



XR Industry
Insight Report
2019-2020



Author: Alex Hadwick



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INTRODUCTION

Could we be nearing a tipping point? That should be the question on the minds of executives working in and around immersive tech as we head towards 2020. Up until now, questions have lingered about awareness, content availability and technology adoption, costs and ergonomics. However, it appears that many of these are progressively being addressed and the sector is picking up momentum according to our survey of more than 750 professionals working in and around XR technologies.

Enterprises are really beginning to grasp the potential for immersive technologies to change the landscape, with higher growth rates reported than in our 2018 survey. Many sectors are really seeing the value that can be brought from investing in XR capabilities, particularly education, architecture, engineering, construction, manufacturing and healthcare fields.

For those that take the dive into immersive tech, the gains are real and demonstrable, strengthening the case for investment and deployment. A massive 93% of enterprises that have decided to use VR have seen a positive effect on their business with 57% saying that that uplift was very positive. It is worth noting that these respondents to our survey are relatively early adopters and therefore likely to be enthusiastic and successful users. Nonetheless, this is spurring on greater investment that will further accelerate gains and adoption.

Although professionals in our survey were more subdued in their expectations for consumer interest and adoption, there may be cause for more optimism than is being expressed. This is because AR seems on the verge of breaking out into something really big. Already 2019 has seen a series of massive announcements from tech giants, including the roll-outs of new features or products from Facebook, Snapchat, Google, Apple, Huawei and YouTube. If developers and brands grasp the opportunities flowing out from this, 2020 could be a huge year for consumer AR.

To understand more of these key trends, please read on and uncover the findings from our major industry survey of more than 750 XR professionals, of whom 35% come from C-suite positions.



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Executive Summary

- Hardware, software and third-party content creators for XR have seen much stronger growth in the enterprise side of their businesses compared to growth in the consumer sector over the last 12 months: Just 25.7% said that growth in the VR for enterprise segment had been weaker than expected, compared to 49.2% who said the same for the consumer side.
- Growth appears to be accelerating for enterprise applications, particularly VR. In 2018 38% said that they were seeing strong or very strong growth in VR for enterprise, which rose to 46% in 2019's survey.
- This reflects demand trends with enterprise end users seeing strong ROI. 93% of enterprise users said that VR had had a positive impact on their business and 88.4% said the same for AR/MR.
- 98.6% of enterprise users said that they were at least considering investing more into XR in the next few years. Of these, 65.7% were sure that they would make future investments, 22.9% said that they were likely to but still undergoing testing and 10% said that they were at least considering doing so but could not confirm.
- XR technology and content suppliers are chasing this growth and shifting focus to providing enterprises with solutions: 73% of these companies said that they were working on VR for enterprise functions and just under 65% said that they were doing the same for AR and MR. By comparison, well under half said that they were working on either for the consumer segment, with just 37.4% reporting working on AR and MR applications.
- Product design and prototyping was the most common area of usage for enterprise end users, with more than 96% deploying VR to help the process, followed by workforce/project collaboration (93.4%), educational learning (89.7%), training/worker guidance (89.7%), sales & marketing/external communication (84.2%) and manufacturing (81.1%).
- AR/MR is being used far less frequently across the board, with its most likely application to be in sales, marketing and external communications, where 56.6% say that they use the technology.
- The leading sector that XR-supporting companies intend to work with is the education sector, with 55.8% saying they expect to provide services to it. The next highest categories were AEC (Architecture/Engineering/Construction; 44.2%), healthcare (42.3%), manufacturing (39.6%) and automotive (36%).
- Gaming is now viewed with far less interest by companies working to provide XR technology compared to 2018's results. In that year's survey, 50% of respondents said that



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they intended to work within the gaming industry over the next 12 months, but this had fallen to just a third of respondents from the supply side of XR in the 2019 results

- The biggest barriers to mass consumer adoption of XR tech are principally the price of devices (46.2%) and the lack of content (45.6%). A second tier of issues noted by the survey population are around Head-Mounted Display (HMD) designs, lack of consumer awareness and usability of HMDs.
- 56% of respondents think HMD comfort and usability will need to improve to increase adoption. Other issues noted by a majority of respondents are improving the Field of View (FOV; 55.9%) and motion tracking (55.6%) capabilities.
- For VR, 94.2% of respondents think that it will take at least two years for consumers to make it a regular part of their technology diet, and a slightly lower 91.1% think the same for AR/MR.
- The majority of our survey population believe that it will take four or more years for AR to move from predominantly occurring on people's smartphones to becoming headset-based, with 51% taking this viewpoint and 44% believing that it will occur in the next two-to-three years.
- Observer Analytics estimates that weekly retention for consumer VR apps has dropped by an average of 7% between Q4 2018 and Q1 2019.
- However, consumer entertainment content creators in the XR space continue to find value in XR. Among this segment 75.9% reported that VR had had a very or somewhat positive impact on their business and 72.3% said the same for AR/MR.
- 82.3% of content creators were planning to increase their output of XR content in the medium term. Of these 63% were sure of their plans to expand XR production and 19% said that they were likely to do so after further testing. On top of this a further 15% said that they were considering doing so, leaving just 3% who reported that they were not intending to increase production.
- There needs to be a shift in the consumer-facing side of the business, however, from VR to AR. 38% said that they created content only for the VR space, 7% for only AR/MR content and 55% for both types, despite being twice as likely to say that AR/MR had more potential to disrupt the entertainment sector than VR.
- This is particularly so in the face of major product and developer kits that will enable easier production and dissemination of AR content particularly over social media, with Facebook, Google and Snapchat all making major enhancements in 2019.
- The clear market leaders for headset usage are the Oculus Rift and the HTC Vive, which have market shares of 45% and 41% among consumers, respectively.



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1 AREAS OF GROWTH

1.1 Growth Trends

XR is establishing itself quickly and strongly in supporting enterprise but still struggling to gain a major foothold for consumers – these are the findings from our major industry survey looking across the entire XR space. Consequently, the companies underpinning the immersive technology space are powering up their support and investment for enterprise, foremost through the deployment of VR technologies, followed by AR and MR, which are showing high growth rates. This is not to say that there is not a market for consumer XR but rather that the depth of interest, use cases and overall market value are currently greater in the enterprise environment, which will lead the way for the penetration of immersive technologies overall.

We can see this in growth rates in 2019, where there was a noticeable divide in the market dynamics between XR for enterprise and for consumer segments.

Whereas around three quarters of hardware, software and third-party content creators for immersive technologies surveyed said that growth had matched or exceeded expectations, this fell to just under half for consumer VR and 58.7% for AR/MR in the consumer segment. Just 25.7% said that growth in the VR for enterprise segment had been weaker than expected, compared to 49.2% who said the same for the consumer side. Furthermore, 46.2% said that enterprise VR has exceeded their growth expectations in 2019, rating growth as strong or very strong, compared to just 24.1% who said the same for consumer VR.

AR/MR areas showed similar patterns but to a lesser degree. Just under half (47.3%) said that AR/MR for enterprise had seen strong or very strong growth, above the 30.5% who said the same for consumer-facing AR/MR applications.

Overall, these growth trends are broadly positive for the industry, even if there are disparities in expected and realised growth. In our 2018 version of this survey, which can be [downloaded for free here](#), we found lower rates of strong or very strong growth being reported for those working with enterprises compared to 2019 results, marking an improvement in market conditions.

In 2018 38% said that they were seeing strong or very strong growth in VR for enterprise, compared to 46% in 2019's survey. Similarly, 47% had experienced strong growth in AR/MR



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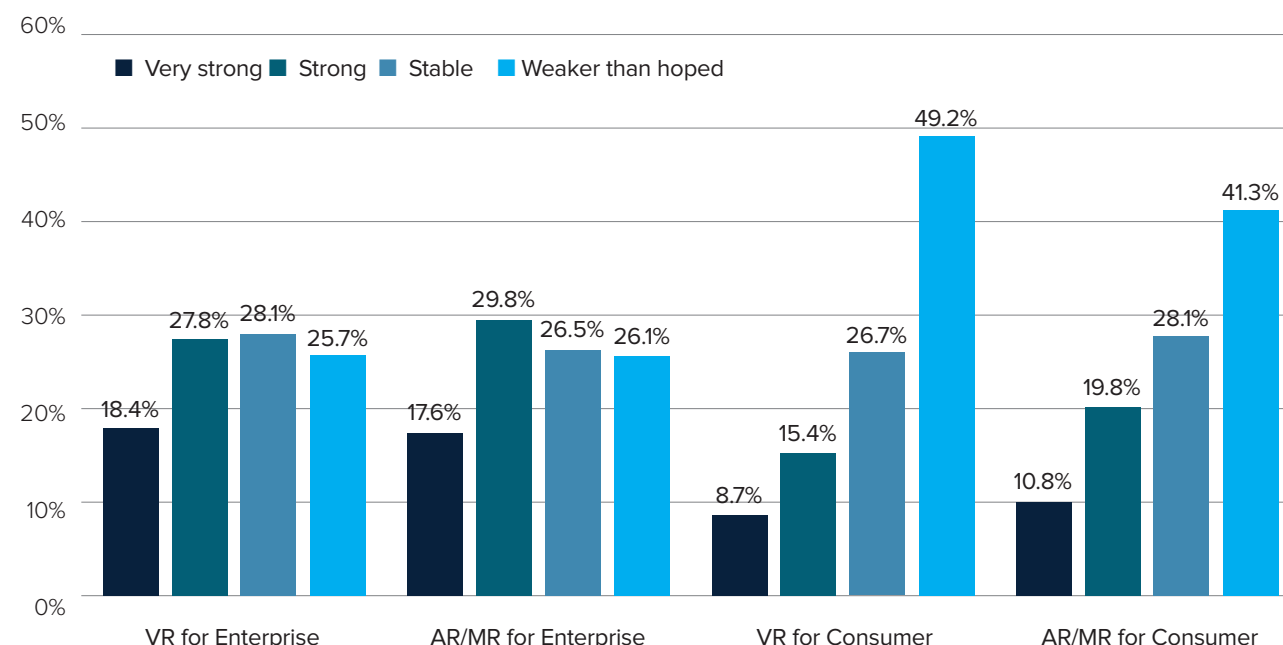


for enterprise, compared to 42% in 2018. Both VR, AR and MR growth rates on the consumer side were broadly similar between 2018 and 2019 results, falling within the margin for error of a percentage point or less of difference, reflecting a lack of change in market conditions in this area.

The trends outlined above are pushing the immersive technology sector to put emphasis and development focus onto the enterprise side, as can be seen in our results. Among hardware, software and third-party content developers, they were much more likely to report that they were working on enterprise functions for XR. Nearly 73% of these companies said that they were working on VR for enterprise functions and just under 65% said that they were doing the same for AR and MR. By comparison, well under half said that they were working on either for the consumer segment, with just 37.4% reporting working on AR and MR applications, despite the growth potential this has within the consumer segment (see Section 3.2 for more).

The trend for an enterprise focus for supply-side companies is unlikely to slow down in the context of the current environment of more stable financial gains to be made from supporting

Figure 1: How Would You Describe the Growth of Your Business in These Areas Over the Past 12 Months?



Source: XR Industry Survey 2019



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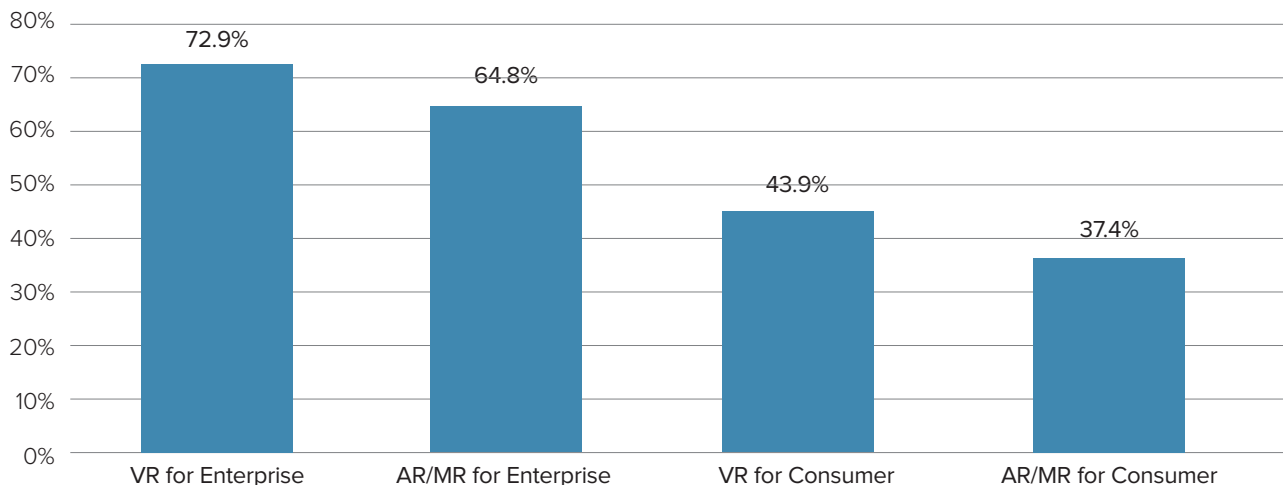
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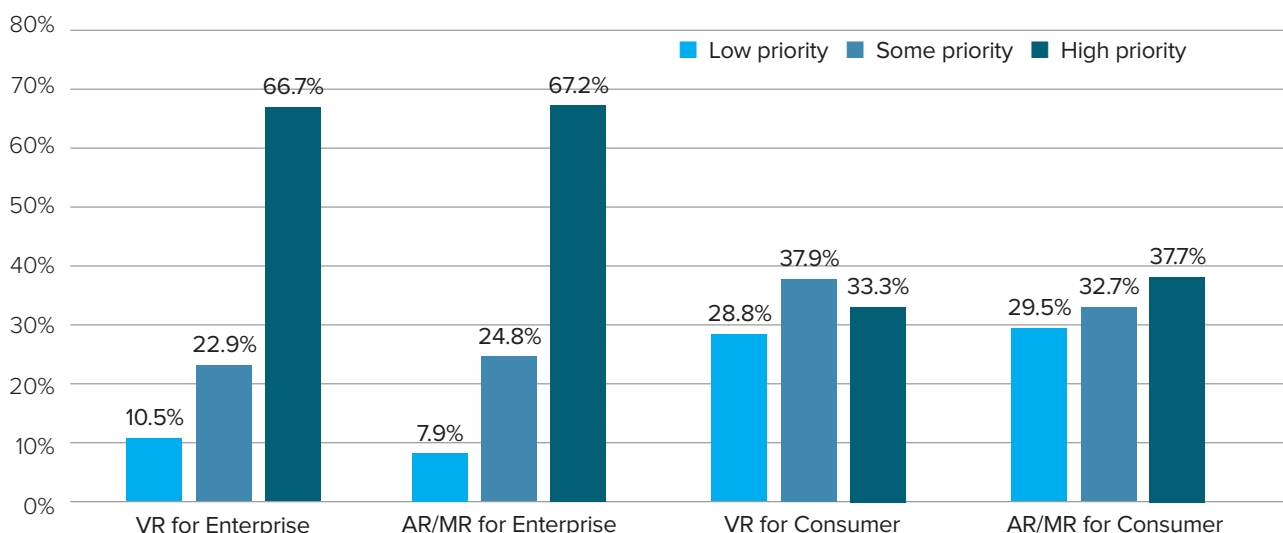
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**Figure 2: In Which of the Following Areas Does Your Business Work?**

Source: XR Industry Survey 2019

this side of the sector. We found that XR tech and content providers are placing a much higher priority on the enterprise side of their businesses looking towards 2020 than consumer-facing products. Just under 90% (89.6%) say that working on VR projects for enterprises is a priority in the next 12 months, with two thirds saying it is a high priority. An even higher 92.0% say the same for AR/MR capabilities for enterprise, with 67.2% noting it as a high priority.

Figure 3: To What Extent Will You Be Prioritising These Areas Over the Next 12 Months?

Source: XR Industry Survey 2019

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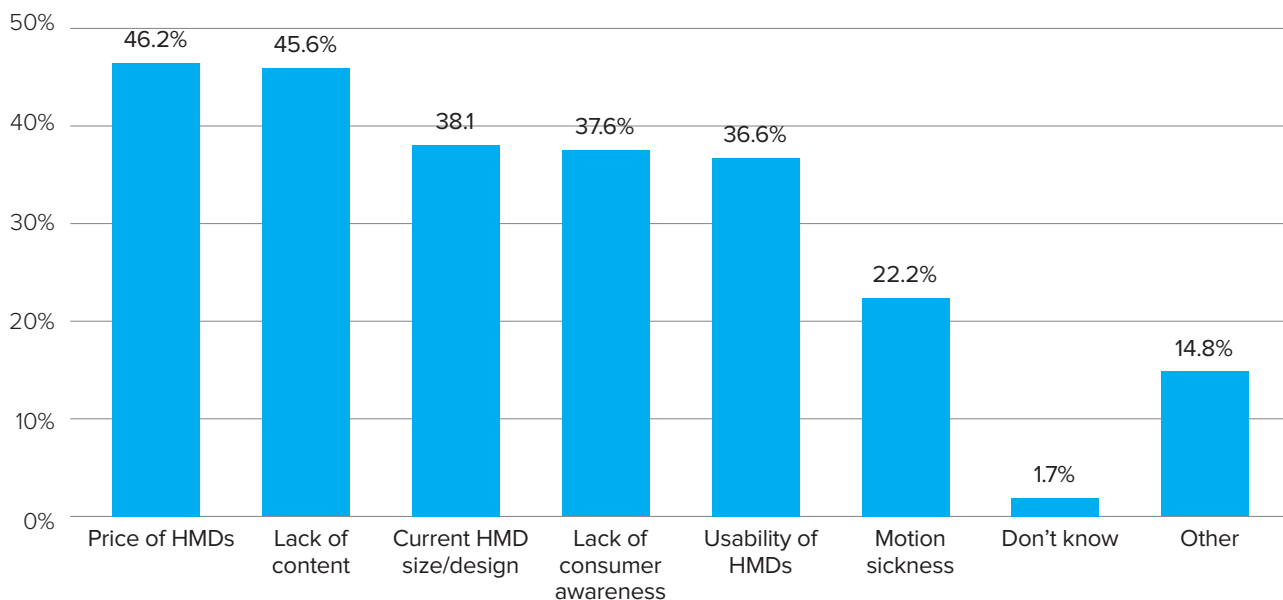


XR providers and supporters are much more subdued when looking at the consumer side of the sector. The majority of those working on immersive software, hardware and content do say that they will continue to work on the consumer-facing side, but at a much lower priority level than for enterprise. Just a third put consumer VR as a high priority and 37.7% say the same for AR/MR, with 28.8% noting the former as a low priority and 29.5% rating the latter as a low priority.

There are several barriers that are holding back consumer adoption of immersive technologies, with gaps in awareness of what is currently available, concerns about hardware prices and designs, and a view that there is not enough content available to warrant investing time and money into the tech. However, it appears that all of these issues are lessening as time goes on and consumers become more comfortable with the tech and its capabilities.

Out of the issues listed above, respondents to our survey said that the biggest barriers to mass adoption were principally the price of devices (46.2%) and the lack of content (45.6%). A second tier of issues that were noted by the survey population were issues around HMD designs, lack of consumer awareness and usability of HMDs. These rates are down on our 2018 survey, where 62% said lack of content was a barrier and 60% said that the cost of HMDs was holding back adoption.

Figure 4: What Do You See as the Biggest Barrier to Mass Consumer Adoption of VR?



Source: XR Industry Survey 2019



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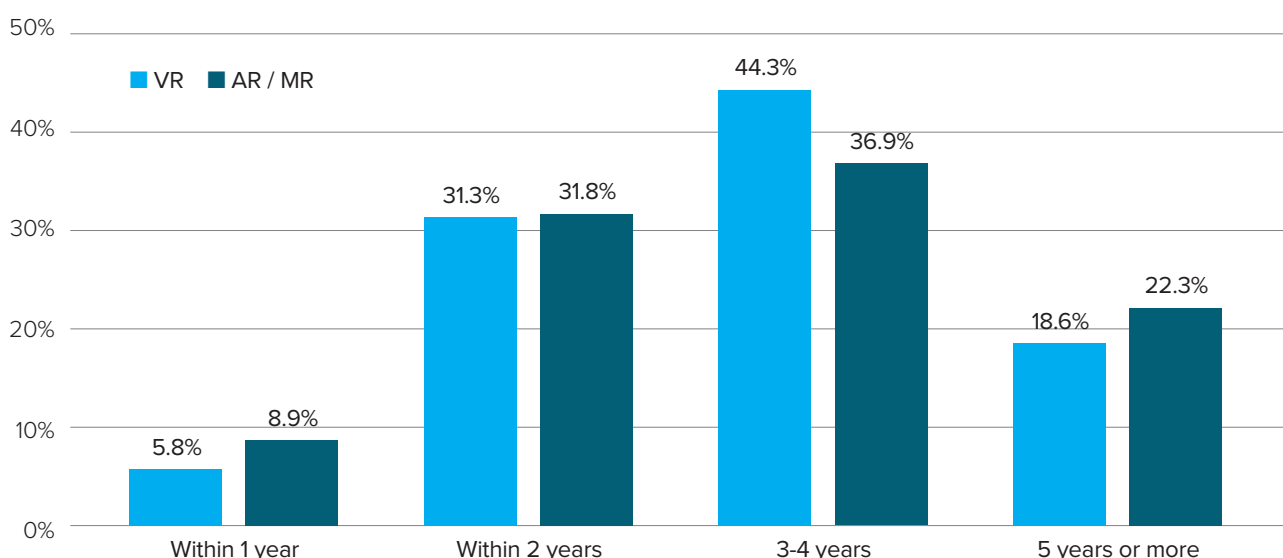


The level of concern surrounding HMD design and usability, which is also noted as the most critical component or function to improve to increase adoption (see Figure 7), appears to be a key stumbling block felt across the industry. This also suggests that AR will accelerate ahead for consumer adoption given the apparent reticence for consumers to buy and regularly wear VR-specific headsets and the industry's concerns over their ergonomics (see Chapter 3 for more on consumer behaviours).

Among our survey respondents, the general feeling is that there is still quite some time before all of these barriers are overcome and consumers fully adopt XR tech, with the vast majority of our survey respondents seeing them as only becoming mainstream out past 2020. For VR, 94.2% of respondents think that it will take at least two years for consumers to make it a regular part of their technology diet, and a slightly lower 91.1% think the same for AR/MR. The majority in both cases believe that it will take at least three years to enter mainstream adoption, with 62.9% believing so for VR and 59.2% saying the same for AR/MR.

Given the real-world mobile applications that already exist within the mainstream for AR, and a rapidly growing list of tech heavyweights enabling the technology, it is likely that many are underestimating the time it will take for this side of immersive tech to become mainstream.

Figure 5: When Do You Think We'll See Widely Accepted Mainstream Consumer Adoption of VR & AR/MR?



Source: XR Industry Survey 2019



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Although there is some reflection of this in our results from the slightly higher percentage that believe AR/MR will enter the mainstream before VR, the enhanced role that companies such as Facebook and Google are going to play in the remainder of 2019 and into 2020, alongside the sudden opening up of platforms to develop AR tech, should accelerate the rate at which the technology enters the mainstream (see Chapter 3 for more).

In comparison to consumers, enterprises are charging ahead with investment and adoption. Enterprises are less driven by cost concerns and can see tangible benefits from investing in the technologies. For example, many can realise strong returns from deploying XR in areas like design, prototyping, collaborating on projects and training and education (see Figure 11 for more).

We can see how these factors are being responded to by XR services providers, as they see the most work coming from areas of the economy where visualization is important in training workers and creating products.

The leading sector that XR-supporting companies intend to work with is the education sector, where there are numerous use cases for the deployment of all types of XR. From replacing or supplementing training simulators, to visualising abstract concepts, to creating learning scenarios beyond the classroom, XR technologies have huge potential in the education and training space.



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In a 2018 survey by EdTech Times, 91% of educators who had used XR technologies reported that they had seen a positive impact from doing so, emphasising its potential in this sector (EdTech Times, 2018). Underlining the excitement, the Bill & Melinda Gates Foundation has gotten involved and launched the XR Education Prize Challenge with a first place of \$250,000 to act as an accelerator for exciting ideas.

Unsurprisingly, the next highest categories were also in sectors where visualization is often required, training burdens can be high, product design can be complicated and costs to materialize projects can be expensive. Education was followed by AEC (Architecture / Engineering / Construction; 44.2%), healthcare (42.3%), manufacturing (39.6%) and automotive (36%).

A recent study by the University of California Los Angeles illustrates the potential gains from VR as a training tool for organizations upskilling workers in complex tasks. The study, although sponsored and small-scale, found a startling improvement from surgeons training using Osso VR software, compared to those using traditional checklists and methods. Across a scoring system of five proficiencies, surgeons trained with the VR method reputedly scored a combined 130% better, with the largest difference in their retention of knowledge of the procedure (Road to VR, 2019).

Interestingly, gaming is now viewed with far less interest by companies working to provide XR technology compared to 2018's results. In that year's survey, 50% of respondents said that they intended to work within the gaming industry over the next 12 months, but this had fallen to just a third of respondents from the supply side of XR in the 2019 results. It would appear that hopes for far wider interest and adoption in the gaming sphere have so far failed to materialize, as consumers are still not engaging with VR gaming in mass-adoption numbers. There may be something of a chicken-and-egg issue ongoing here, with the expense and complexity of creating a quality VR game not appearing to be worth it given relatively low adoption and engagement rates within VR gaming, and consumers not willing to take the plunge and buy VR equipment as there is yet to be a huge cross-platform hit backed by a major publisher. As yet, larger and more recognisable games companies and properties have focused on porting existing games over to VR experiences, which makes it harder to generate the necessary hype and can create quality assurance issues.

These results reinforce that large businesses and public bodies that need to cut costs on complex procedures are going to be critical drivers of the XR revolution, potentially leading the way in adopting cutting-edge technologies and spurring investment, with



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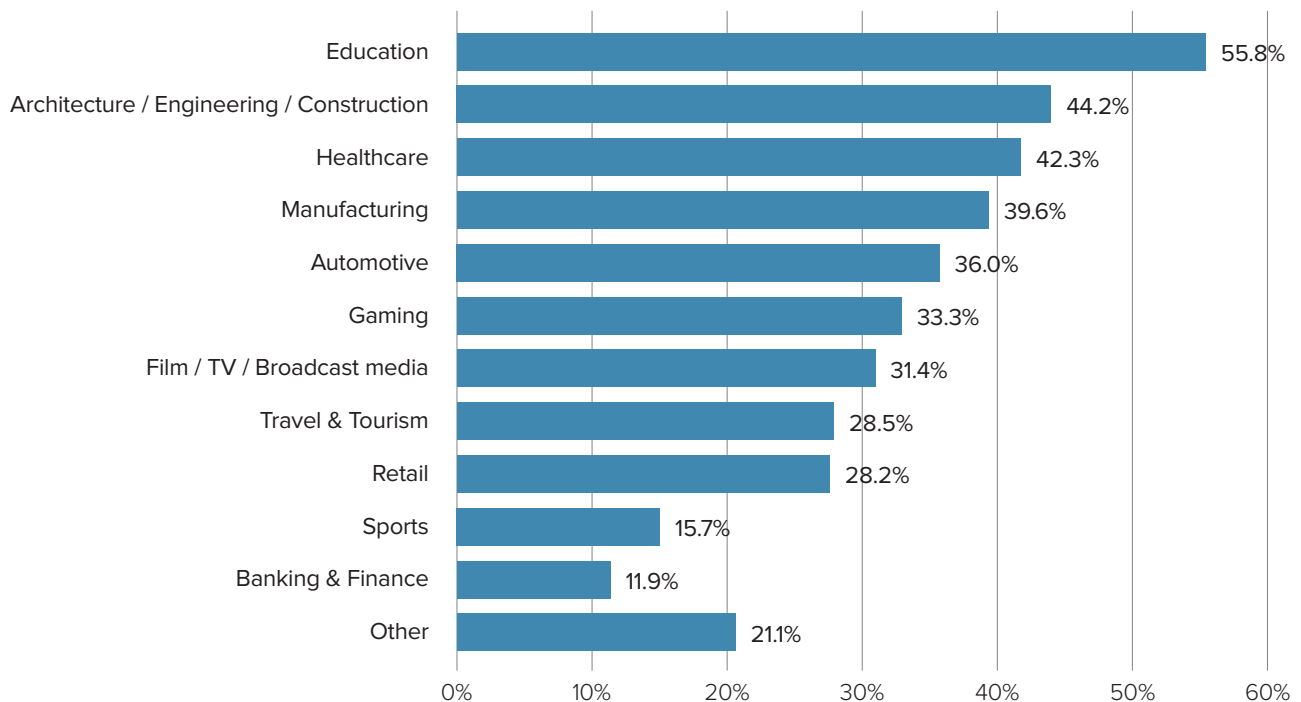
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Figure 6: In Which of These Industries Do You Intend to Work in Over the Next 12 Months?



Source: XR Industry Survey 2019

consumer-facing tech following behind, as can be seen on our results, where consumer-side industries were largely rated lower by XR suppliers.

1.2 Developments Required for Future Growth

It is clear in our results that while XR has made huge strides in the last 18 months, it is still not ubiquitous as a technology and its usage, while exploding, is not quite commonplace so far. So, where does the industry and its users see the main gaps?

Our survey population believe that the technology largely needs to focus on headset functionality and ergonomics to improve their usability, which will then help overall adoption of XR.

At the top of concerns around the components and functions of current gen XR technology is HMD comfort and usability at 56% of respondents, an issue already noted in Figure 4. Following on from this are a series of issues surrounding how the user is tracked when using XR devices, with Field of View (FOV; 55.9%), motion tracking (55.6%) and eye tracking (49.9%) all noted as major issues.



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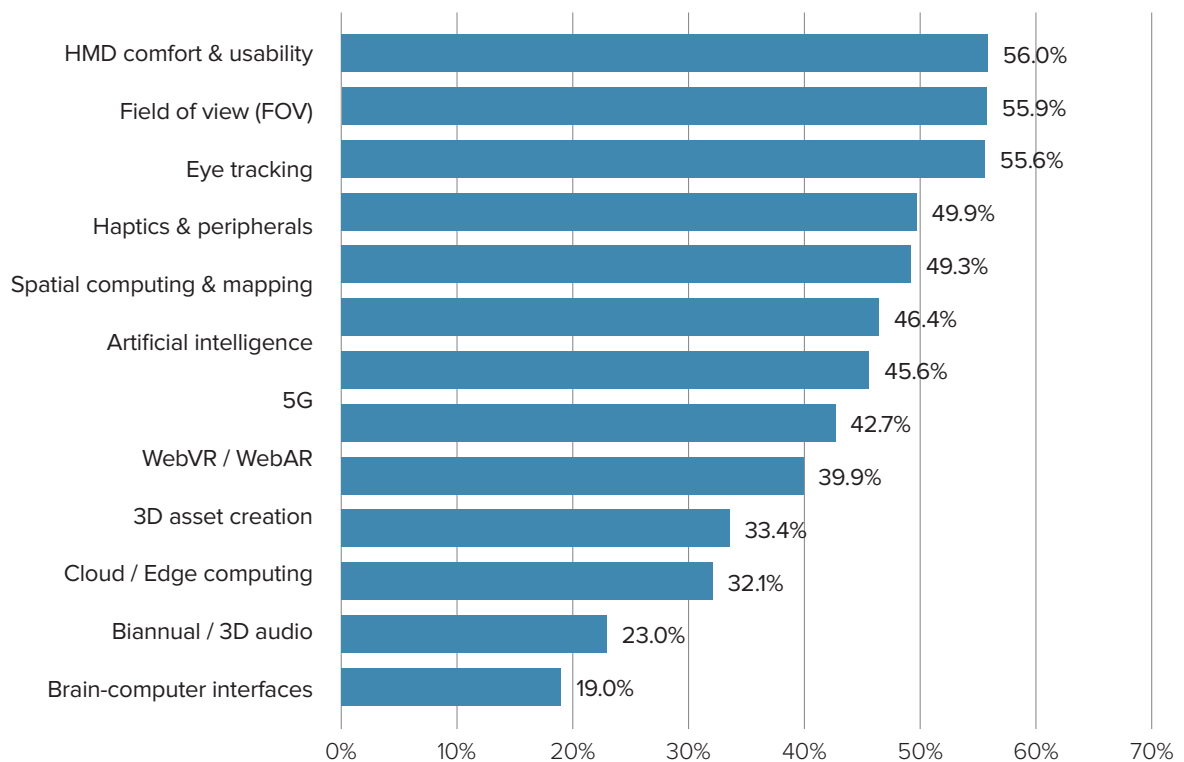
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The sector also believes that connectivity could help to bolster capabilities and thus adoption, as 46.4% said that spatial computing and mapping needs to be improved and integrated and 42.7% noting that adding in super-fast 5G connections could help develop XR products (see 1.2.1 for more).

Figure 7: Which Components and Functions Do You Believe Are Most Important to Develop, Improve and Integrate for XR to Be More Widely Adopted?



Source: XR Industry Survey 2019



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1.2.1 Viewpoint: Hooking Up HMDs

Both Vinay Narayan from HTC Vive and Ted Schilowitz from Paramount believe that connecting XR devices to the mobile internet and moving functions over to cloud computing could make major differences to the tech and its adoption. “I think one of the biggest technologies that is really needed to get these headsets further in both AR and VR is 5G,” says Narayan. “One of the biggest challenges to getting a VR headset smaller ... is the ability to compute and power. By moving a lot of these technologies onto the edge, you’re able to kind of shrink those platforms down [and] reduce the cost of entry.”

Schilowitz agrees, seeing items that require low power and that might result in latency staying on the headset, “But things like very, very highly graphically-created backgrounds, and things where latency can be managed, you can create something where part of the deliverable is coming from the edge. And if you’re using 5G, it can come very quickly off the edge.” This would lead to a blend between the device and “grid computing over a fast mobile network ... so, things that we thought were impossible on an all-in-one device on a Qualcomm chipset will become possible.”

“There’s a lot of experimentation going on,” says Amy Peck, Founder and CEO of EndeavorVR. “Being able to split some of the computing needs and the dynamic rendering needs between cloud, edge and device, and then even having strategies for that to happen dynamically, depending on the weight of a particular application, will be challenging but could yield results.”

Switching some of the workload away from devices would lead to redesigning the headset so that it negates some of the comfort and size issues we see today. “The other thing that starts to become really interesting is the form factor”, says Schilowitz. “The lightness and the ability to make this truly a wearable device when you can park the processing off board.... It’s all about finding and streaming from the network into the device, meaning those devices can be effectively weightless.”

These issues in developing comfortable, functional and affordable headsets are pushing their usage out further into the future. The majority of our survey population believe that it will take four or more years for AR to move from predominantly occurring on people’s smartphones to becoming headset-based, with 51% taking this viewpoint and 44% believing that it will occur in the next two-to-three years.



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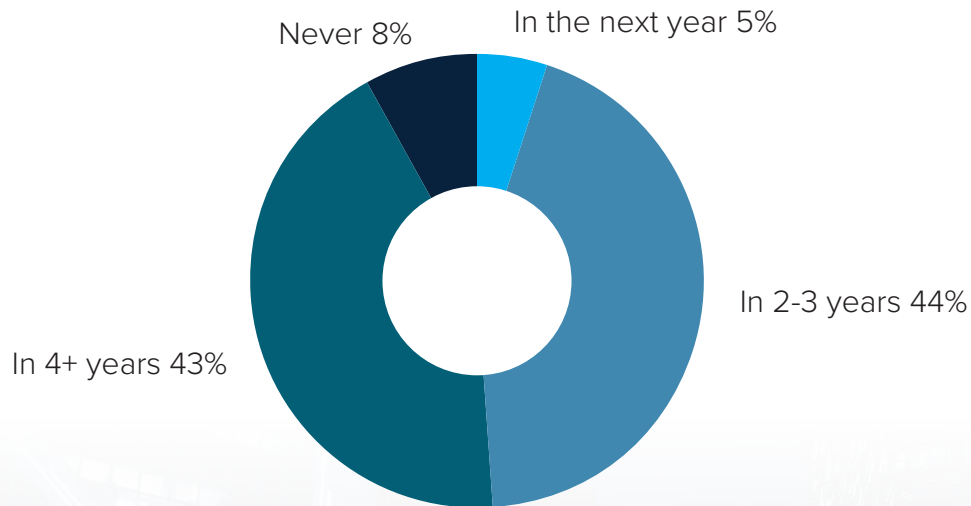
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Figure 8: When Do You Think That the Predominant Use of AR Will Move from Phone-based to Headset-based?



Source: XR Industry Survey 2019



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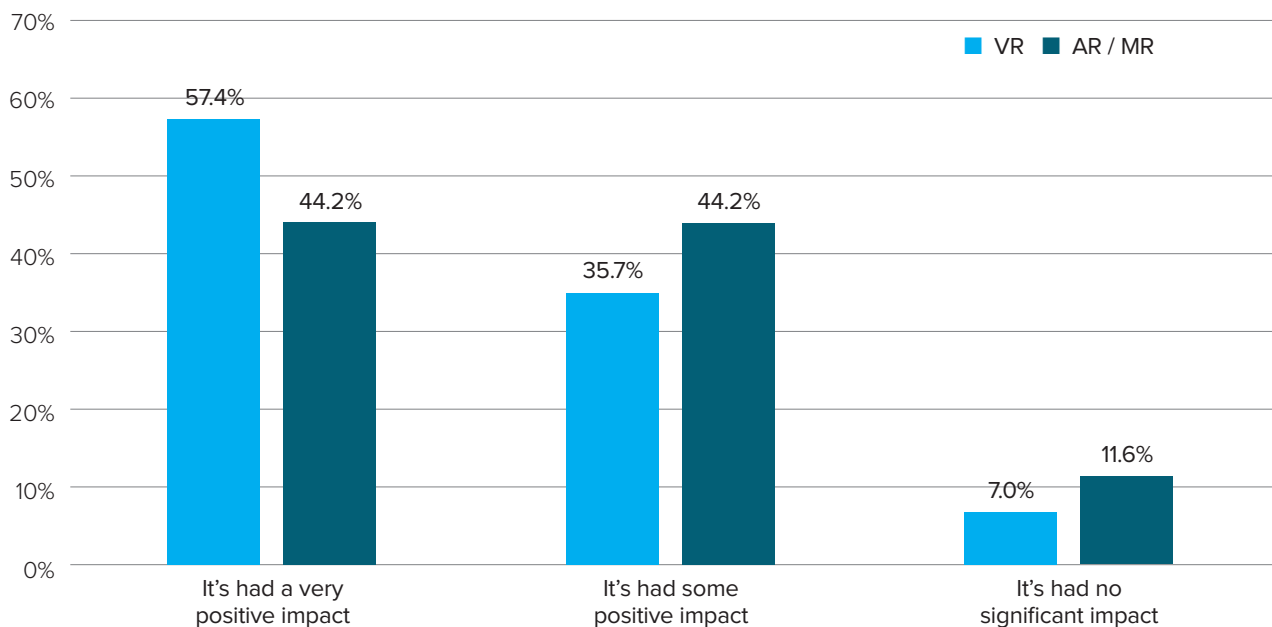
2 IMMERSIVE TECHNOLOGY FOR ENTERPRISE IN 2019

As we saw in Chapter 1, XR technology suppliers and third-party content creators are extremely positive about the state of immersive technologies for enterprise and expecting higher growth rates for enterprise XR than in 2018.

We can see the demand driving this optimism through our survey, which also broke out enterprise end users to see how they viewed the XR space currently. Overwhelming percentages of enterprise users of XR view the technologies as beneficial and also said that they are going to make further investments, underlining the growth potential that this sector is taking into 2020.

When asked how they would describe the impact of immersive technologies onto their organization, over 90% said that VR had had a positive impact and slightly less said the same for AR/MR. For VR, 57.4% said that it had made a very positive impact and 35.7% said it had had some positive impact, combining for 93% of respondents believing it to have had a positive impact. Slightly less said the same for AR/MR, with 44.2% saying it was making a positive difference and 44.2% rating it as 'very positive'.

Figure 9: How Would You Describe the Impact of XR on Your Business?



Source: XR Industry Survey 2019



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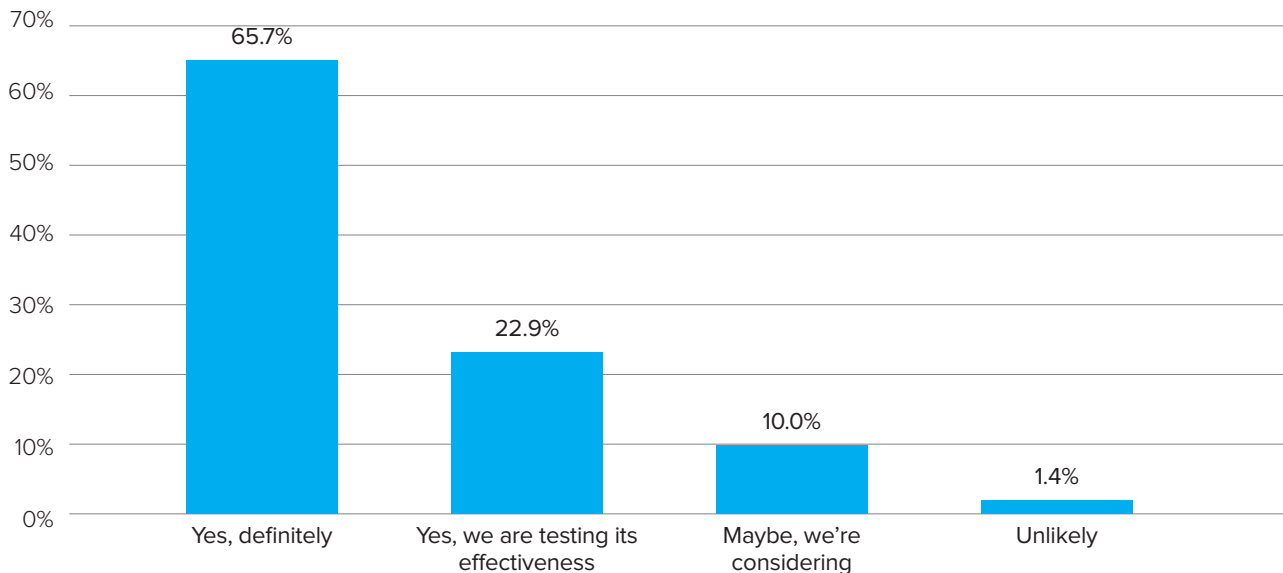
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Figure 10: Expected Investment Stance into XR in the Medium Term by Enterprise End Users



Source: XR Industry Survey 2019

Even better for the sector, a massive 98.6% of enterprise users said that they were at least considering investing more into XR in the next few years. Of these, 65.7% were sure that they would make future investments, 22.9% said that they were likely to but still undergoing testing and 10% said that they were at least considering doing so but could not confirm as yet. This bodes well for further development and enhancement of technologies, particularly in the VR space.

The case for investing in XR is helped by the increasingly wide range of applications it can help with. Enterprise users reported to our survey that they are using XR technologies across a wide range of applications within their businesses, with VR the dominant aid to their operations.

In each category we asked about, more than 80% of respondents said that they had incorporated VR into the process. Product design and prototyping was the most common usage, with more than 96% deploying VR to help the process, followed by workforce/project collaboration (93.4%), educational learning (89.7%), training/worker guidance (89.7%), sales & marketing/external communication (84.2%) and manufacturing (81.1%). AR/MR is being used far less frequently across the board, with its most likely application to be in sales, marketing and external communications where 56.6% say that they use the technology. This illustrates the different use cases for the technologies, with VR providing tangible benefits for workflows

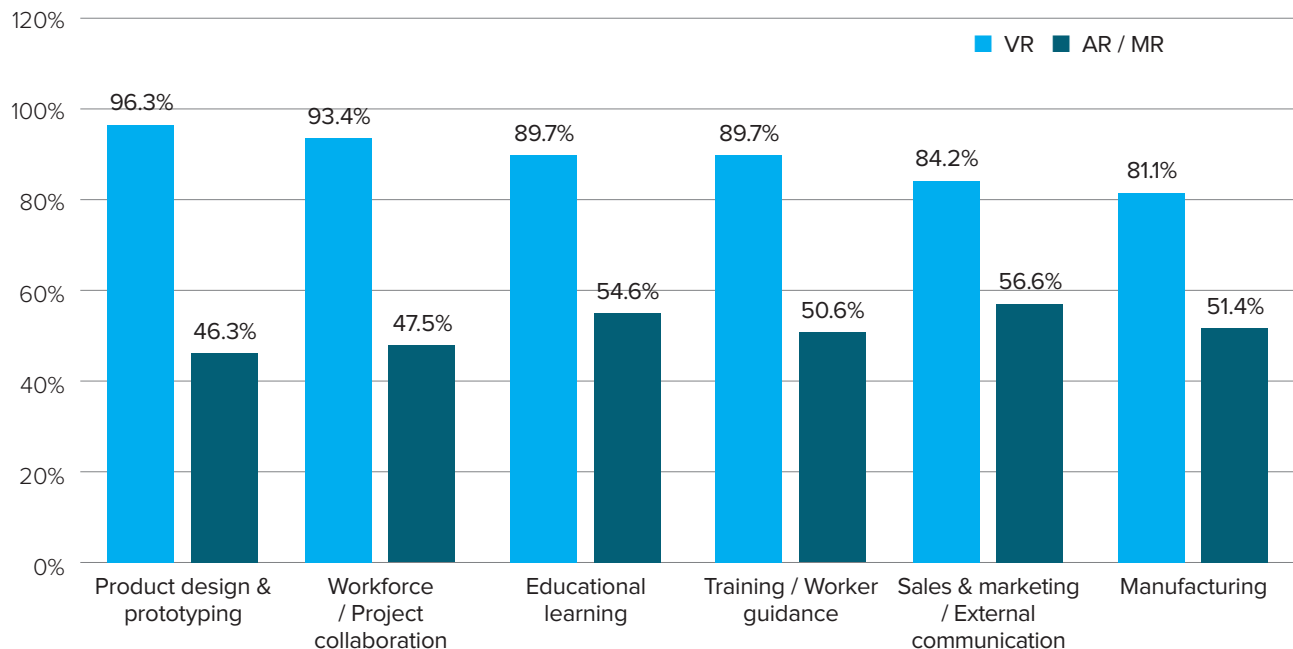


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**Figure 11: In Which of These Areas Do You Use XR in Your Business?**

Source: XR Industry Survey 2019

and AR/MR currently more used for marketing purposes and playing a support role. Once AR/MR becomes more established, we can expect this to shift and more users to replace or supplement their VR systems with these technologies.

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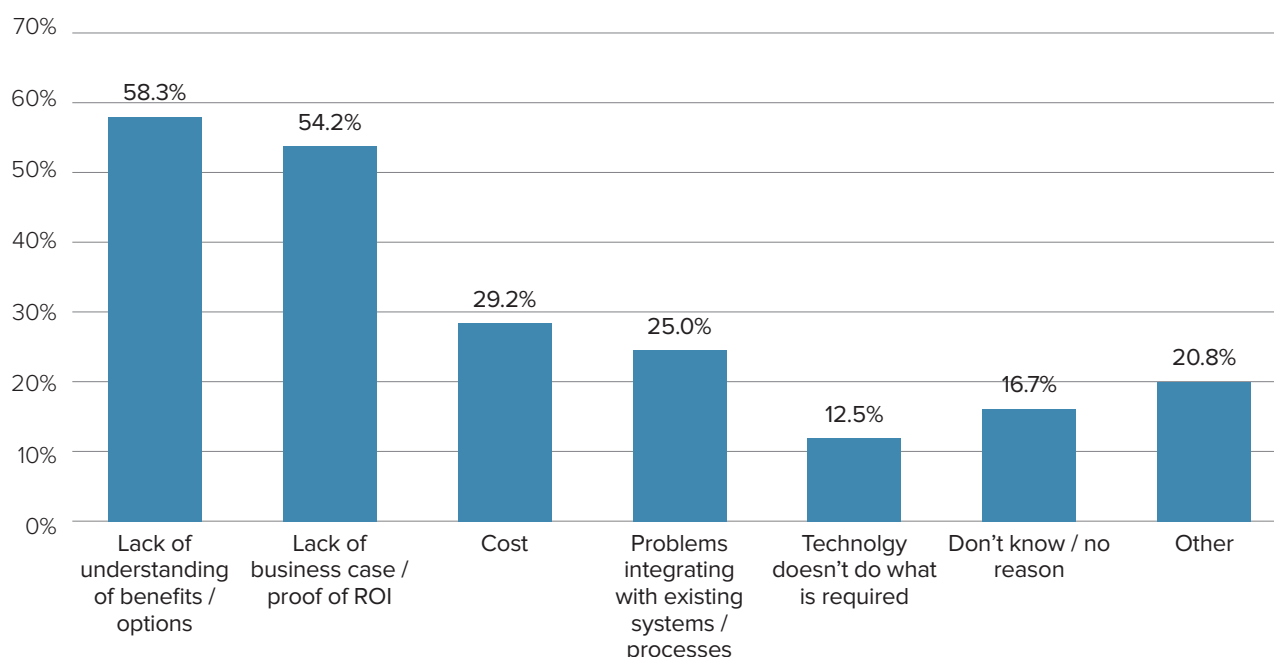
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2.1.1 Viewpoint: A Sustainable Enterprise Ecosystem

For Vive's Narayan they have to not just think about their ecosystem now but looking both forwards and backwards in time and across different systems to help raise adoption. "The things you could do on the Vive Focus today are going to be very different than what you may do tomorrow.... So, we worked with Qualcomm to really integrate at a chipset level, what we call the Wave Platform. "Whatever headsets, including HTC manufactured headsets two years from now, they'll run on Wave and you can still leverage that content." This is "critical for enterprises, because they want to continue to leverage their investments, they want to continue to make sure that what hardware they have is compatible with other hardware as well." Narayan sees the future as far more device-agnostic as more capacity hands over to the cloud via 5G.

Figure 12: What's Stopping You from Integrating VR or AR/MR into Your Business?



Source: XR Industry Survey 2019

For those companies that are on the fringes of taking the plunge into XR technologies, the primary issues preventing them from deployment are getting to grips with the technology and proving its value to the organization. Whereas cost was cited by 29.2% of those not yet using



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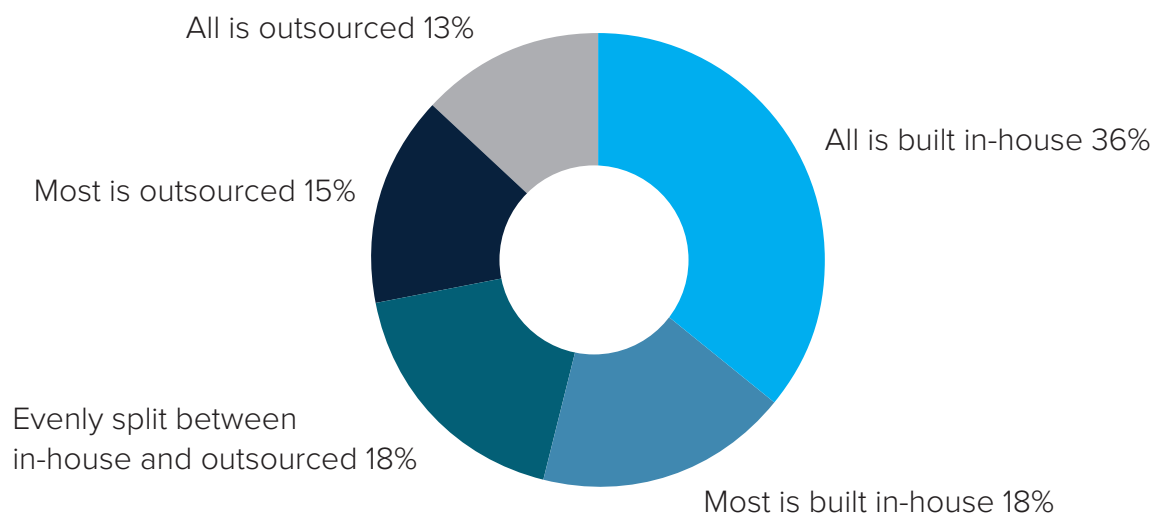


immersive technologies, a far higher 58.3% said the barrier was a lack of understanding of the benefits and options, and 54.2% had issues making strong business cases that prove ROI.

As noted in the survey and our case studies, the results from enterprises show that there are considerable savings to be made from deployment of XR tech, principally VR at this stage. Therefore, these issues should subside as the platforms and devices become more prevalent and the competitive environment underlines the case for deployment.

For those that have begun to work with and deploy XR technologies, there is a strong commitment to work internally to develop the technology and deploy it. Among enterprise users, 71% say that at least half of their work on XR content is done in-house. Just 15% said that they outsource most of their XR development to a third party and 13% say they do so for all of their immersive content.

Figure 13: Roughly How Much of Your XR Content Is Built Internally Versus Outsourced to Specialist Developers?



Source: XR Industry Survey 2019

2.1.2 Viewpoint: The Enterprise Use Case

For enterprise users, it's all about achieving previously impossible efficiencies and savings through XR. Ted Schilowitz, Futurist in Residence at Paramount, saw this when he went to "A very, very large automaker ... and we spent a couple of days with their



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executive teams and a lot of their researchers. I was seeing at least 30 or 40 valid day-to-day use cases of where they're using virtual reality and mixed reality equipment."

This manufacturer was using XR to test for "Hand position, body position, inside the automobile, as they start to test for autonomous driving. What's that going to feel like? They're using these simulation tools on a very regular basis to lower costs, increase efficiency, and increase iteration. They can very quickly experiment with things, [whereas] they used to have to hand-build things or build things in kind of a custom, 3D-printed world and try things out. Those would be week-long projects. Now, they can change things around using game engines almost instantaneously."

Mixed reality start-up Varjo is also working in this field with Volvo to improve how they design their vehicles. This has involved rendering new designs into physical car designs, putting "the interior into a virtual model, so they can test their future cars," at a new level of detail says Varjo CEO Niko Eiden. Now Volvo can use it to see high details. From a designer's perspective you can see leather stitching, you can see panel gaps with just one click, leading to "significant savings in terms of time in the design process of the car," as Volvo no longer needs to produce and reproduce 1:1 models throughout.

Eiden also sees major cost-saving opportunities when it comes to training, particularly in those professions where you have something that might happen rarely, but when it happens you have to know what the right reaction is. "Pilots are a great example, as are police, firefighters, emergency personnel, [and in] control rooms, nuclear reactors." The last of these is something Varjo's headset has been used on already at Loviisa power plant in Finland, where the MR training rooms reputedly costs a tenth of a physical training room (ZDNet, 2019). "In those places, when something goes wrong, you need to know how to react. Therefore the investment and training costs can be pretty high, especially as the cost of failure when something goes wrong is higher," says Eiden.

For Angelo Del Priore, Partner, HP Tech Ventures, the evidence is clear and will help to spread XR tech: "There's plenty of efficacy studies. You're going to save time, you're going to save money, you're going to speed [up] and have higher quality outcomes, whether you're painting something or performing knee surgery. And it's just people are kind of slowly adopting it as one believer moves from Walmart or Target to Kmart, they're going to bring that belief system with them."



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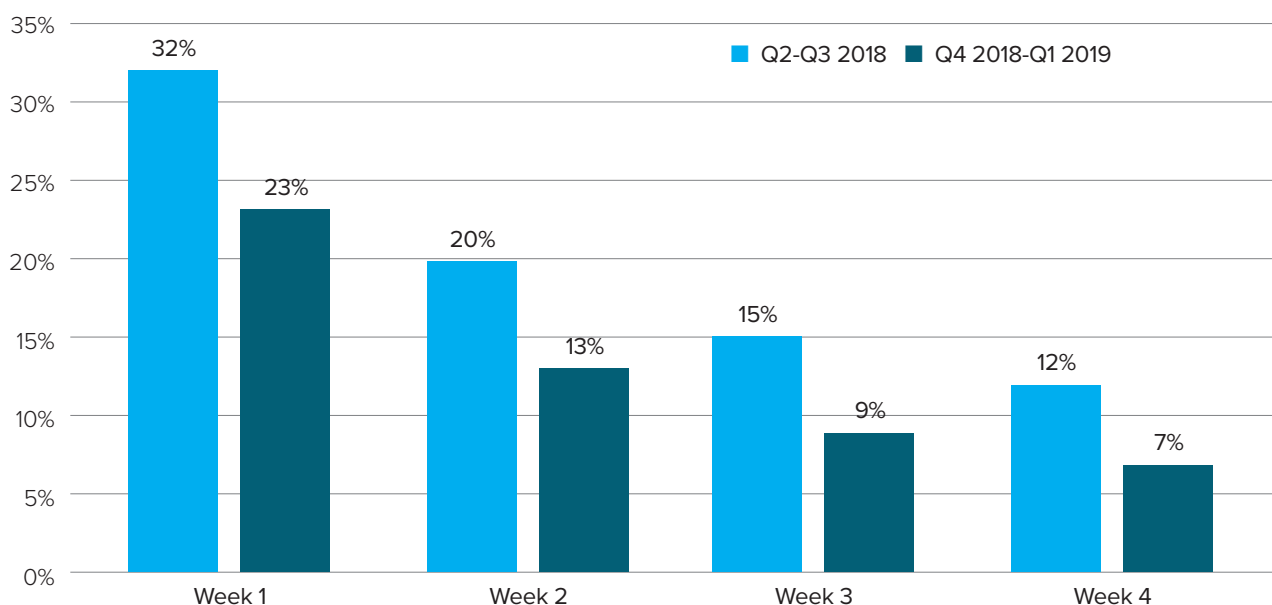
3 IMMERSIVE TECHNOLOGY FOR THE CONSUMER IN 2019

Thus far, the consumer side of XR may not have quite lived up to the expectations that many within the industry had, particularly gaming VR, but this doesn't mean that there shouldn't be cause for optimism if brands are willing to look in the right places. Currently, it seems as if VR will continue to struggle to gain traction and will not truly enter the consumer mainstream until out past 2020. However, developments in AR are accelerating and developing at a breakneck pace, with consumers beginning to respond and engage accordingly. Tech heavyweights are throwing themselves into the space, putting AR products in the foreground and massively opening up development tools to a much wider audience at lower costs than ever before. Breakthrough applications going to arrive a greater pace and 2020 could be a critical year for spreading the use of AR.

3.1 Consumer Content

One of the primary issues for getting XR, and particularly VR, off the ground in the consumer space has been driving consistent engagement. Currently it does not appear that there has been a significant uplift in consumers engaging with VR on a consistent basis, according to data gathered by Observer Analytics.

Figure 14: Weekly Retention Rates for Consumer VR Apps



Source: Observer Analytics PC VR Report Q4 '18 - Q1 '19



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Observer Analytics measured usage and engagement across 25 VR apps available in consumer app stores across 2018 and into 2019. Looking at a weekly retention metric, calculated using the total number of new users that opened an application in a given period, then finding the percentage of that original cohort that returned to the application in the following weeks they found that engagement is down in Q1 2019, compared to Q4 2018. They found that weekly retention has dropped by an average of 7% and 41.9% of new users only opened the application measured in the dataset once during these two quarters (Observer Analytics, 2019).

3.1.1 Viewpoint: VR Consumer Adoption

For Stephanie Llamas, Vice President of Strategy & Head of XR at SuperData, “VR adoption is going to hinder on three things.” Firstly, “It’s going to be content. So, [for example] Beat Saber has done wonders for getting people excited about VR, and people who experience it, who are new to VR, it’s a really great first experience. As we see more experiences like that, that’s really helpful, so we need to see a lot more. And then the second being price of headsets. That’s been prohibitive for a lot of people, especially with setups that are expensive as well – having to buy PCs, or consoles or so on. And that leads to the third one, which is standalone. It needs to be untethered and it needs to be something you can throw on quickly and take off quickly, you know, have a five-minute session, or a 60-minute session. Until you have those three things, you’re facing a lot of barriers to entry.”



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These results hark back to our findings regarding challenges and barriers to greater adoption and lower enthusiasm in the industry for the consumer side of the business.

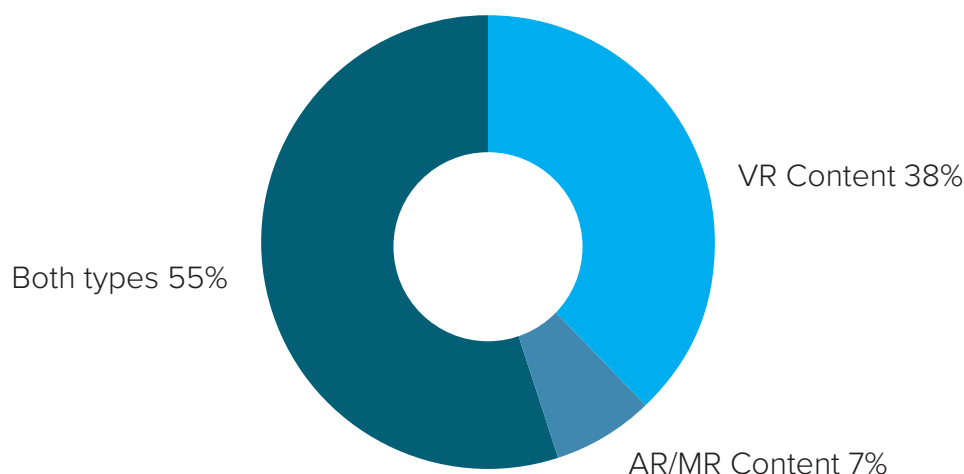
However, the issues largely apply to VR and it may be that the industry needs to refocus what it is pursuing and where it sees the best opportunities for growth.

Currently, the industry continues to have a bias towards the creation of VR content, where traction continues to be problematic. When we asked consumer entertainment content creators in the XR space where they were currently working, 38% said that they created content only for the VR space, 7% for only AR/MR content and 55% for both types.

VR is by no means finished and will continue to have a consumer market, particularly in gaming, with VR titles and kits finally breaking into top seller lists on Steam and Sony reporting relatively strong headset sales – reaching 4.2 million as of March 2019 (or 4% to 5% of its PS4 user base) – and continuing to promote VR games as key to their PlayStation platform (engadget, 2019). Furthermore, headset costs are falling, developer costs are reducing and shared software is proliferating, with the current dominant gaming engine Unreal also capable of powering VR applications.

However, it seems that there may need to be more focus on AR and a tempering of hopes for the consumer VR sector given our findings.

Figure 15: Does Your Business Create VR or AR/MR Content?



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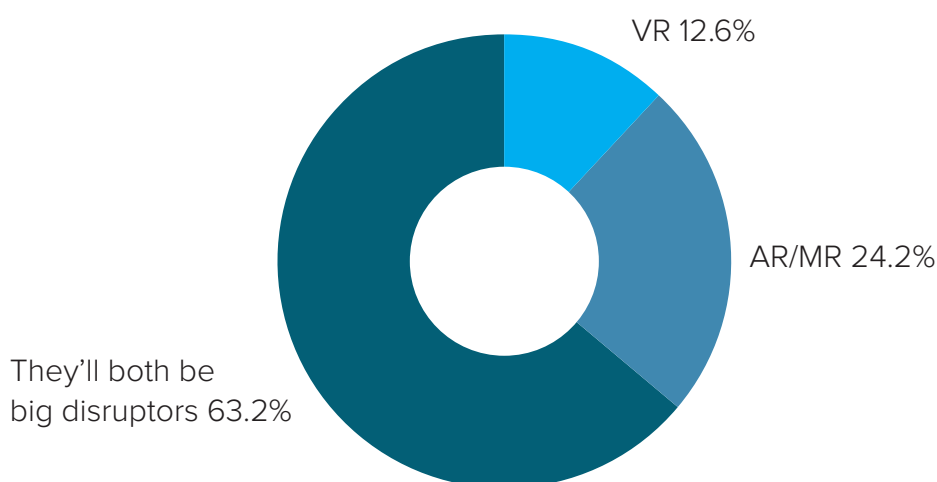
3.2 An XR Breakthrough?

Furthering this need to diversify and get deeper into AR/MR content, we found in our results a mismatch between the percentage of those working in VR and the expectation of its success. Whereas there was a noticeable slant for consumer XR content creators towards developing VR products, their expectations for disruption on the next half decade show that there is greater optimism surrounding AR and MR.

In our survey results, respondents from this segment were around twice as likely to say that AR/MR had the potential to disrupt the entertainment sector than VR, at 24.2% for AR/MR and 12.6% for VR alone. Although the majority believe that both have the potential to disrupt, at 63.2%, the difference in expectations of breakthrough success and disruption does suggest that there will be some reorientation of focus for consumer-facing XR businesses in 2020.

Overall though, consumer content creators continue to find value in investing into XR, demonstrating that there is plenty of life in the consumer market despite some of the more downbeat figures. Among this segment we found that around three quarters had found a positive impact from XR on their business. 75.9% reported that VR had had a very or somewhat positive impact and 72.3% said the same for AR/MR.

Figure 16: Do You Think VR or AR/MR Has More Potential to Disrupt the Entertainment Sector Over the Next Five Years?



Source: XR Industry Survey 2019



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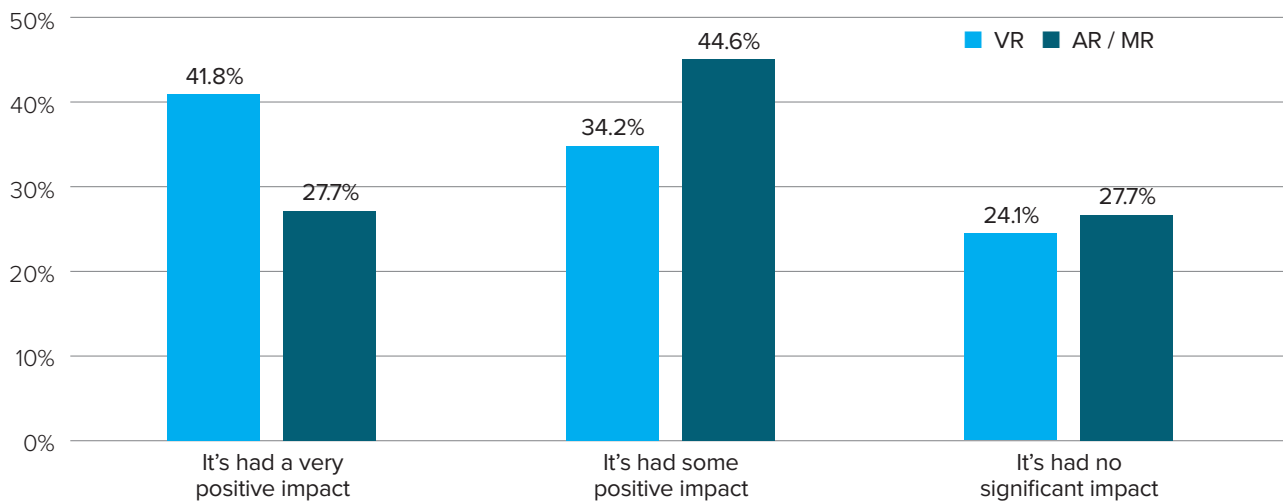
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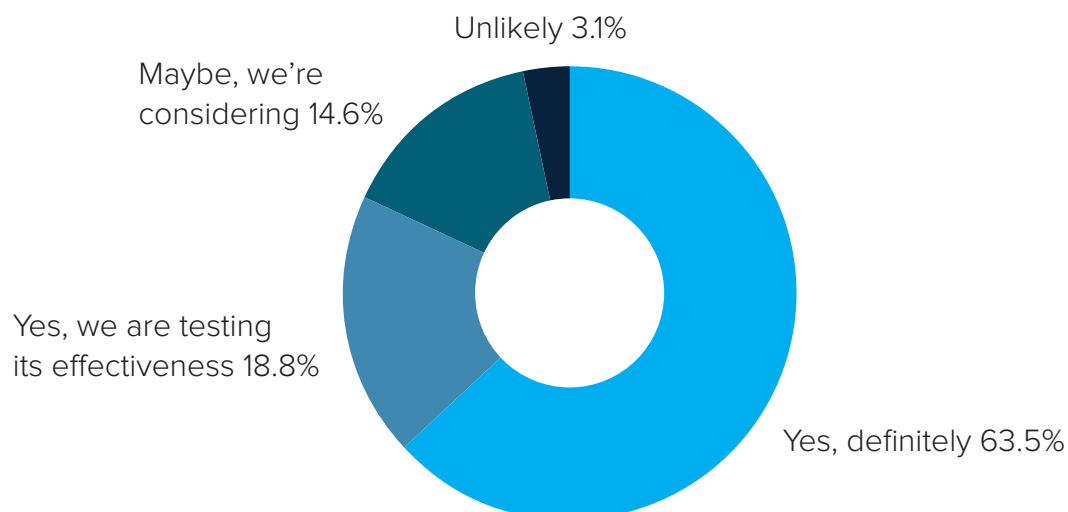
Figure 17: How Would You Describe the Impact of XR on the Growth of Your Business?



Source: XR Industry Survey 2019

This is leading them to push further into the consumer XR business rather than retreat. We found that 82.3% of content creators were planning to increase their output of XR content in the medium term. Of these 63.5% were sure of their plans to expand XR production and 18.8% said that they were likely to do so after further testing. On top of this a further 14.6% said that they were considering doing so, leaving just 3.1% who reported that they were not intending to increase production.

Figure 18: Do You Intend to Increase Your Production of XR Content Over the Coming Years?



Source: XR Industry Survey 2019



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In this, content creators will be helped by the increasing importance major tech companies are placing on the XR space, particularly in rolling out AR products and development kits. Almost every major household name is working on something in the field that will enhance what consumers can access, what/how organizations can post and the tools developers use.

Facebook has made a series of major announcements across 2019. It has been building out its AR efforts and claimed at its 2019 F8 conference that more than a billion people had interacted with AR through their platforms. However, the biggest announcement was the expansion of its Spark AR platform, so that it is now far more accessible to smaller developers. Spark AR has been opened up for all to access and with its integration with Instagram, users can deploy AR effects directly to the platform. Facebook also announced that it is running a beta test so that users can preview products through AR. They can use their camera from within the Facebook app after clicking on an advert.

Google is also keen not to be left behind. It has announced AR additions to both Maps and YouTube that could be critical to furthering AR usage in the mainstream. Google Live View allows directions to be overlayed onto the real world in real time through the camera of a phone enabled with Google's ARCore or ARKit. Perhaps more important though, is YouTube's deployment of an AR feature that allows users to see how they would look in a particular make-up. Known as Beauty Try-On, the button within the app was launched in June 2019 and means followers of beauty bloggers can test products as they watch a video. If successful, this technology is likely to be rolled out onto a far wider suite of products.

Snapchat continues to be an innovator in the space, enhancing its AR offering, which is core to the product, with a new AR bar that can scan surroundings, access Snapchat's extensive library of 'Lenses' that input overlays onto camera images or allow the creation of a new lens.

Elsewhere, Microsoft launched HoloLens 2, Huawei unveiled a new XR services platform, Apple debuted an AR overlay called AR[T] that, as the name suggests, places digital art into several cities, and Amazon continues to incorporate AR into how its consumers view and choose products, as well as enhancing its Sumerian developer kit.



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3.2.1 Viewpoint: AR at a Tipping Point?

David Ripert, Chapter President of the London VR/AR Association (VRARA), increasingly sees “AR touching every sector out there,” spearheaded by gaming but also the beauty and fashion space. Increasingly it is possible for consumer brands of all shapes and sizes to incorporate AR into their offering, spurred on by a wave of talent and tech availability. “You have 3 million 3D modelers out there around the world, many AR developers that are able to develop AR experiences and the tools are now commoditised. We have access to a lot of different tools. Facebook has SparkAR, which you can use to create AR functions for Facebook and Instagram. You can use Lens Studio to upload the AR to Snapchat. You can use Adobe Aero. You can use Sumerian from Amazon. You can use Unity’s toolkit, which is very easy to use. It’s becoming democratised.”

The end result is greater outreach for brands at costs lower than what was imaginable just two or three years ago. Customers can see and envision products in whole new ways. “Retailers are starting to scan all of their inventory of products and turn them into 3D models, so that even before you get to AR you can look at these products in 3D and look at them from different angles. Then you can have the AR option to put them into your living room or personal environment using your mobile phone in real-scale. If you are buying an expensive TV, you’ll be able to place it on your wall or table and see how it will fit in and look like.”

3.3 Supporting Consumer Technology

Looking at consumer VR technology usage, the clear market leaders for headset usage are the Oculus Rift and the HTC Vive, which were used in 45% and 41% of sessions monitored by Observer Analytics, respectively. All other headsets pale in comparison, with Windows MR having a 6.6% share, Vive Pro a 6.5% share and others just 0.9% (Observer Analytics, 2019).

Similar to headsets, there are massively dominant players for the supporting hardware, with Nvidia controlling the graphics card market, Intel the processor market and AMD a runner up in both.



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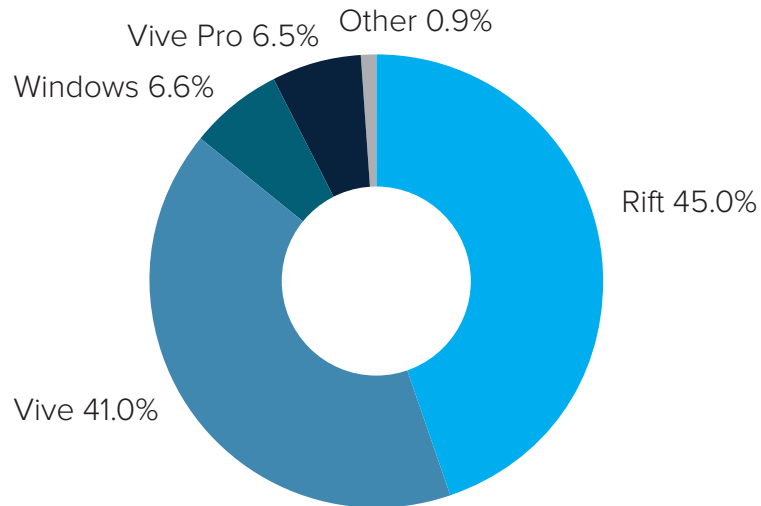
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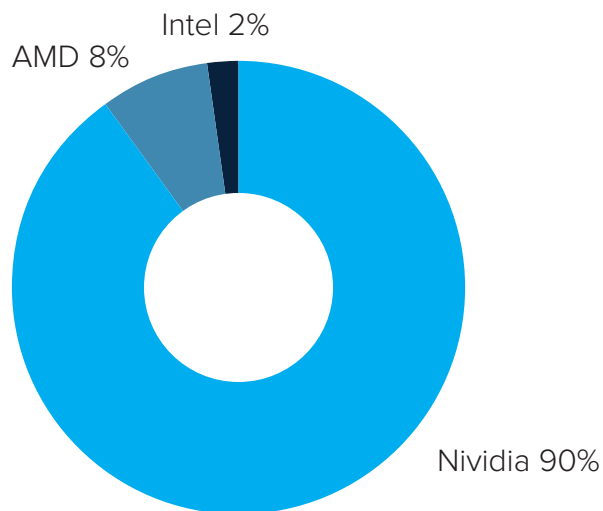


Figure 19: Consumer VR Headset Market Share



Source: Observer Analytics, 2019

Figure 20: Consumer VR Headset Graphics Card Market Share



Source: Observer Analytics, 2019



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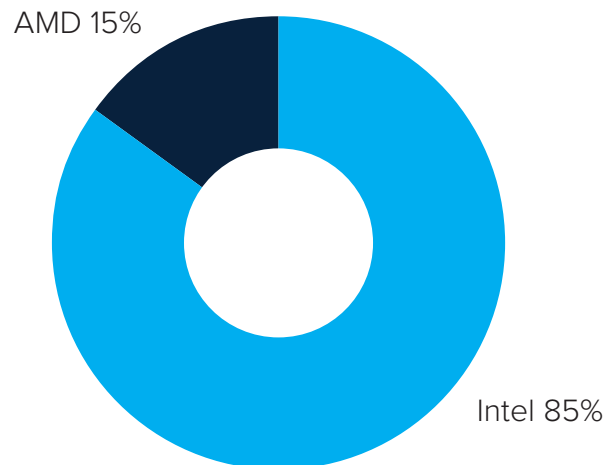
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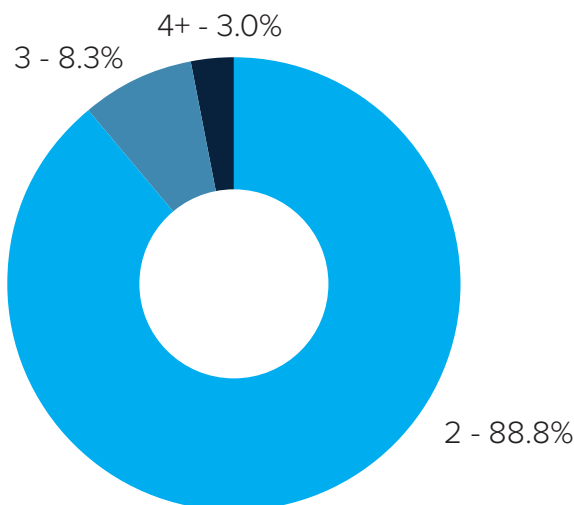
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**Figure 21: Consumer VR Headset Processor Market Share**

Source: Observer Analytics, 2019

Figure 22: Consumer VR Headset External Sensors

Source: Observer Analytics, 2019

When it comes to external sensors, 88.8% of headsets continue to use two sensors and 11.3% use three or more (Observer Analytics, 2019). Interestingly, this could be about to trend downwards as Oculus has taken a different direction with the Oculus Quest and the new Oculus Rift S doing away with external sensors altogether. The brand's relative dominance at the moment could mean that we see a different direction for consumer headsets and how they track the user in the future.



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4 CONCLUSION

Already 2020 is shaping up to be an exciting and potentially pivotal year for immersive content, software and hardware. Although there is variability in how different areas are viewed and perceived to have performed, there is broad-based optimism about growth and future potential.

Enterprises will provide the XR industry with a key base from which to grow. Businesses and public bodies increasingly see the value that it can bring to their organizations, allowing for cheaper training costs, easier product development, better collaboration across complex projects and vastly improved visualization. This flow of investment into the space will allow XR businesses to flourish on a continued and engaged user base and accelerate the development of VR technology and adoption rates.

Consumer XR may not have quite the same level of profitability yet but it is showing signs of major potential and the next 18 months should see key developments. From the likely dropping of the next generation of consoles into the consumer market, to falling headset costs, to the explosion of open-source development software, to the rash of AR integration on major platforms, the space is likely to evolve extremely rapidly and for the better.

It is our belief that 2020 will be a critical year for the development and application of XR technologies in both enterprise and consumer entertainment. VR & AR are already becoming deeply interwoven with business practices across industry and are on the verge of taking a huge leap into the consumer mainstream as never before. It remains a thrilling and critical space to watch.



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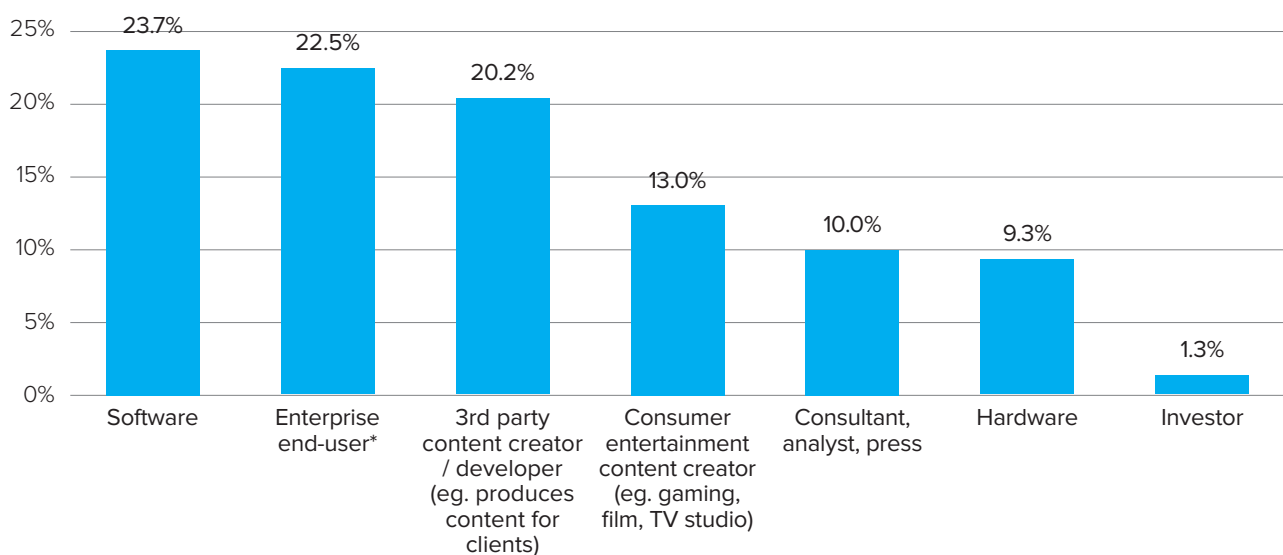
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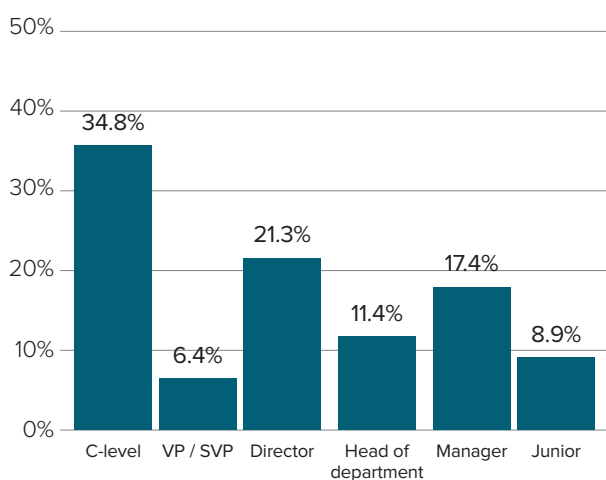
VR intelligence conducted a cross-sectional survey of XR professionals in Q2-Q3 2019. These respondents represent our primary audience of senior-level decision covering content creators, hardware and software manufacturers, industry end users, consultants, analysts, press, and those playing a role in pushing the industry forward. A total of 761 respondents replied to our survey. The following is a breakdown of how respondents identified themselves.

Company Type

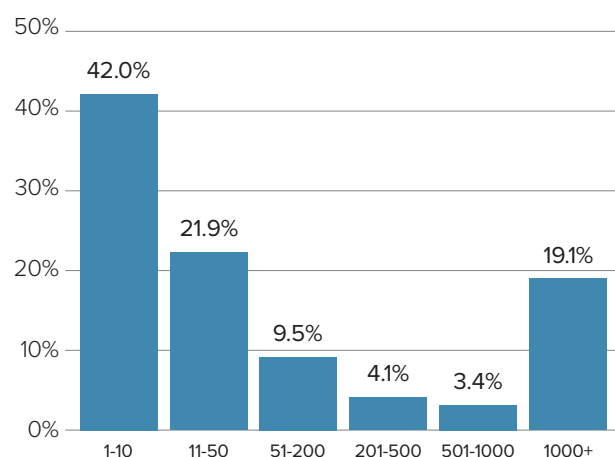


*In such industries such as automotive, construction, engineering, manufacturing, retail, logistics, banking etc. + education and healthcare institutions.

Seniority of Respondents



Company Size



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Decision Makers

50%
End Users

10+
Industry Verticals

A SOLUTION DRIVEN AGENDA DEDICATED TO ENHANCING CONSUMER EXPERIENCE TO DRIVE VR & AR ADOPTION

- **WHO** is leading the charge that you should be partnering with? And what are the secrets of their success?
- **WHAT** are the primary platforms, hardware, software and solutions options that will take immersive tech and content to the next level? And where are the tech gaps?
- **WHERE** are the real consumer and enterprise market opportunities right now? And what's coming round the corner?
- **WHEN** will VR & AR go mainstream? What major successes are we seeing already? And what are the barriers holding back adoption?
- **HOW** are businesses across industry reacting to the shift to immersive tech? What impacts are VR & AR having on day-to-day operations and productivity?
- **WHY** should you be investing? Will early movement pay-off, and what levels of ROI can you expect?

[VIEW THE FULL AGENDA HERE >>>](#)

WORLD CLASS SPEAKERS FROM THE MOST POWERFUL COMPANIES ACROSS INDUSTRY, TECH & ENTERTAINMENT



Michael Haddad
Augmented Beauty US Director
L'Oreal

L'ORÉAL
Research & Innovation



Lee Billington
Director of Digital Experience Design
Gensler

Gensler



Raj Pallapothu
mHealth Global Business Lead
Bayer



Shelley Peterson
Principal Investigator – AR & MR
Lockheed Martin

LOCKHEED MARTIN



Ted Schilowitz
Futurist in Residence
Paramount



Curtis Hickman
Chief Creative Officer
The VOID



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Unquestionably the best conference of its kind I've been to. The quality of the presenters, depth of thinking, and real-world experience on hand was exceptional.

Skip D'Amico, Global Manager, Digital Innovation, **Cadillac**



REGISTER TO CONNECT WITH 600+ XR DECISION MAKERS >>>