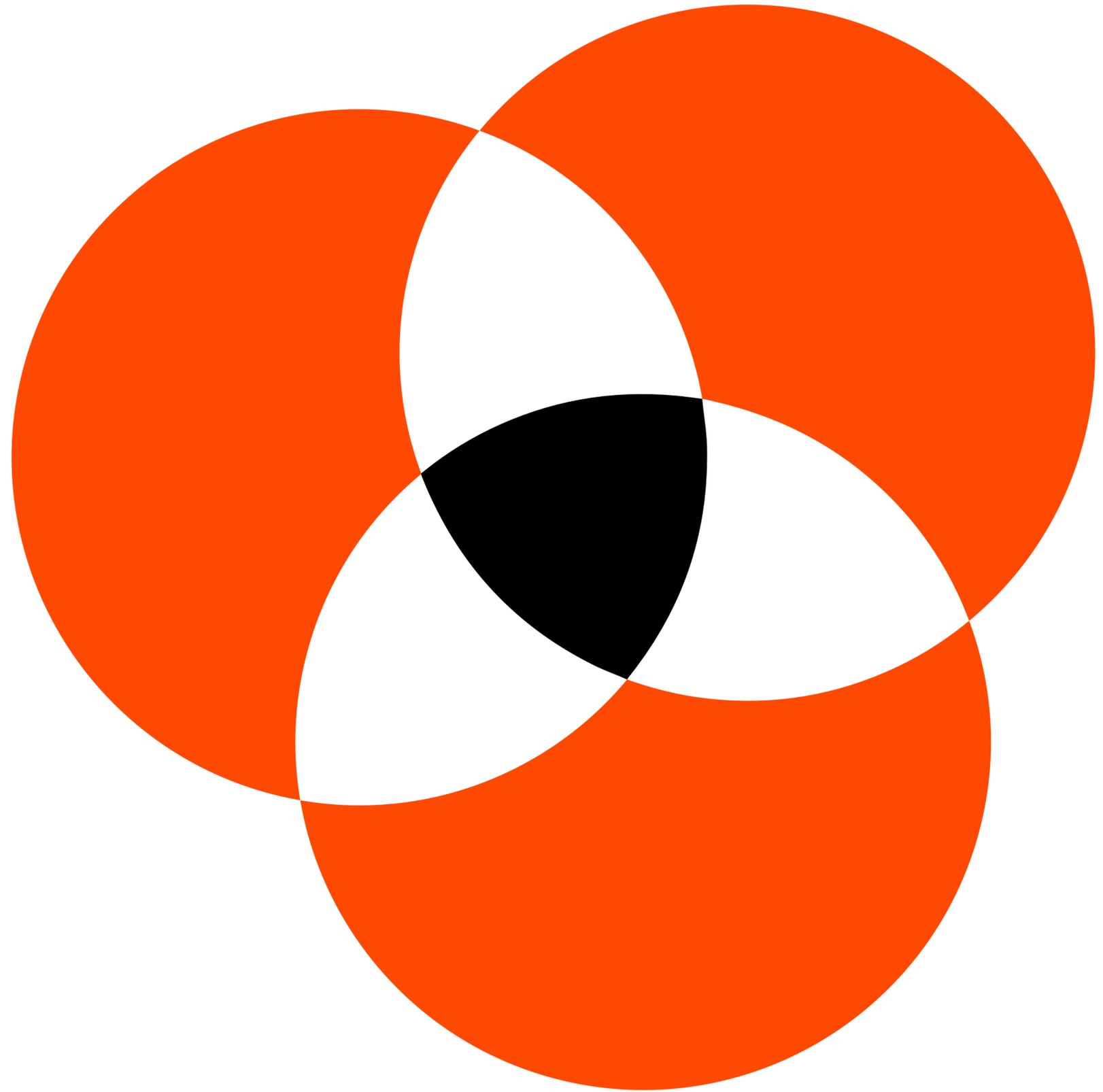
**Hololens 2 by Microsoft**  
\$3,500
- 

**Magic Leap One**  
\$3,000
- 

**Lenovo Think Reality A6**  
N/A

# 03

## XR in action



## XR in creative storytelling

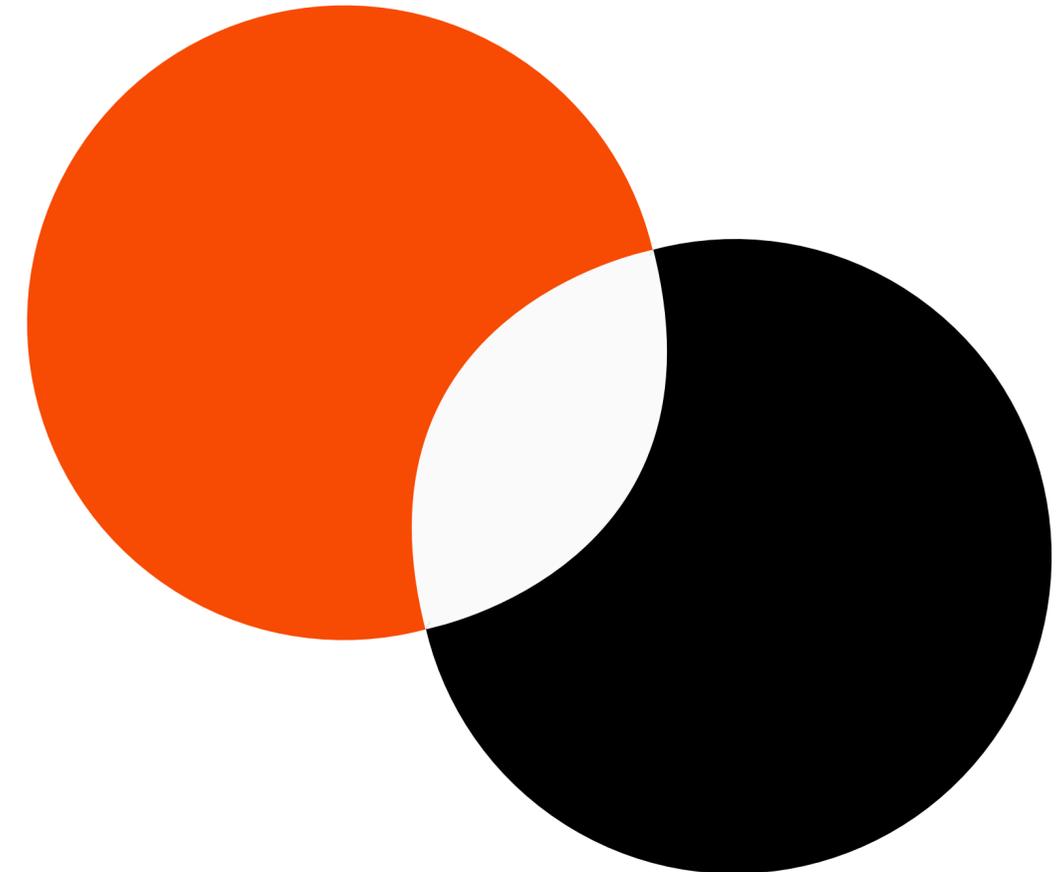
The magic of these immersive experiences is in the stories they tell and how they resonate with users. The connection between the tech and the tale, executed through high quality content and well-designed interaction, can result in stronger brand engagement and increase sales. There are a number of factors to remember when creating content specifically for XR experiences:

- Episodic: Great narratives should it captures the user's imagination over time.
- Interactive: The user is the protagonist, shaping their own story.
- Non-linear: Rich content takes the user on their own unique, personal journey.
- Crafted: The content is high quality, immersive, and captivating.
- Connective: it offers the potential for deep and meaningful connections.

In the future, machine learning models and smart applications of AI tools will be able to start to understand how we individually interpret and react to content. Eventually this will lead to an autonomous content created through the elements of the world around you with content will be able to 'learn' and 'see' for you.

This means that as the content becomes more aware it will be able to gain a better context of your environment and people and things within it and will accommodate personal preferences. Based on a wide range of factors, you will receive a customised experience designed specifically for you down to a neurological level.

For example, your GPS system will learn that you always change your driving route to the fitness centre during a certain time of day, by passing the traffic. As you drive, it will be aware of this preference and modify its driving instructions in real time. Or, your favorite grocery retailer app will take note of your favorite foods, anticipate how often you eat them, and remind you when it is time to replenish your supply, offering 'just in time' special adverts and coupons to encourage a purchase.



## XR in CPG



### Coca-Cola BVRAIN

Coca-Cola's 'Taste the Feeling™' moniker was taken to the big screen in a project designed to boost pre-movie refreshment sales by encouraging people to arrive early. 'Taste the Movies' project involved the creation of a virtual reality/brain sensor headset – nicknamed the 'BVRAIN' – that guests wore to watch movie trailers. The VR viewing capability was coupled with brain sensing technology, monitoring brain activity and recommending the perfect Coca-Cola Freestyle flavour to match their movie preferences and emotional responses. Once people had completed the experience they could scan a QR code to receive their perfect recipe in the social messaging platform WeChat.

The creative use of technology transformed movie-goers' thoughts into reality, boosting beverage sales in the process – with 90% of those participating purchasing the recommended soft drink.

## XR in Retail



### Foot Locker

Foot Locker wanted to integrate a new AR functionality into their existing mobile app—allowing them to offer customers exclusive content and experiences timed to limited-release product drops. Foot Locker launched an AR scavenger hunt coined 'The Hunt,' timed with one of the most anticipated shoe drops of the year — the new LeBron 16 King 'Court Purple' sneaker launch. To celebrate LeBron's regular season debut as a Laker, we offered sneaker-obsessed consumers in Los Angeles a chance to be one of the first to buy a pair.

But instead of camping out in line for their kicks, fans were invited to engage in 'The Hunt,' using their newly updated Foot Locker app to unlock geo-targeted AR clues throughout the city, eventually leading them to the coveted limited-edition LeBron's. The actual clues were influenced by perceptual art and featured three dimensional AR installations inspired by the newly minted Laker. Hundred's participated and the shoe sold out in less than 2 hours.

## XR in Entertainment



### Aeronaut

New technologies have transformed the creative landscape – from how we design new experiences, to how we consume content, technology is augmenting our experience of music. Musician and artist, William Patrick Corgan wanted to debut his 2017 solo album ‘Ogilala’ with a launch that could support his creative vision.

He created ‘Aeronaut’ a first-of-its-kind VR experience that could bring his unique visual art to life, helping fans experience music in an entirely new way. The work was awarded the Grand Prix for Digital Craft at Cannes Lions 2018, led to Isobar being named to Fast Company’s Top 10 VR/AR company for 2018, and was the Webby People’s Voice Winner in Advertising, Media & PR: Best Use of Animation or Motion Graphics.

## XR in Mobility



### Chevrolet CoDriver

CoDriver is a multi-sensory activation that showcased the features of a vehicle through virtual tours of Dubai, New Zealand, and Australia.

To generate attention, inspiration, and curiosity for GM vehicles and showcase the true performance of models, CoDriver enabled people to experience the car in situ through a connected VR experience. CoDriver features rich storylines that traversed some of the world’s most spectacular landscapes, from New Zealand’s South Island, to the rolling sand dunes of The United Arab Emirates. Shot with a 3D-printed GoPro sphere mount, the footage was combined with advanced audio equipment to capture atmosphere and vehicle feedback - so each user got an individualised experience of the car - just as they would on the road.

## XR Personal Care & Cosmetics



### Royal Philips

The Philips Beard AR 3D Grooming App is a real-time innovative AR service that uses facial mapping to enable consumers to try on a range of fashionable beard styles. An advanced algorithm scans and analyses the user's face to generate one of 20 photorealistic virtual beards, demonstrating how the style would look fit the user's facial shape and personality. Once the perfect beard is selected, user's can receive tips on how to style it correctly. Or, if the clean shaven look is preferred, the app provides tips on getting perfectly stubble-free.

In addition to AR, the service creates a customised interactive grooming routine and personalised advice with AI-enabled facial analysis to assist men on an on-going basis, track a user's progress, and provide tips and tricks on maintaining the desired facial style through interactive tutorials.

## XR in Education



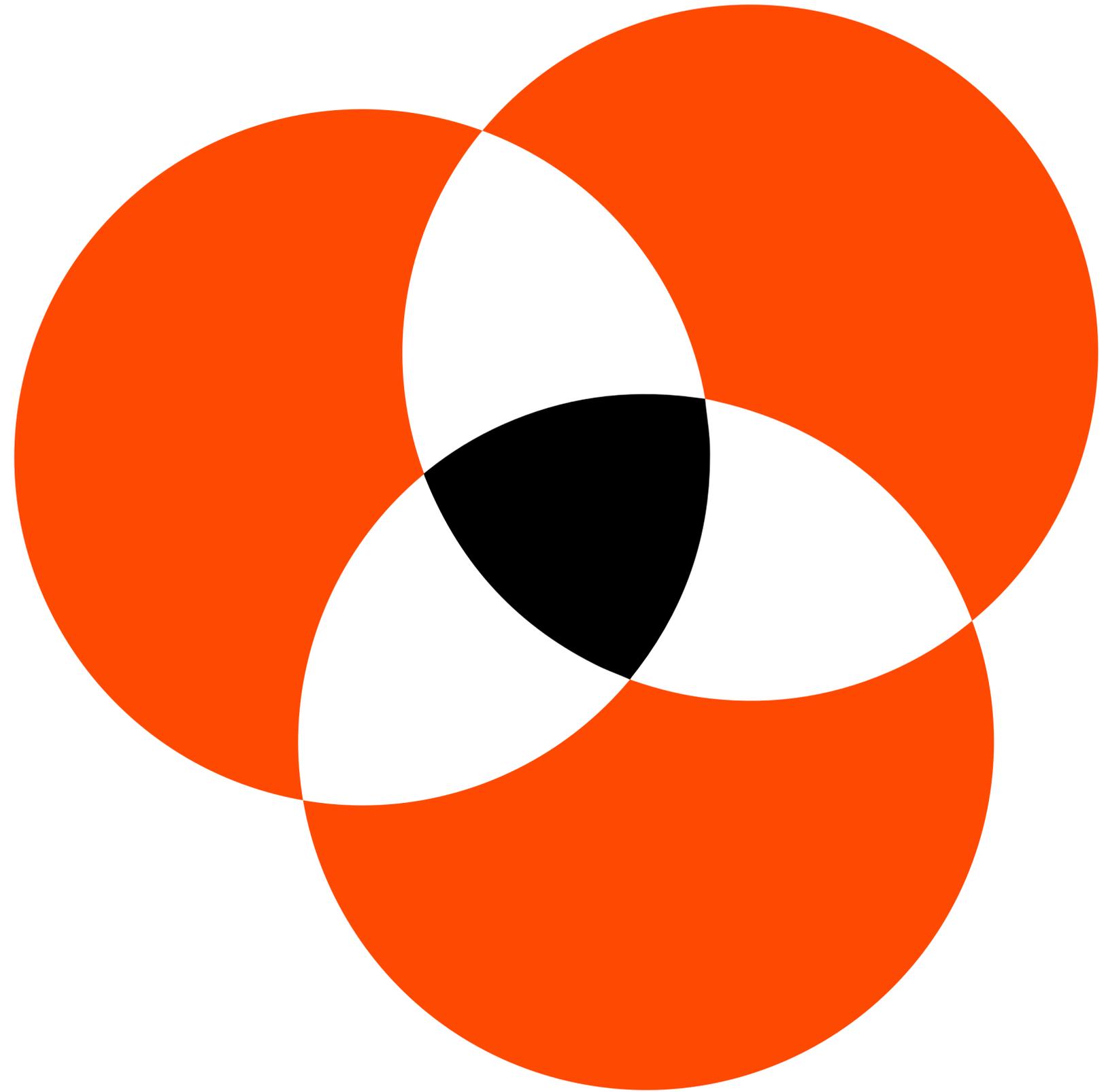
### Ngarandi

An Australia-first augmented reality app Ngarandi is bringing cities to life through the stories of Aboriginal history, was released in the lead up to NAIDOC Week.

The app was created in response to findings from Indigenous Business Australia which revealed a decline in participation in Indigenous tourism experiences as a result of individual's inability to find the appropriate information and a belief that in metropolitan regions, these experiences simply do not exist. Voiced by former chairman of Indigenous Tourism Australia, Dr. Aden Ridgeway, Ngarandi presents two gamified experiences derived from the stories of the Eora people, the traditional owners of the areas around Sydney.

# 04

## Extending CX & Commerce



## Extending CX & Commerce

As we approach 2020, there is a great deal of activity in the AR/VR industries related to commerce and how brands can find new ways to encourage customers to transact through experience, leading to new patterns and behaviours across the commerce landscape. Extended reality provides an entirely new set of tools that can be leveraged to change the way we think about commerce, from finding new products and services, through produce education, comparison and off to purchase.

We see great opportunity for AR to influence the way that people reorder the products that they are loyal to. This changes commerce from an activity to more of a behaviour that naturally rides along with ongoing experiences that they are engaged within virtual spaces and digital bubbles that wrap our existing physical world.

2019 saw the advancement of core technologies intended to make augmented reality experiences easier to produce and distribute. Apple's ARKit and Google's ARCore are both now ubiquitous tools for development of these experiences, each making it easier for brands to bring AR apps to consumer devices. In addition, there have been major advancements in Web-based AR, leaving glitchy performance and huge downloads as a remnant of the past.

As we look more broadly at the evolution of XR, we can not escape the fact that its AR and VR building blocks are moving from a state of novelty to that of adding real value to both BtoC and BtoB commerce. If there is any place outside of marketing engagement where AR is seeing the most movement at this time, it is in retail and consumer-facing commerce applications.

Across the industry, from small retailers known for taking risks to massive commerce players like Amazon, Walmart and IKEA, there is a great deal of innovation and investment happening in XR. In addition, we see weekly movement in the investments made in consumer AR applications by product companies and brands. Retailers are smart to adopt this technology: According to research from Digital Bridge, roughly 70% of consumers expect retailers to launch an AR app within the next six months. Further insights from Google show 34% of users say they would use AR while shopping, and 61% say they would prefer to shop from stores that offer AR.

**Together, all of this indicates consumers are ready for more and that we've hardly yet tapped into their expectations of what future experiences can offer. In terms of XR in commerce, AR is clearly leading the current wave of innovation.**

## Experience from the inside

Consumers find value in AR and the additional content that we bring to them through finely crafted AR experiences intended to enhance their brand and shopping experiences. The value of having more (and more accurate) context has been well established as a primary benefits of XR, primarily AR. This is loud and clear when we provide users the ability to bring digital assets and information forward to augment the things in the world around us and to enhance our physical environments outright by inserting completely virtual 3D content into them.

But this doesn't only apply to consumer retail per commerce use cases. In fact, the real growth ahead might be on the BtoB side, giving retail store associates, merchandising professionals and others that work across the retailers and brands powerful, visually rich new ways to go about their jobs, ensuring that the customer experience transcends what we are capable of offering people today.

From product design collaborations through to in-store merchandising and one-on-one customer hand-holding in retail establishments, there are hundreds of places where augmented and mixed reality may land to create operational efficiencies. Let's not count virtual reality out either. The last year has seen a revolution in how the technology can be used to better train retail employees, evidenced by things like Walmart's distribution of roughly 17,000 Oculus Go VR headsets to stores and learning centers.

Our expertise in commerce and customer experience see the application of VR as an exceptional way to assist retailers with:

- **Sales Training:** How can you validate that employee have the right sales acumen to do their jobs, and help them where they might fall short? VR content experiences have been proven to be very effective at enhancing the effectiveness of this important job function.
- **Simulating Stress:** There are those things that nobody wants to think about, but that everyone should be prepared for - from belligerent customers to theft to chaos erupting due to "Black Friday" sales, VR simulations are able to help employees understand how to best handle things in a safe, efficient and effective way.
- **Customer Experience / Service and Support:** When on boarding new employees in retail, sometimes there is a trade-off that is made to the experiences of our customers while be bring new associates into the fold. VR training can eliminate this by allowing new staffers to learn the ropes virtually before stepping onto the floor where real customers' expectations might not be met due to interactions with untrained workers.

## Experience from the inside

From the perspective of Augmented and Mixed Reality, there are numerous emerging uses that both create new ways of working as well as enhance existing processes with the inclusion of spatial awareness and contextual content. When customers enter a retail store, they expect things a certain way, and a key element of these expectations is product availability and fundability on store shelves. In fact, research conducted by Harris Interactive concluded that more than two out of three (68%) of U.S. adults would avoid shopping at a particular retail store if they encountered empty shelves and 63% would move on from a retailer if their desired items were out of stock.

By providing next-generation software tools to both brands doing retail merchandising and store associates responsible for keeping items on the shelves, the potential impact to in-store experience is huge. Retailers have been collecting data on shopping behavior for years, but using that data in a way that allows store managers or their employees to make actionable decisions in real-time has been aspirational. By incorporating that data into augmented or mixed reality applications used by store employees, the chances that products are where customers expect them to be can dramatically increase.

Having a retail environment where the shelves are stocked, items are findable and things are nice and tidy are all elements that establish trust between shoppers and the brand and it has been established that well-trained store associates are also a vital element of the customer experience. When we think about the future, we have to also mention that we aren't far away from application platforms that provide real-time, augmented capabilities to those store associated when dealing with customers.

There have been various concepts related to this - all providing an ability for employees to be able to engage with customers in the same data-fueled, intelligent way that an e-commerce Web site or mobile retailer app experience can.

The technology is not the barrier to this becoming common amongst large retailers. Rather, we still have human preferences and attitudes that hint that such systems might not be so well received. There are still social barriers that need to be overcome before the average consumer is accepting of computer-assisted humans: retail employees that are all-knowing due to some wearable device that can surface the name, preferences and patterns of customers. It all sounds like something from an episode of "Black Mirror", and perhaps that's where it should stay, given the distaste of too much technology in otherwise human experiences. There's something to be said for the unassisted dialogue between retail associate and a shopper that needs help.

"The future of retail and brand advertising is immersive. This effort promises to create a global infrastructure for consumers to discover and explore products by interacting with them virtually before purchasing, via real-time 3D graphics and virtual and augmented reality. Unity is excited to be part of this initiative to build the future of commerce in 3D."

- [Tony Parisi, Head of AR/VR Ad Innovation at Unity Technologies](#)

## Moving outside of the box

The last several years have revealed monumental changes in retail transformation. With the rapid growth of eCommerce, spearheaded by tech giants like Zappos, Wayfair and Amazon, retail has become as much an online experience as a physical one, and that's true across the globe as more and more consumers become accustomed to buying through digital experiences.

It is estimated that by the end of 2019, 1.92 billion people in the world will be regularly shopping online and it is expected that this will simply continue to grow as emerging countries leapfrog today's web and wired connectivity as they move towards 5G enabled mobile experiences. This transformation in commerce combined with the ongoing improvements in mobile phone cameras, sensors, screens, batteries and processors means that, outside of the confines of a retailer's physical store, there is a massive opportunity to bring new forms of commerce experiences to shoppers, and XR is one of the primary enabling technologies to do this. Today, most of the innovation in augmented reality is being applied to commerce. There are hundreds of startups working to create scalable AR solutions for brands and retailers and they range from virtual try-ons of clothing and accessories to augmented "try-ins", placing photorealistic 3D models of products in one's home to see how things look and fit before they make the decision to purchase.

The barrier to these types of experiences scaling across retailers and consumer markets has less to do with the desire by shoppers and more to do with the cost associated with content production, the challenges current eCommerce or enterprise content management systems have handling 3D content and the need to perfect the user experience of AR applications to make them frustration free and easy for any virtual shopper to use.

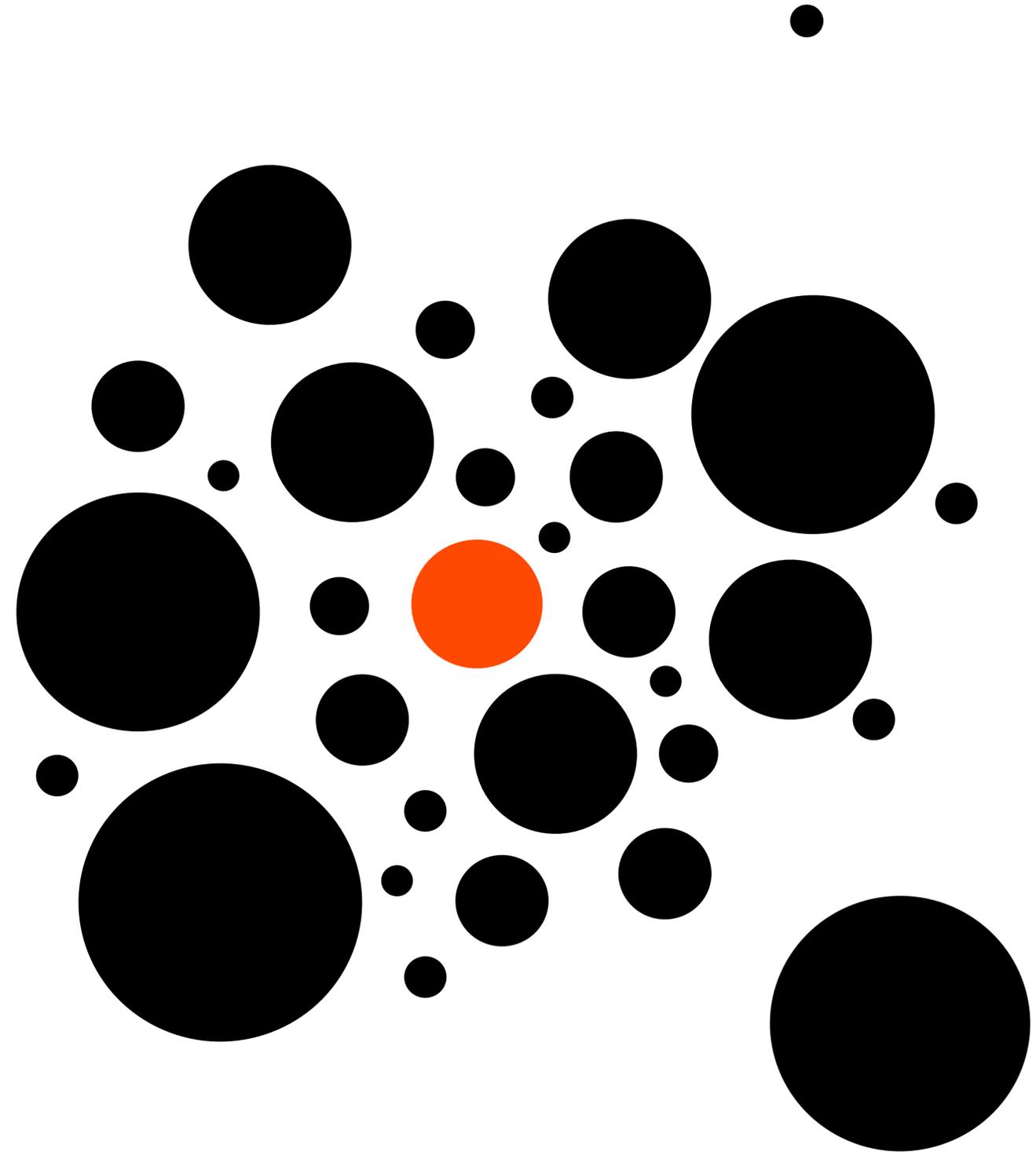
These factors have led to an explosion of startups looking for solutions that they can sell to large retailers and brands, while at the same time seeing innovation teams at those brands and retailers, along with their agency partners working with the businesses to also determine where and how to innovate against the opportunity to bring commerce into the future with XR content and experiences. Just as we've recognised that lackluster in-store experiences turn customers away, the same can be said for digital. Poorly designed applications that don't meet the expectations of consumers along with bad performance and less-than-real 3D models offer challenges to the progress we've seen to date.

Rest assured, these challenges are not without solutions, and the industry at a whole recognises what must be done. One major development has been the formation of a working group with members from across the technology and retail landscape. Organized by Khronos, the 3D Commerce Working Group's charter says it all: "The 3D Commerce Working Group will create specifications and guidelines to align the 3D asset workflow for online retail from product design and manufacturing, through each stage of retail to end-user delivery, so that 3D representations of products can be experienced realistically and consistently across all devices." This group's members include Amazon, Shopify, Adobe, Lowe's, Unity, Microsoft and other major players in retail, eCommerce and technologies used to bring eCommerce experiences to consumers. As they continue to work together to iron out scalable solutions for 3D content creation, optimisation and delivery, there is also a lot of momentum behind evolution of other key elements of commerce such as payment processing and experiential aspects such as social-interaction inside of extended reality experiences, including collaborative product search, virtual trials, and sharing.

“Our ability to experience products virtually prior to purchase is unprecedented and, over time, will become part of consumer expectations.

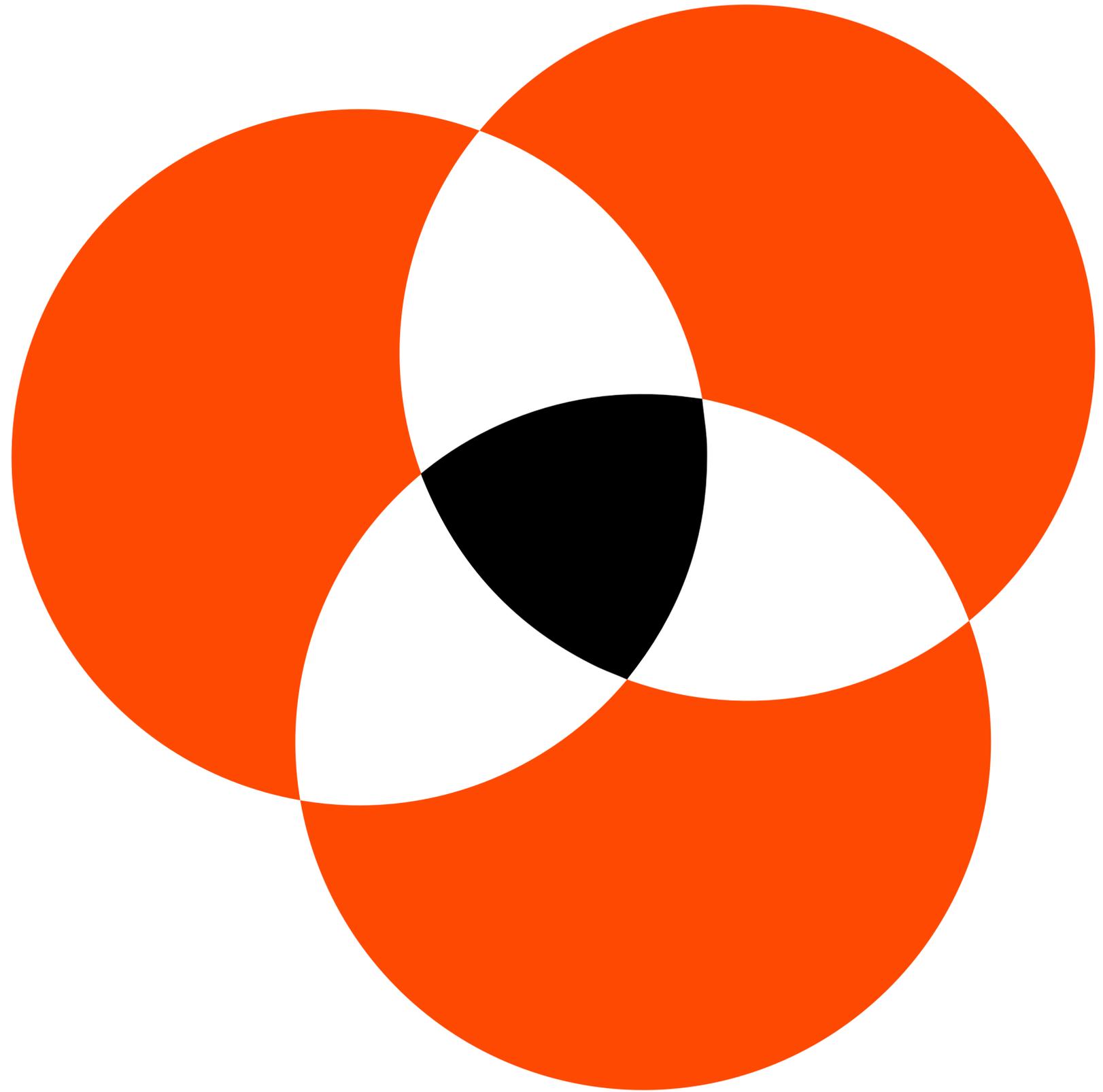
This is not a solution looking for a problem, rather we find ourselves with a new set of capabilities that improve upon existing shopping patterns and fill the gaps in the purchase journey.”

- Dave Meeker, Chief Innovation Officer, Isobar US



05

B2B XR



## B2B XR

While consumer VR/AR is moving into the mainstream, enterprise XR is well on its way to establishing its position in the marketplace. In fact, Gartner predicts that 20% of large enterprises will adopt immersive technologies this year.

At the head of the pack for developer tools is Unity Technologies, which is best known for its gaming engine. Fast Company named the organisation #1 most innovative company in the enterprise sector for 2019. Last year, Unity leveraged its technology for non-game purposes expanding its software into new verticals such as automotive, film, architecture, engineering, and construction.

This advancement in Unity developer tools means a greater capability for enterprise across myriad industries to optimize XR for a wide variety of purposes: research and development; visualisation; modeling; product design; manufacturing; recruitment, training and knowledge-sharing, and much more. An example of this at scale is Microsoft being awarded a \$480 million USD HoloLens deal with the United States Army. The contract is for the purchase of prototype AR systems for use in combat missions and in military training and could lead to the purchase of more than 100,000 HoloLens 2 headsets. While Google Glass was panned after its public launch in 2014, the company has reworked the technology and in late May released the AR Google Glass 2 for Enterprise to very favorable reviews and a price tag of only \$999 USD, one-third of the cost of earlier versions. The expanded Oculus for Business is scheduled for release this autumn, with a suite of products and improvement to the Oculus Quest hardware. Forrester Research predicts that more than 14 million U.S. workers will be using smart glasses in the next five years with expenditures by large U.S. companies reaching \$3.6 billion by 2025, compared with just \$6 million USD in 2016.

**XR has the enviable opportunity of revolutionising nearly all aspects of business from operational process improvement through the entire lifecycle of product and service design and delivery to market adoption, employee training and consumer acceptance.**

Any way people interact with each other, machines, or data can be enhanced via XR and often at a significantly reduced cost.

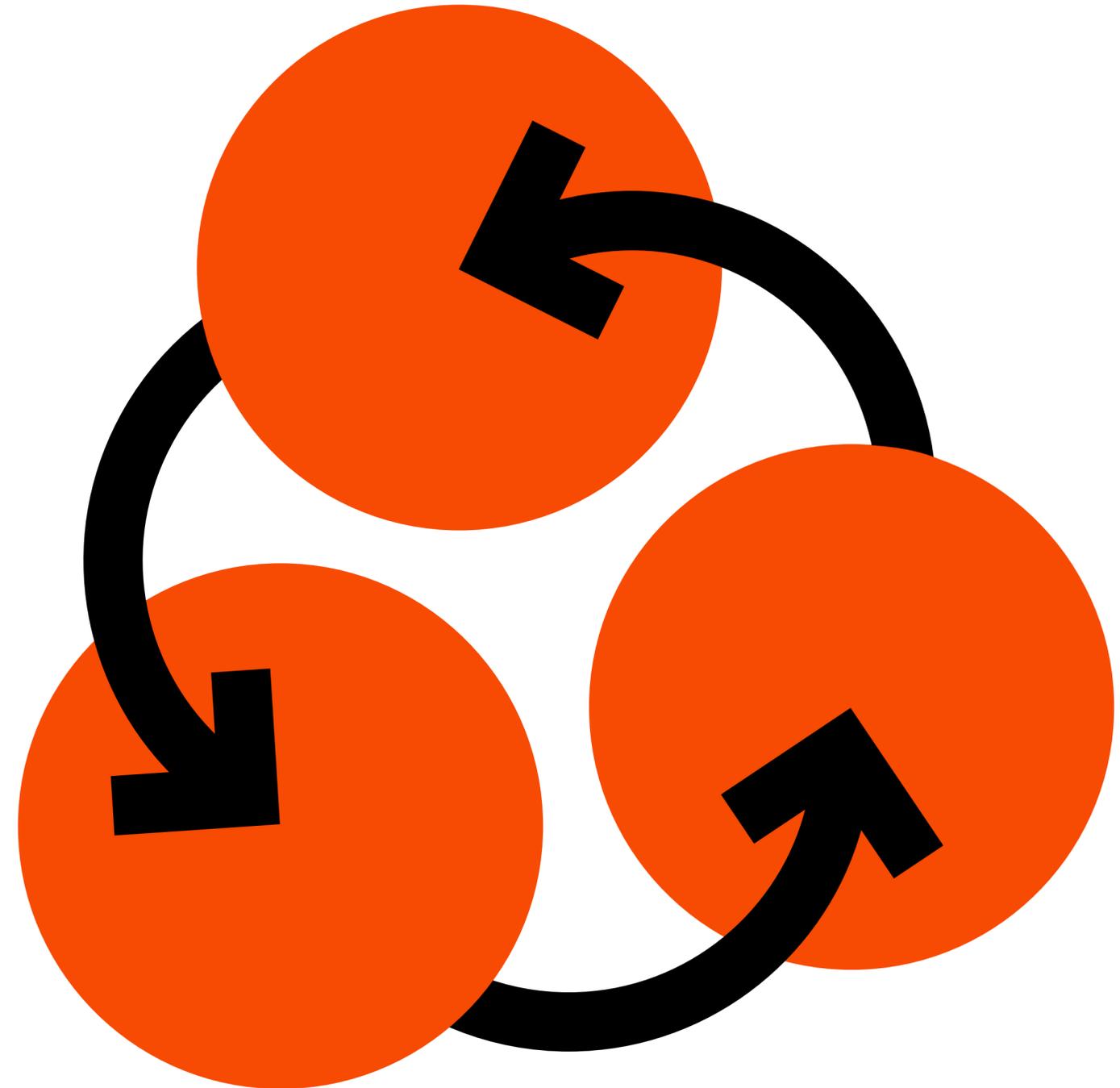
While consumer XR is still in proving mode, there are various examples of where enterprise uses of AR/VR are being recognised for a return on investment, including success stories at Walmart and Lockheed Martin. As with any emerging technology at this stage, XR applications are generally single-point solutions that solve for specific use cases. They do this well, but outside of any sort of ecosystem and primarily in proof-of-concept or pilot mode at this time.

To gain further traction in B2B / enterprise scenarios, scalable ecosystems must begin to thrive and while we will likely see emerging technology players make moves into this space, many eyes are on existing enterprise players like Microsoft and Adobe.

“Enterprise XR is going to need to see various things happen to become ubiquitous.

We have to standardise 3D content, which is a movement that is currently underway, as well as provide better tools to author and deliver experiences to users. We can't embark on a custom development project every time a new use case is identified. Microsoft has been leading the way with some of its authoring tools, and we expect other hardware and software platform companies to follow suit in the next year.”

- Dave Meeker, Chief Innovation Officer, Isobar US



## Enterprise adoption

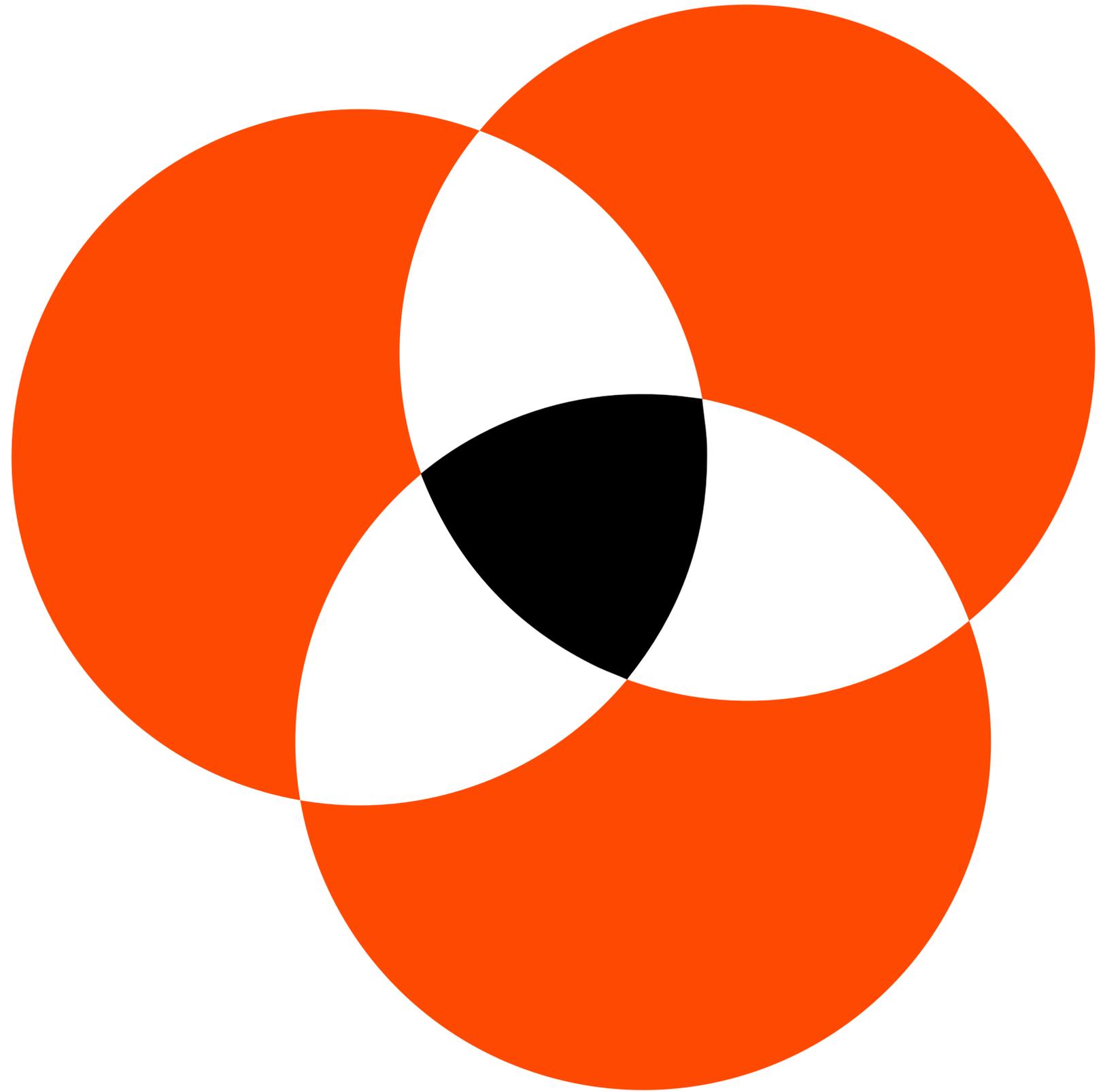
As more advanced mobile devices with better cameras and spatially-aware sensors come into play for enterprise users and as mixed reality headsets continue to evolve, expect to see more champions across the fortune 1000 adopting XR to improve contextual awareness, mobile intelligence and overall operational efficiency. However hardware alone isn't going to be enough.

### Keys to enterprise adoption of XR:

- **Asset creation / capture:** The creation of 3D content is key to enabling XR experiences. While some experiences will simply overlay 2D content onto a view of the 3D world around a user, the future of enterprise content experiences will leverage 3D content. There are many different approaches to this today, from standard “At-the-desk” 3D content workflow production where fully digital assets are created to tapping companies like Autodesk and Intel that are pushing things forward with 3D scanning and photogrammetry/volumetric capture technologies.
- **Content management:** Much like the Web, enterprise adoption of Web applications grew exponentially when secure, scalable content management platforms entered the picture in the early 2000's. Expect to see more integration of 3D content into existing major players in enterprise CMS and also the emergence of some new players that are focused solely on enabling spatial computing. This includes not just content approval and asset storage, but also the ability to attach XR content to places and objects, breaking content away from the flat 2D screen and moving it into the world around us.
- **Experience authoring tools:** Perhaps with some overlap (and certainly integration) with enterprise content management is the necessity to provide experience authoring capabilities to workers outside of sophisticated software development teams. New tools will enter the marketplace that allow for visual authoring of XR experiences, speeding time to market and reducing the cost of publishing new solutions. One approach to this is tight coupling of hardware and software experience authoring as demonstrated in Microsoft's “Dynamics 365 Guides” tool which is used to quickly create content that can be easily deployed to users of the Hololens 2.
- **Measurement and optimisation:** There is no doubt that adoption and ongoing success of XR will require ongoing measurement and optimization of content and experiences. This offers some unique new challenges given new types of data that can be captured as part of a user's experience in 3D space and with 3D content.

# 06

## Measuring XR effectiveness



“Emotions provide the energy behind virtually every behaviour people engage in, every day of our lives. And emotions are tricky to measure.

For VR to power anything, including commerce, we must measure in-the-moment emotion. Brands that invest in VR now can have precise and sensitive methods that measure stumbling blocks and successes without depending on self-reporting, language, cognitive effort, memory, or even users' willingness to give an honest answer.”

- [Dave Meeker, Chief Innovation Officer, Isobar US](#)



## Measuring XR effectiveness

The power of immersive experiences is widely recognised, but brands hesitate to invest without a way to measure its value.

We worked in collaboration with the MIT Media Lab to develop a way to capture and analyse behavioral and biometric data, and understand emotional states created by VR, AR, and MR experiences.

With this foundational research, we advanced our work to include integration with our proprietary [MindSight® tool](#). It uses deep brain activity analysis coupled with eye tracking, facial expression, galvanic skin response (GSR) and heart activity to see how test subjects respond to XR experiences. By recording all the relevant inputs into a time-locked database, deep analysis can be done on the effectiveness and efficiency of this new content to help us further understand emotional responses to content.

For example, we can now measure experiences created in leading game engines like Unity to capture the behaviour of users during their virtual sessions.

A recent example includes the comparative test for Lionsgate's Jigsaw film trailer, pitting a standard 16:9 edit with a fully immersive, VR based, moral dilemma.

Not surprisingly the VR experience trumped the humble film trailer across five key measures, with a staggering 336% increase in emotional valence. This data generated in real-time enables developers and brand marketers to pinpoint elements in the user journey that enhance or detract from the experience and to create a truer ROI based on that experience.

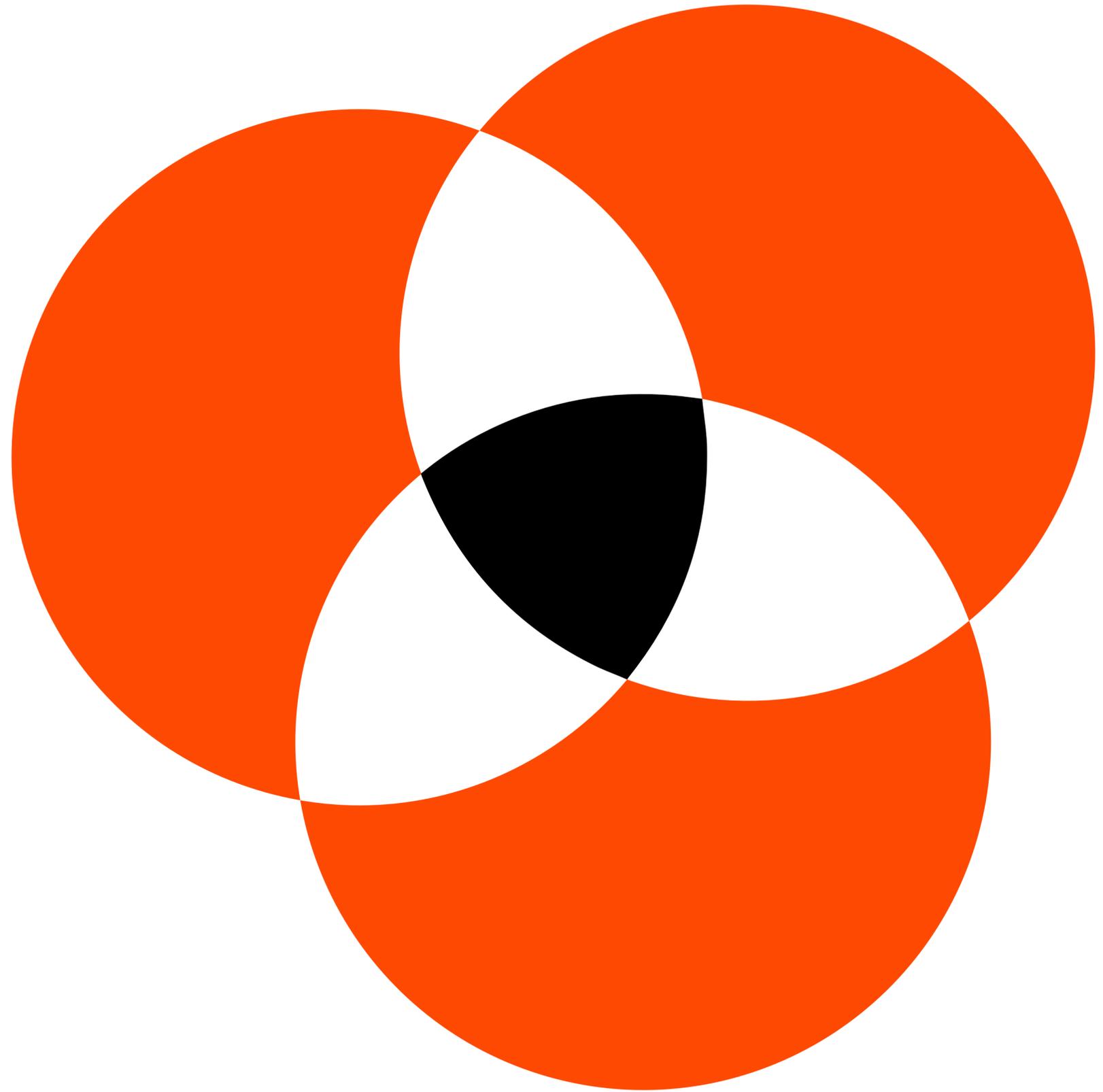
By providing a mechanism to replay behavioral and emotional data captured during VR experiences, the platform enables stakeholders to actually 'go into' the VR application and analyse areas that have stimulated an emotional reaction from the user.

Multiple stakeholders can simultaneously view users' avatars playing back inside the VR session as it was experienced.

- Gender response appears equal. Men and women are similar in terms of their emotional response to triggers. In Isobar's Mountain Dew experience we always see large GSR peaks indicating emotional arousal as soon as the subject realises they are going to skydive from the back of an airplane.
- Multiple metrics are essential. It's important to use a variety of emotional arousal and valence, and to build them into predictive algorithms that summarise emotional states. Without this, you've just got a big pile of data. Certain sensors are better in different situations, eg, EEG is prone to movement artefacts for room scale; facial EMG is less sensitive to detecting emotions, but less prone to artefacts.

# 07

## XR next steps



## XR next steps

Data, Machine Learning and Artificial Intelligence can create truly individualised XR experiences. But where to start?

### Web-based AR

WebAR is exactly as it sounds, AR experiences accessed on your mobile device through your web browser, with no need to download an app or scan a snapcode. An example of this is the recent [RBG for Good](#) campaign which was designed to encourage voter turnout in the recent United States midterm elections.

AR offers marketers a new opportunity to enhance brand experiences throughout the customer journey while changing the way companies operate. It can be an essential solution for nearly any activity that requires people to collaborate and communicate around complicated data sets. From healthcare to product and service design to education and training. However, one of the biggest hurdles for mass AR adoption has been the medium's continued reliance on visual markers like Snapcodes and branded apps to deliver immersive and interactive experiences to users.

For AR to overcome these barriers, it needs to work in a web browser. But despite existing open-source libraries and concerted efforts from leaders like Google and Mozilla, the future of WebAR has been plagued by limitations around performance and features.



### Adverts within XR

We can now insert ads into VR and AR content directly. There are now 8 million 6DOF headsets in use worldwide and anticipates tethered headset sales for 2019 to reach 5 million. Providing these immersive experiences can be subsidized by sponsored content within the games/apps themselves. Monetisation of in-app or in-game adverts is still being strategised, and systems are being currently developed to allow marketers easier access to this burgeoning medium. With realtime data, adverts will continue to become more personalised and impactful as collected user information is used to provide the most engaging and actionable marketing programs for each user.

Isobar worked with Unity, the leading game engine in the marketplace, and Lionsgate Films, to create the first VR-based advertisement for Unity's ad network. We created an experience that we could measure and quantify the investment required by brands who aim to reach the next generation of filmgoers. For [Lionsgate Films'](#) "Jigsaw," the emotional responses to the 30-second VR trailer resulted in a 70% completion rate – 6 times higher than traditional 2D online video trailer.

## What businesses and brands should do next

XR technology provides new opportunities for brands to engage with customers in engaging, innovative, and immersive ways. The promise of the Internet as a communications and branding platform was that it offered brands an expanded canvas to tell their story. XR allows customers to experience the brand before making a financial commitment but fundamentally the power of XR lies in augmenting experiences beyond what was previously possible. Think about how the Aeronaut VR experience augments music - rather than replacing or replicating products or services through headsets.

As barriers to mainstream acceptance of XR continue to fall and the technology becomes a more regular feature in households around the world, brands can't afford to be left behind. XR still represents a considerable financial investment but the experience created can deliver positive returns for the brand as a powerful and effective XR experiences. Fuse a virtual reality emotional measurement and analytics platform—such as MindSight® and other precise methods to help measure ROI from VR brand experiences. Quantifying results is vital to the success of any campaign. If the XR space is to develop further, brands need to solidify this thinking into their projects from the onset.

5 takeaway strategies marketers need to deliver success:

- **Monitor the latest trends.** XR is an area that is rapidly changing. Estimates on growth levels in the coming years suggest that momentum is set to increase wildly. Brands need to constantly monitor the landscape to ensure they are ready to take advantage of new, emerging opportunities.

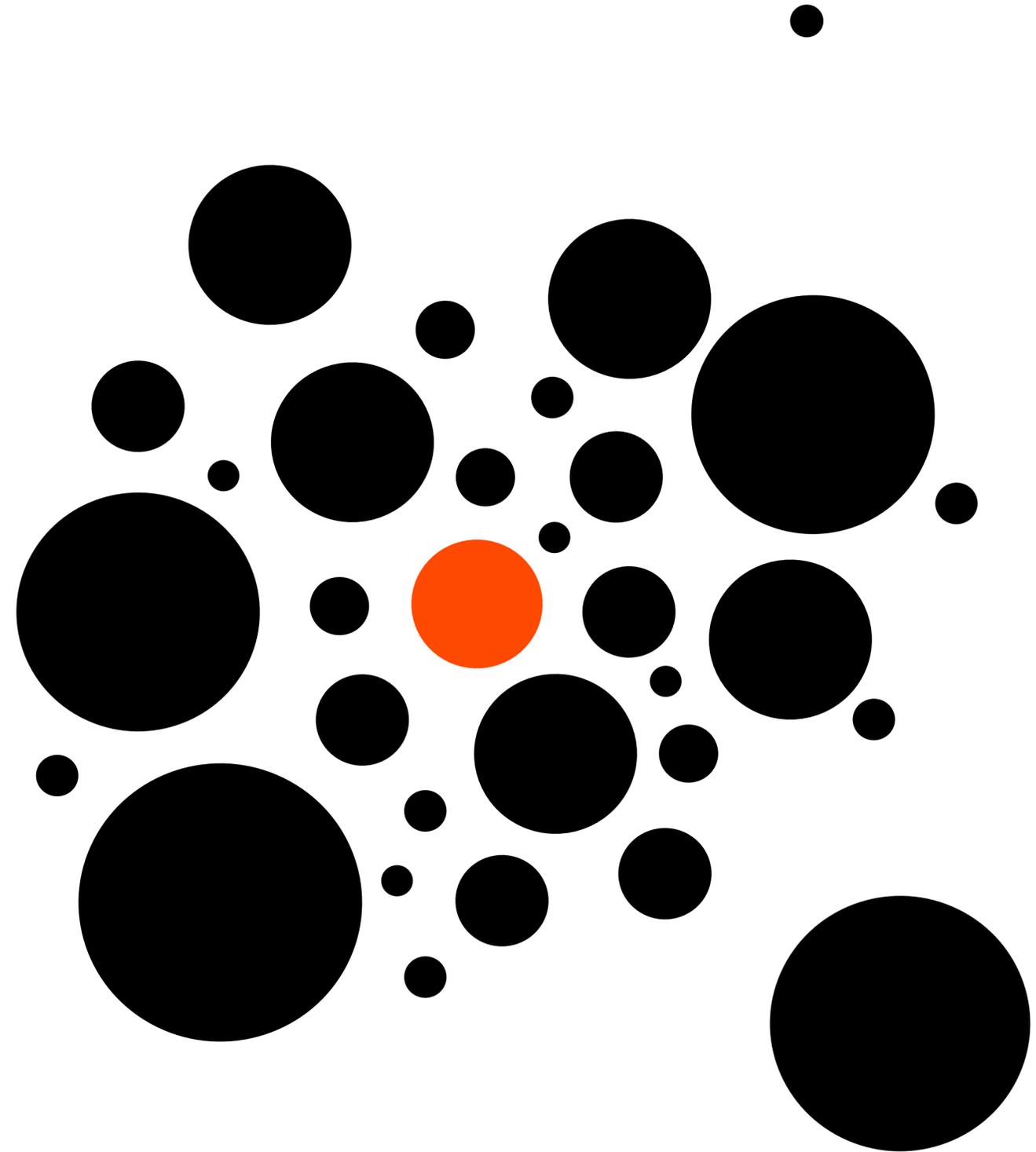
- **Make it a positive and personalised experience.** There is no longer any excuse for producing low standard experiences or make the user feel uncomfortable. There are biometric sensors that detect emotion which can also be used to predict the early onset of motion sickness for example. Developments like this mean that campaigns can be tweaked to ensure they will offer positive experiences that can be personalised using realtime data.
- **Focus on the narrative.** XR is not just about technology. Too often businesses and brands forget that effective content is a hugely important in XR experiences. Creating an engaging narrative is central to ensuring a truly immersive and engaging XR experience. It's therefore vitally important to find a partner who can deliver from a technical and content perspective.
- **Clearly define objectives.** When setting out on an XR campaign, it's important not to be dazzled by the potential of new technology. Setting clear objectives will help to ensure the investment in XR is well spent.
- **Measure effectiveness.** For brands to get the most out of XR experiences, it's essential that they can measure their impact. This means creating appropriate KPIs to generate meaningful measurement and we designing ways to test emerging technology, such as the world's first VR Emotional Measurement tool, so the impact of every touchpoint and experience can be better understood.

## What is Isobar doing in this space?

Isobar provides end-to-end services for VR, AR, MR and XR experiences. We have the ability to conceive, create and manage next generation experiences for custom hardware to highly scalable, lower-tech solutions for the mass market.

We offer story design that resonates with end users, to content production and technology development, through to analytics and optimisation. We create tools and frameworks that help inform and shape our thinking, this includes thought leadership related to content creation and distribution as well as full platform development—such as the world’s first emotional response analytics platform—helping us to quantify the value of the next generation experiences we develop for our clients.

Isobar is at the forefront of VR, working across industries to help define strategic roadmaps for the next wave of training, education, productivity, and consumer-facing digital experiences.



## 3DOF

Three degrees of freedom.

## 6DOF

Six degrees of freedom.

## Ambisonics

Full-sphere, adaptive surround sound format using two or more separate audio channels that captures sound on the horizontal plane as well as 360 degrees around the listener: above, below, behind and in front.

## Artificial Intelligence (AI)

The science and engineering of making intelligent machines by ‘training’ computers to simulate or imitate human behavior such as speech recognition, visual and aural perception, decision-making and language translations.

## Augmented Reality (AR)

Uses real-time data to augment the physical environment using visual or aural resources, overlaying virtual objects (or sounds) onto the real-world.

## Biometrics

The measurement of a person’s unique physical or biological measurements and calculations such as heart rate, body mass index, pulse rate, fingerprints, voice recognition, emotional responses, etc.

## Consumer XR

Content created for consumption by the general public end user as opposed to tools for B2B or enterprise users.

## Degrees of Freedom (DOF)

## Extended Reality (XR)

An umbrella term for all real-and-virtual combined environments enabled by computing technology including AR/VR/MR or any combination thereof.

## Entertainment XR

A sub-category of Consumer XR specific to the entertainment industry.

## Enterprise XR

Content created for brands’ consumed in a B2B or internal environment (e.g., employee onboarding or training, education, sales tools, logistics, ordering, manufacturing, visualisation etc.) as opposed by the general public.

## Field of View (FOV)

The open observable area a person can see through their eyes or an optical device, such as a headset.

## Flat Screen Experiences

XR content experienced on a flatscreen display such as a TV, PC monitor, laptop, tablet, or phone.

## GSR

Galvanic skin response refers to changes in sweat gland activity based on the intensity of a person’s emotional reaction to a stimulus, otherwise known as emotional arousal.

## GPU

Graphics Processing Unit (GPU) is a specialized electronic circuit designed to rapidly manipulate and alter computer memory to render a visual image for output to a display device. The more powerful GPU, the faster the 3D images will appear to the user.

## Haptics

Any interaction involving touch.

## HMD

Head Mounted Display.

## In-game Advertising (IGA)

Adverts built into a video game as an integral part of the experience, such as a branded display sign, product placement and so forth.

## Location-based Advertising

The integration of mobile advertising with location-based services to provide consumer's adverts specific to their present location.

## Machine Learning (ML)

A subset of Artificial Intelligence (AI) that uses algorithms and statistical models to improve a machine's performance on a task.

## Mixed Reality (MR)

Part real, part virtual—overlying and anchoring virtual objects or sounds to the real world and enabling a connection between the two.

## Reality-virtuality Continuum

A sliding scale used to visualise the possible variations of real and virtual environments.

## Room-scale

A VR design paradigm that enable users free movement in and around a play area, reflecting their body's real-life motion within the VR environment.

## Screenless HMD

An emerging technology that transfers or displays information in front of the users field of vision without using a screen.

## Standalone VR

6DOF HMDs such as the HTC Vive Focus and the Oculus Quest that have built in screens but do not require a PC.

## Triple-A

World-class, often noted as a nickname to identify the top global brands.

## Tetherless

PC-based VR without the HMD cord.

## Virtual Reality (VR)

A fully immersive experience that transports the user into a new reality, commonly through the use of a headset.

## Web XR

AR/VR/MR experiences that use a web browser (vs. a specific installed app or device) to access immersive experiences.

## Worldscale

XR experiences that allow the user to traverse anywhere around the globe and retain the ability to participate while tracking the body's motion within the experience.

## XR

Extended reality is a term referring to all real-and-virtual combined environments and human-machine interactions generated by computer technology and wearables.

isobar