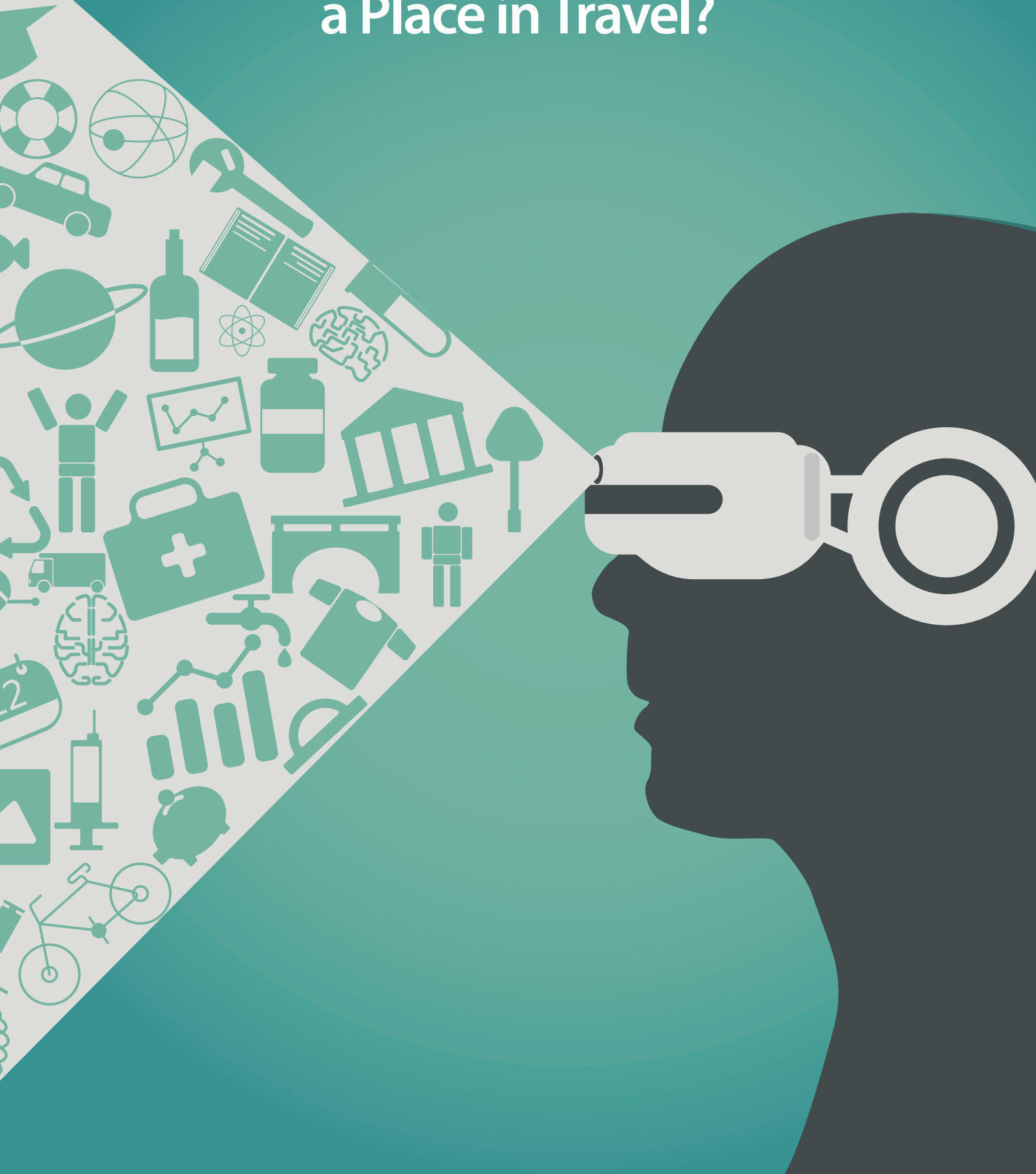


Does Virtual Reality Have a Place in Travel?



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About EyeforTravel

We bring together everyone in the travel industry, from small tech start-ups to international hotel brands, to form a community working towards a smarter and more connected travel industry.

Our mission is to be the place our industry goes to share knowledge and data so that travel and tech brands can work collaboratively to create the perfect experience for the modern traveler.

We do this through our network of global events, our digital content, and our knowledge hub - EyeforTravel On Demand.

Our Values

We believe the industry must focus on a business and distribution model that always puts the customer at the center and produces great products. However, to deliver an outstanding travel experience, the strength, skills, and resources of all partners in the value chain must be respected and understood.

At EyeforTravel we believe the industry can achieve this goal by focusing on a business model that combines customer insight with great product and, most importantly, places the traveler experience at its core.

At our core we aim to enable the above by valuing impartiality, independent thought, openness and cooperation. We hope that these qualities allow us to foster dialogue, guide business decisions, build partnerships and conduct thorough research directly with the industry.

These principles have guided us since 1997 and will continue to keep us at the forefront of the industry as a vibrant travel community for many more years to come.

Our Services

Our events are at the heart of EyeforTravel. These draw in experts from every part of the travel industry to give thought-provoking presentations and engage in discussions. It is our aim that every attendee takes back something new that can help their business to improve. This might be in the fields of consumer research, data insights, technological trends, or marketing and revenue management techniques.

Alongside this we provide our community with commentary, reports, white papers, webinars and other valuable expert-driven content. All of this can be accessed through one place - the On Demand subscription service.

We are always expanding the content we create, so please get in touch if you want to write an article for us, create a white paper or webinar, or feature in our podcast.

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- 70,000+ database contacts
- 2,500+ annual event attendees
- 100,000+ monthly online reach
- 1,000+ online conference presentations

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Introduction

Communicating the experience is key for the travel and tourism industry. Experiences are the currency of the travel industry but giving travelers a genuine and personalized idea of what their leisure trip will look like has been elusive.

Enter VR, which potentially could transform how travel is marketed.

Although the simulation of reality has been the goal of scientists and marketers for decades, the level of awareness of VR's increasing capabilities outside of the video gaming community is still growing and in its infancy. However, there is evidence that consumers can already see the potential of VR and how it can be used in a practical sense to discover travel.

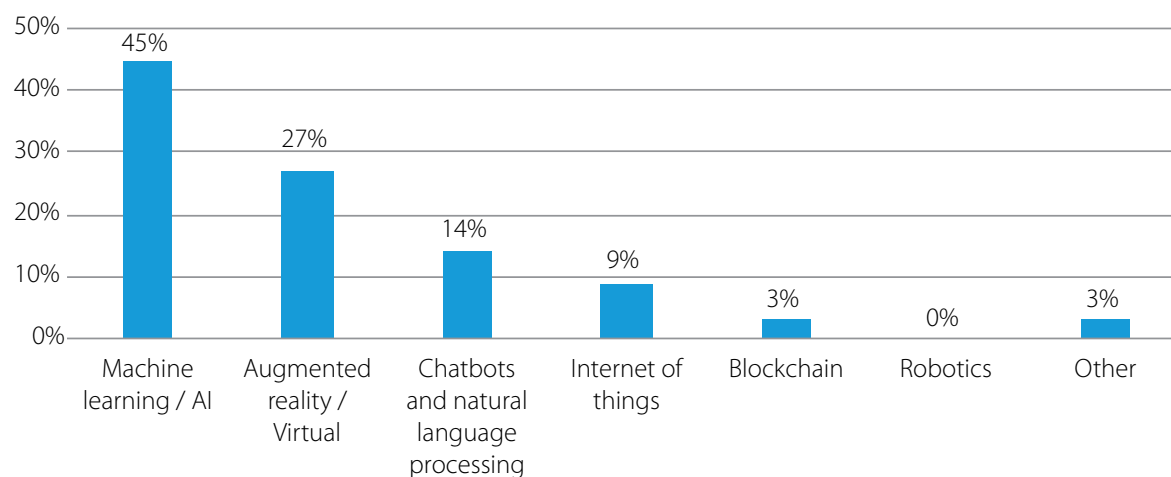
Shipment numbers of dedicated headsets are also small, especially when compared to annual sales of the big brand name smartphones. However, with the purchase

of Oculus Rift by Facebook, the public profile of this technology was suddenly thrust into the limelight.

From initial steps in the 1960s, rapid development of the concept of "VR" in the 1980s, to today where the dream for VR can finally now be realized - technology has finally delivered the platforms needed, creating virtual environments and spaces, only limited by the creators' imaginations and their budgets.

Developing completely immersive experiences is the ultimate goal of the VR industry. Today, VR is evolving video content into 360-degree experiences that can be accessed on very low-cost VR equipment – a smartphone and Google Cardboard can deliver a surprisingly realistic 3D experience to the user. More sophisticated hardware and software can improve these images, but cost and a low installed user base will need to improve before more brands make the substantial investments needed to further evolve VR.

Figure 1: Which of the following emerging technology excites you most?



Source: EyeforTravel's San Francisco Summit, 2017



Despite the small market currently, the travel industry should be a key driver of VR technology for commercial use, especially as it has always been an early adopter of new technologies. Offering customers novel ways of researching a destination will continue to grow in popularity.

Travel brands will also be able to further leverage User Generated Content (UGC), which has proven to be massively popular and shows no signs of stopping yet. With 360-degree cameras that are capable of shooting content for VR applications and affordable to ordinary consumers, travel brands will literally be able to add a new dimension to their marketing using this content.

At EyeforTravel's San Francisco Summit, attending travel professionals thought that AR and VR was the most exciting area of emerging technology, behind machine learning and AI (see Figure 1).

As with any emerging technology it is important to remain grounded, as Morton Heilig, inventor of the Telesphere Mask and original VR pioneer, said all the way back in 1960: "When anything new comes along, everyone, like a child discovering the world, thinks that they've invented it, but you scratch a little and you find a caveman scratching on a wall is creating virtual reality in a sense. What is new here is that more sophisticated instruments give you the power to do it more easily. Virtual reality is dreams."

1

A Brief History of VR

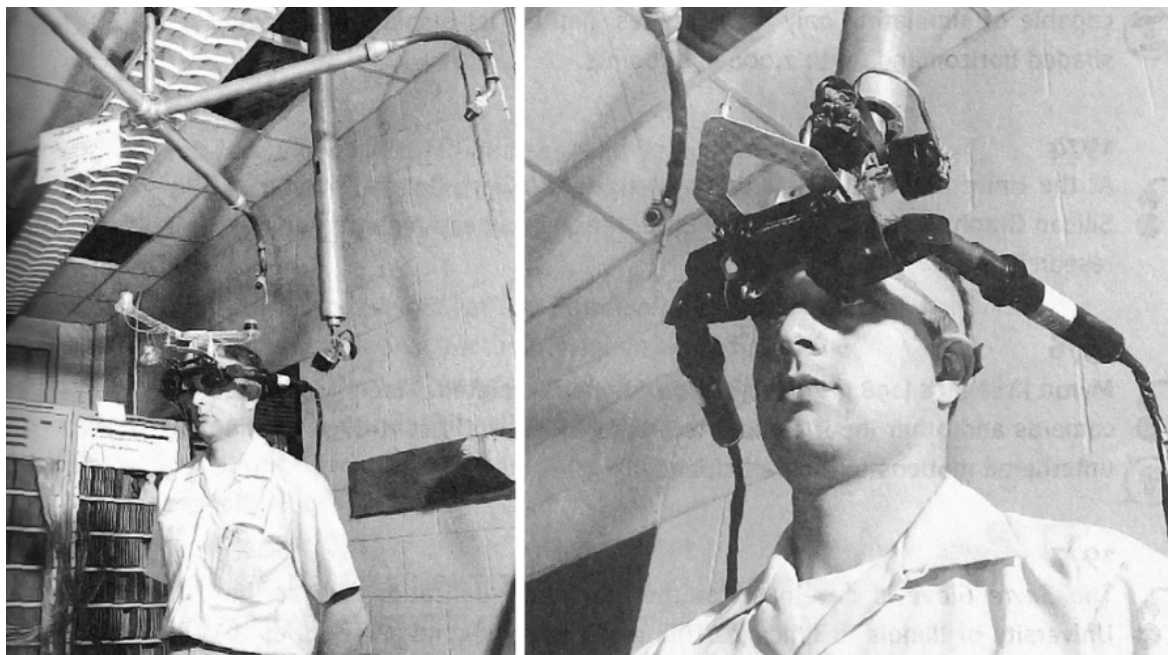
The head-mounted display, as we recognize VR today, can trace its history to the 1960s. Patented by Morton Heilig in 1960, the Telesphere Mask offered 3D stereoscopic images with sound, but no motion tracking. The following year, Comeau and Bryan – two Philco Corporation engineers – developed the Headsight, which incorporated video and motion tracking for the first time, giving a glimpse of what VR could be.

Ivan Sutherland is credited with first describing what would later become virtual reality, stating: “The ultimate display would, of course, be a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With

appropriate programming, such a display could literally be the Wonderland into which Alice walked.”

The actual term “virtual reality” would have to wait until the 1980s when Jaron Lanier, founder of the visual programming lab (VPL) coined the term. VPL developed a range of hardware and software that would form the basis of VR today. High cost and a lack of processing power of the computers that generated the virtual worlds prevented VPL from commercializing their technologies.

In the 1990s the film *The Lawnmower Man* again moved VR back into the public consciousness. Then, 1993 saw Sega announce its VR headset for the Sega Genesis console. The head-mounted display had head tracking,



Even in 1968, scientists and engineers were dreaming of VR, creating this head mounted three-dimensional display. Credit to Ivan Sutherland, 1968.



NASA astronaut Scott Kelly performing checkouts for NASA's Project Sidekick, which makes use of Microsoft's HoloLens device. Credit to NASA.

stereo sound and LCD screens. However, cost and development issues meant it remained a prototype.

Again, a film moved VR into focus with the release of *The Matrix* in 1999. Depicting a virtual world that moved the vision of *Tron* and *The Lawnmower Man* on to question the very nature of what is real and what is simulated, the 21st century would finally see VR achieve its goal of a simulated experience that potentially could be mistaken for reality.

The year 2014 was pivotal in the history of VR. Computing technology, displays and 3D graphics had all advanced to the point where they could converge into a perfect storm of development. The purchase of Oculus Rift by Facebook and the development of competing VR platforms, such as HTC Vive and PlayStation VR, mean that the technology will continue to evolve and develop.

Currently, VR is in early adopter mode with high relative costs. However, the next three to five years should see overall costs reduce to move VR into the mainstream, allowing more brands, including

those right across the travel sector, to leverage the technology in their businesses.

Announced at CES 2017, Pico Neo CV breaks the tether between the VR headset and the PC, offering a completely wireless experience. For travel brands, currently the only wireless option is the decidedly low-tech Google Cardboard. Pico Neo CV could offer the virtual freedom that many users are looking for. But all eyes are on the development and popularity of Samsung's Gear VR, which offers an affordable entry point for consumers into the world of VR.

Current and Forecast VR Market Conditions

The current market conditions for VR are mixed to say the least. Despite the hype and promotion surrounding VR, it remains in an early adopter phase. 2016 failed to be the year where VR became mainstream, as many analysts had predicted. That being said, there are signs of both interest and traction with consumers. These early tendrils are growing and should lead to substantial increases in shipments of headsets, monthly users, and market value of VR products sold each year over the next half a decade.

2.1 Consumer Perceptions of Virtual Reality

When it comes to consumer perception of VR, there is interest in the medium and an appetite for consumption that crosses different geographies. Furthermore, a substantial proportion of consumers can already see the possibility of using VR in travel planning. However, VR will need to overcome pricing barriers, with many

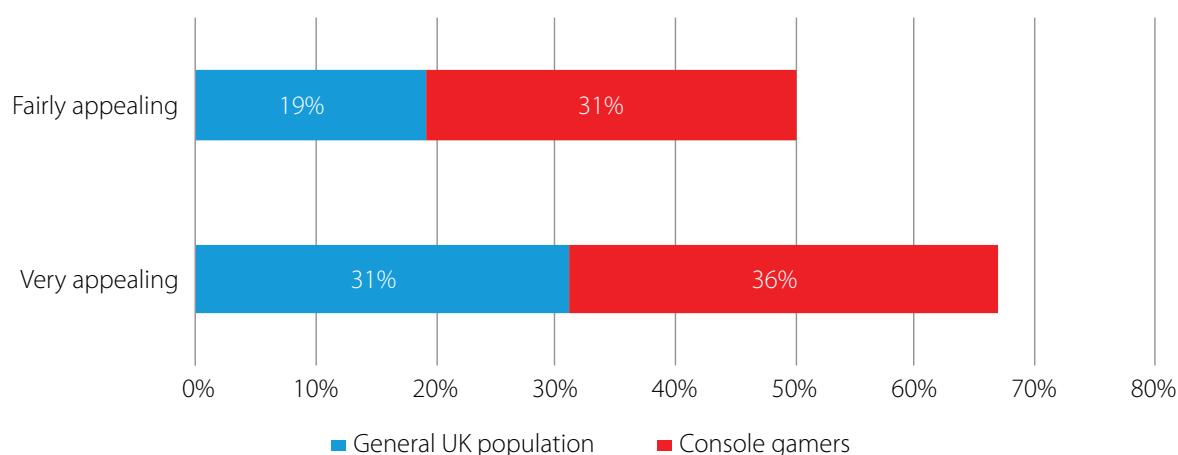
consumers waiting for prices to fall before committing to buying dedicated headsets.

Currently, it is up to leading technology consumers to acquire VR technology, particularly for gaming. They will bring VR into the mainstream, as will cheaper but more capable headsets, and more content on VR, which is currently quite limited. For travel brands, this content will need to be provided at low to no cost and will also need to be compatible with smartphone VR software, as this is where the consumer market is expected to be largest in both user and device shipment terms.

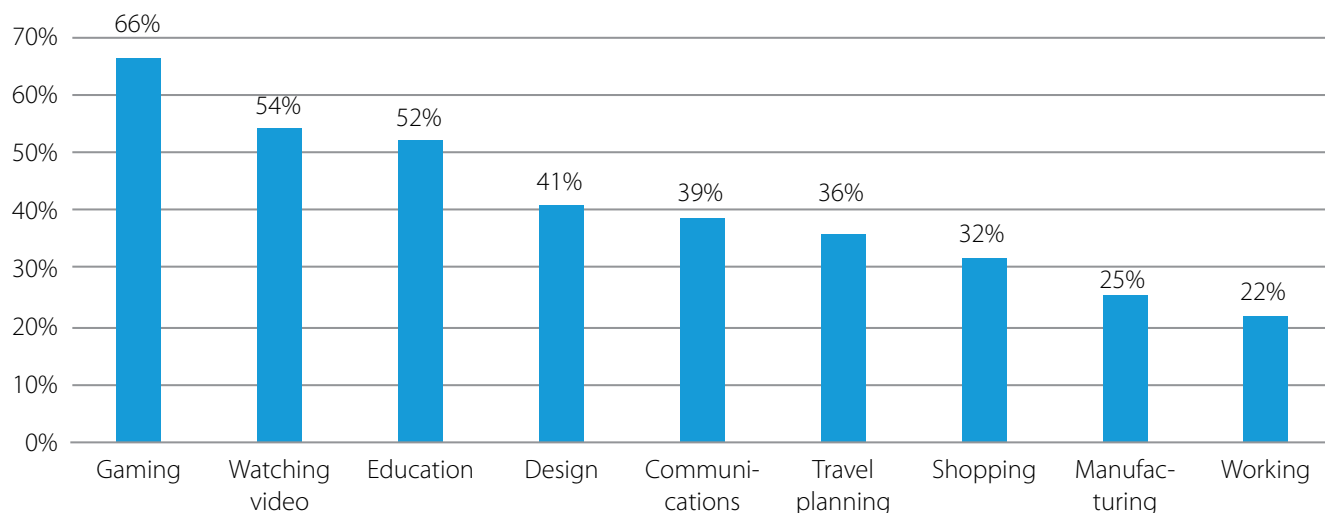
Consumer interest in VR crosses geographic boundaries with a variety of studies noting consumers are open to owning and using VR, including for travel content.

GfK Consumer Research in the UK found that half of British consumers find the idea of owning a VR device appealing, with most – 31% – finding the idea very appealing. GfK also found that this figure rose among

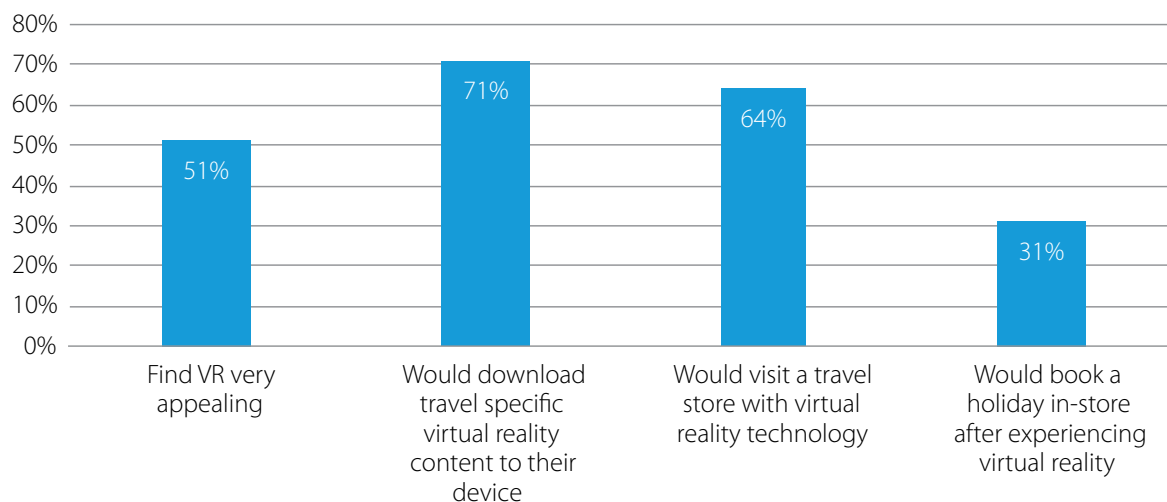
Figure 2: How appealing do you find the idea of owning a virtual reality device (UK consumers)?



Source: GfK, 2017

Figure 3: Where Do UK Consumers Feel VR Would Be Useful?

Source: GfK, 2017

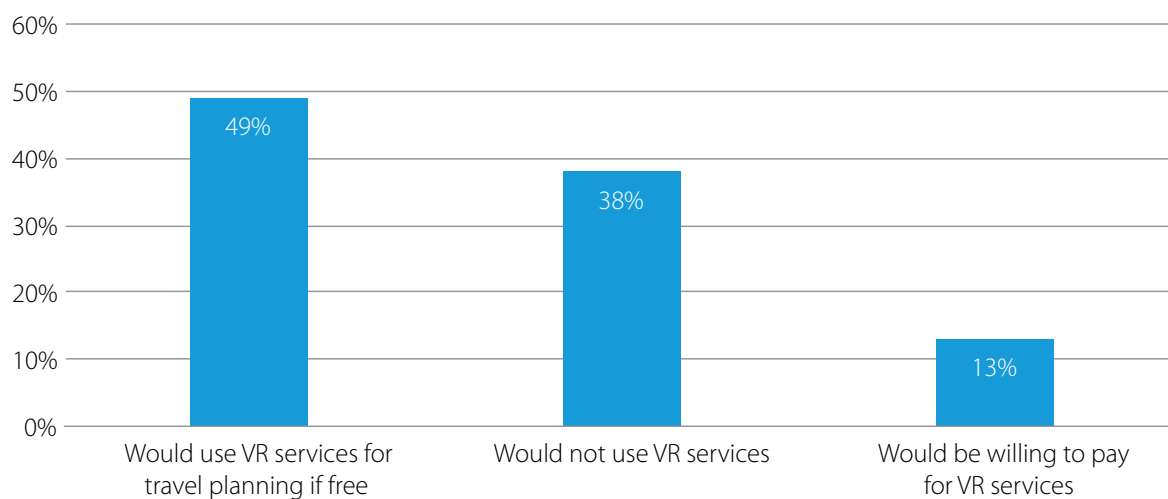
Figure 4: Attitudes to VR in the Middle East, North Africa and South Asia

Source: YouGov, 2016

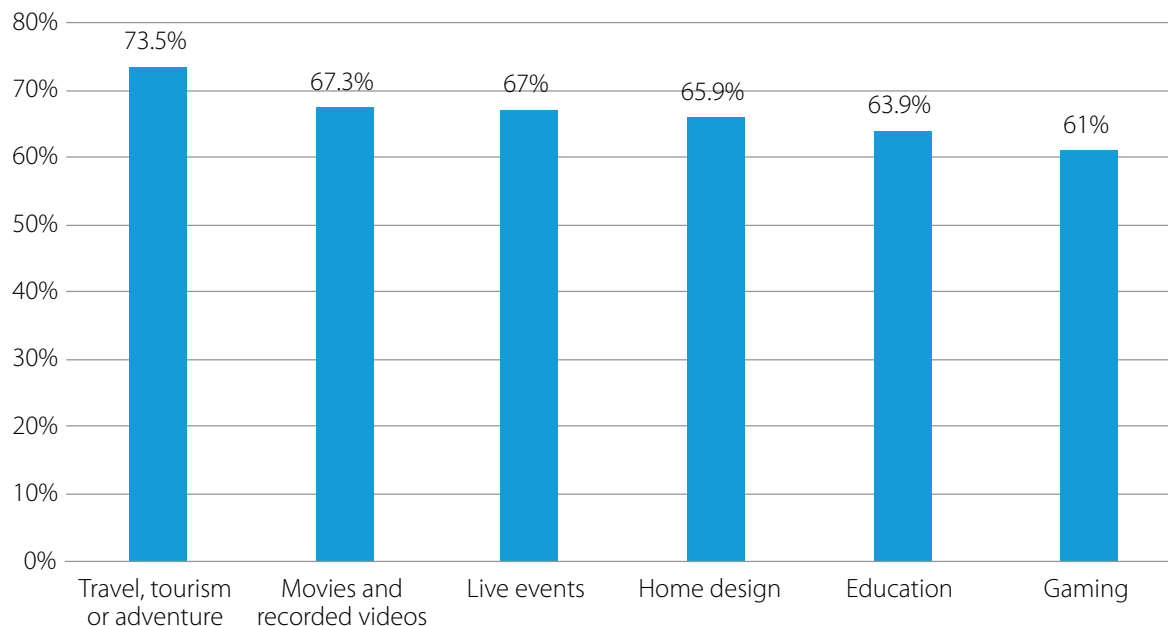
leading edge consumers and gamers. For the latter, more than two thirds (36%) thought that owning a VR device was appealing (GfK, 2017; see Figure 2).

For UK consumers gaming was clearly felt to be the area where VR could have applications, with 66% of the sample seeing it as an area of use. For travel, 36% of respondents saw VR as playing a useful role in travel planning (GfK, 2017; see Figure 3).

Results elsewhere are even more encouraging for travel and VR in the future. A YouGov poll of consumers in the Middle East, North Africa and South Asia revealed that 51% of consumers from the 21 countries surveyed find VR “very appealing”. When it came to travel and VR, nearly three-quarters of respondents (71%) would use VR as an aid to plan their holiday and found 64% would visit a travel agent if VR was available, with a third stating they are likely to book a trip after experiencing the destination using VR (YouGov, 2016; see Figure 4).

Figure 5: Attitudes to VR for travel planning in Germany

Source: Statista, 2016

Figure 6: Percentage of US Consumers Interested or Very Interested in Using VR

Source: Greenlight VR, 2016

Statista Digital Market Outlook conducted a survey in Germany and concluded that 62% of respondents would consider VR as a tool for holiday planning (Statista 2016; see Figure 5). Research focusing on the US from Greenlight VR was even more encouraging, particularly as the US is expected to be the biggest market for VR technology in the medium term (see

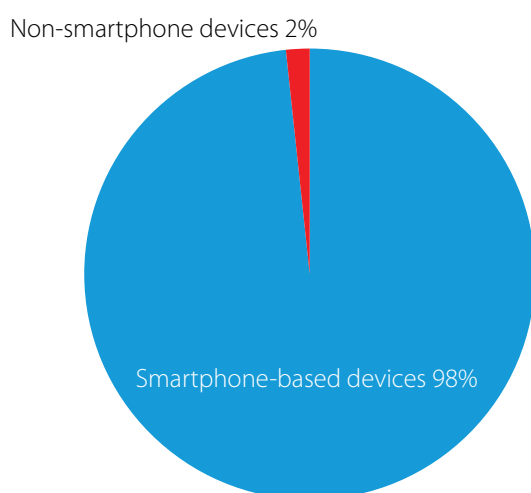
Figure 11). In a 2015 consumer survey they found that that gaming was the area of most interest for US consumers. However, by mid-2016 this had shifted, with travel, tourism or adventure (73.5%) rising to become the top category that consumers were interested or very interested in, far ahead of gaming (Greenlight VR, 2015; see Figure 6).

Across these surveys there was also a consensus that VR is facing a barrier when it comes to adoption, and that is cost. This notion encompasses all costs, with consumers wary about overpaying for VR headsets, supporting hardware and even services. In Statista's German survey only 13% would consider paying for a VR experience that helps them to plan their travel (Statista, 2016). Greenlight VR's research found that the biggest concern reported by US consumers in 2015 was that they considered it

"too expensive", an issue cited by 45% of respondents, and this was followed by 29% reporting that they were "waiting for a price drop" (Greenlight VR, 2015).

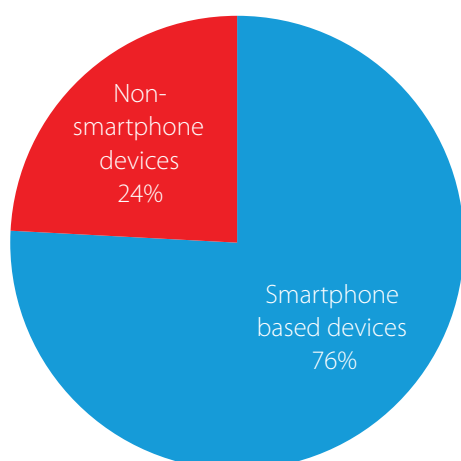
GfK reported that the leading issue for consumers in their UK survey was "the price of VR headsets (73%), followed by the price of other hardware (64%), safety concerns around using VR outside the home (61%), worries about VR devices excluding others from sharing the experience (44%), and nervousness around VR consuming attention. Although much reported in the media, concerns about motion sickness were expressed by only 33% of players (lower than we expected), and advertising worried only 26% of respondents."

Figure 7: Estimated Share of Smartphone and Non-Smartphone VR Device Shipments 2016



Source: SuperData, 2017

Figure 8: Estimated Share of Smartphone and Non-Smartphone Device Shipments 2021



Source: CCS Insight, 2017

However, these perceptions should diminish over time as costs will fall with increased production volumes, especially as mass manufacturing of devices for the smartphone market gets into full swing. In 2016, SuperData estimated that 98% of the VR devices shipped were designed to be used with smartphones (SuperData, 2017). This is expected to broadly continue, although non-smartphone VR devices are expected to increase to 24% of shipments in 2021 (CCS Insight, 2017). As the smartphone market is, and is expected to be dominant, producers will need to manufacture cost-effective devices. Smartphone users are unlikely to buy expensive, bulky, and complex pieces of equipment and will more likely be looking for something that is easy to integrate and that can use a wide variety of app-enabled content.

Low-cost smartphone VR platforms are typified by Google Cardboard and then, at a step up above, Samsung's Gear VR. These offer high levels of flexibility and the most consumer penetration so far (see Section 2.2 for more on which company's devices have shipped the most units). Although these are not as powerful or quite as immersive as full, tethered VR set-ups, they are the best route into VR for travel and tourism brands and do not require substantial and long-term investments.

The interest in a wide variety of applications and the dominance of smartphones points to a much wider set of use cases for VR than just gaming. "Virtual reality has always been more than a medium for gaming experiences and consumers understand that," said Clifton Dawson, CEO of Greenlight VR. "Our findings from multiple studies suggest that some players in the VR ecosystem may be overly focused on gaming. The reality is that consumers have a wide variety of interests for using virtual reality. Platform and content providers would

be wise to consider these bigger, richer findings as they develop their content portfolio and marketing strategies.”

Overall, even with VR just emerging and maturing as a consumer technology, there is already considerable awareness and interest in VR. Furthermore, travel-related VR content is widely considered by consumers to be an area that holds extremely high potential. Within a few years, as ownership and encounters with VR rise, this should lead to a majority of consumers seeing VR as a viable means of planning journeys.

2.2 Virtual Reality Device Sales

Despite this interest in VR and a recognition of functionality, sales in 2016 were disappointing when compared to forecasts made before the year began. For example, CCS Insight adjusted its forecast to reflect a slower start. Previously it expected 2 million units of dedicated VR headsets (such as the Oculus Rift or PlayStation VR, as opposed to smartphone units) to be sold in 2016 – it now estimates 1.2 million were sold. Similarly, Digi-Capital expected a combined USD4.4 billion of VR/AR revenue in 2016 but revised that estimate down to USD2.7 billion (Digi-Capital, 2017).

When it comes to the manufacturers currently in the lead, Samsung and Google are ahead in terms of

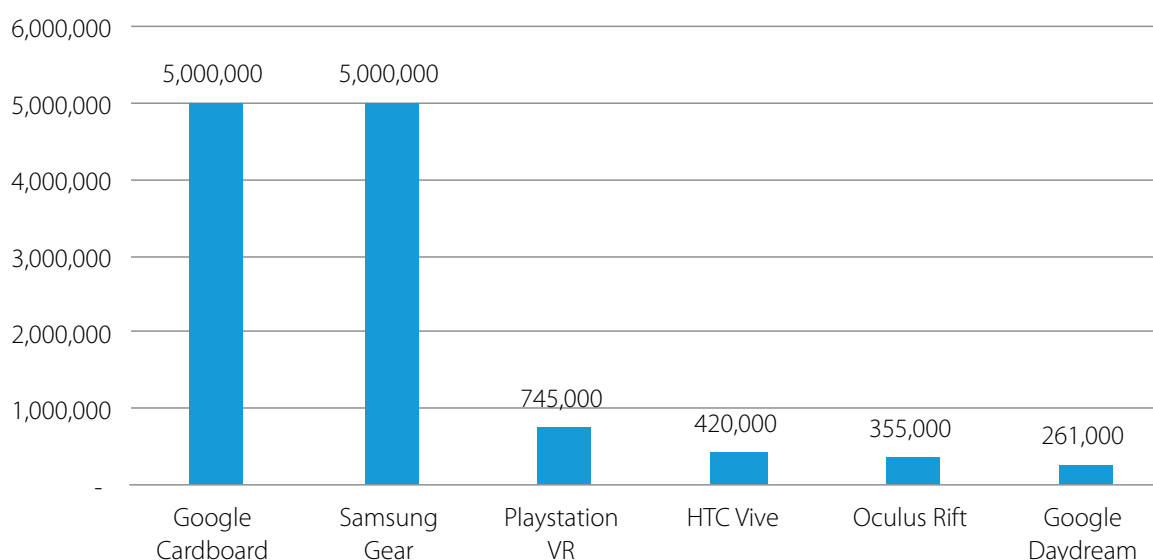
shipments according to self-reported data. Both claim that in 2016 they shipped around five million units of their Gear and Cardboard systems (Business Insider, 2017; Fortune, 2017). Google also notes that its VR Cardboard app has been downloaded a reported ten million times, giving it a healthy installed user base. It is also worth noting that Samsung struggled with brand image and its model line after flaws in the Galaxy Note 7, so this may have diminished their potential sales in 2016.

When it comes to more complex dedicated systems, the numbers are far smaller. SuperData Research estimates that by the end of 2016 the following had been sold among the major VR headset players going for more expensive and complex offerings:

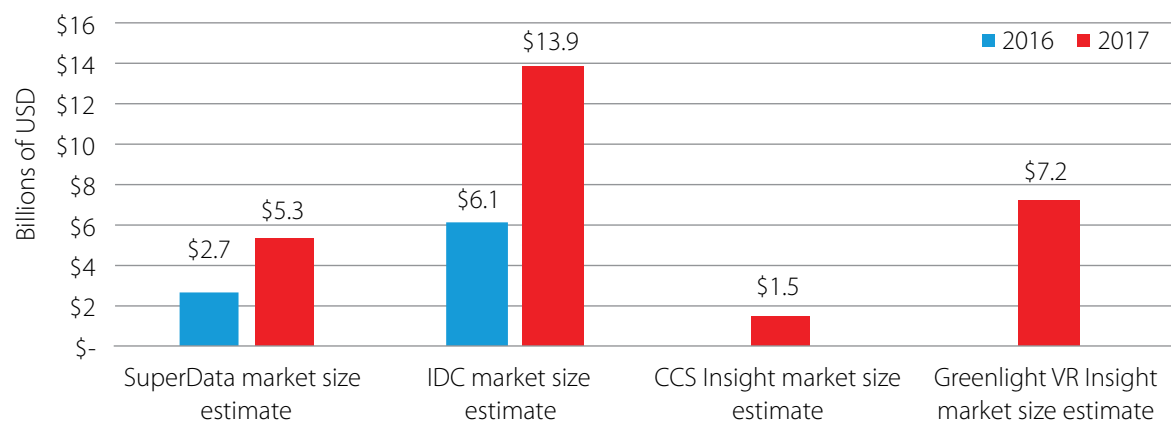
- 745,000 PlayStation VR units.
- 420,000 HTC Vive units.
- 355,000 Oculus Rift units.
- 261,000 Google Daydream units (SuperData, 2017).

This means that between approximately 1.2 million and 1.5 million units of dedicated VR headsets were shipped in 2016, far behind the number of smartphone devices that were shipped, which reinforces the point that consumers are currently wary of investing in pricey VR units and putting their cash towards the lower end of the market.

Figure 9: Shipments of VR Headsets by Company in 2016



Source: Business Insider, 2017; Fortune, 2017; SuperData, 2017

Figure 10: Estimated Revenues Generated from VR in 2016 and 2017 (USD billions)


Source: SuperData 2017; CCS, 2017; IDC, 2017a; Greenlight Insights, 2017

Table 1: Estimated Revenues Generated from VR in 2016 and 2017

SuperData market size estimate	SuperData forecasted YoY change	IDC market size estimate	IDC forecasted YoY change	CCS Insight market size estimate	Greenlight VR Insight market size estimate
2016 USD2.7 billion		USD6.1 billion			
2017 USD5.3 billion	96.3%	USD13.9 billion	127.9%	USD1.5 billion	USD7.2 billion

Source: SuperData 2017; CCS, 2017; IDC, 2017a; Greenlight Insights, 2017

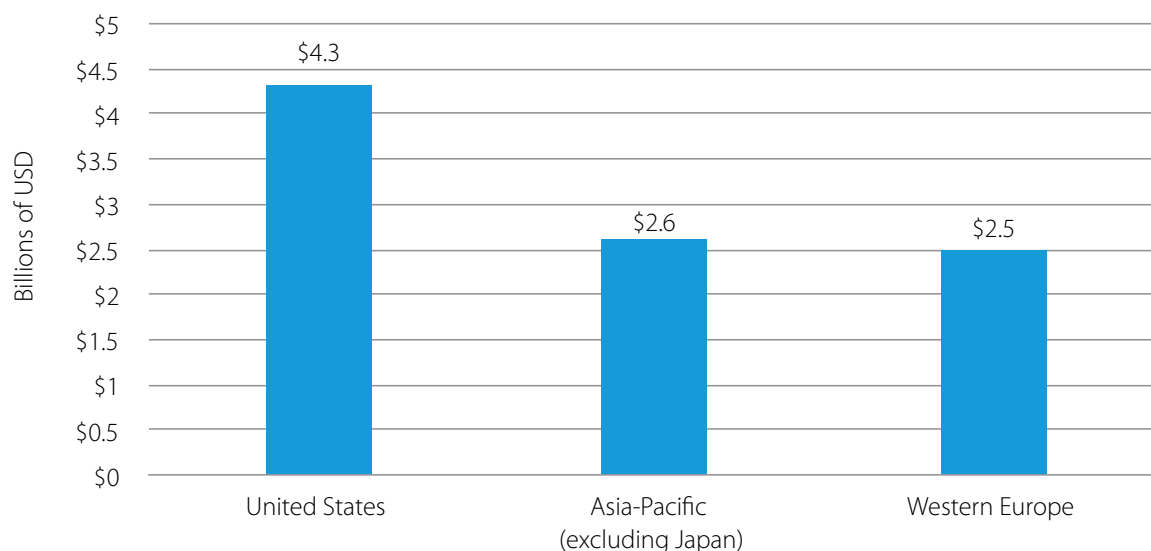
Nonetheless, the VR market is still turning over noticeable sums of cash even at this early stage and analysts are expecting big leaps in spending in VR in 2017 and beyond. SuperData estimates that the VR market was worth USD2.7 billion in 2016 and IDC ballparks it at a much higher USD6.1 billion. Heading into 2017, both expect the market to roughly double, with SuperData estimating that it will reach USD5.3 billion and IDC expecting revenues of USD13.9 billion (SuperData, 2017; IDC, 2017a). CCS is far more cautious, with the lowest expectation of just USD1.5 billion in revenue. Greenlight VR puts the market in 2017 at USD7.2 billion (CCS Insight, 2017; Greenlight Insights, 2017). Averaging out these estimates suggests that 2017 will see considerable growth and a greater exposure of VR as leading edge consumers continue to purchase VR products and consumer consciousness grows. There will also be more variety and a greater number of players in the VR field. For example, Google Daydream was only released in November of 2016 and Microsoft are expanding their range of HoloLens devices into a fully fledged set of

products in 2017. Overall, 2017 will set the ground for further growth, with shipments increasing ahead of revenue, as we shall see in the next section.

When it comes to expectations for market growth, the clear leader is the US. IDC expects the US to generate USD4.3 billion of revenue in 2017, compared to USD2.5 billion for the entirety of Western Europe and USD2.6 billion for all of Asia-Pacific outside Japan (IDC, 2017a). Given that the US is the base for most of the major companies pushing VR, such as Google, Microsoft, and Facebook, and thanks to its high disposable income, it seems that this market will be the most focused-upon for VR offerings in 2017.

2.3 Virtual Reality Market Growth to 2021

It is really over the next four years that most analysts expect VR technology and consumer adoption to become mainstream and to deliver meaningful market

Figure 11: Forecasted VR and AR Spending by Region in 2017 (USD billions)


Source: IDC, 2017a

growth. Almost all forecasts point to shipments of devices creating a genuinely meaningful market within a few years. If predictions do follow through, then 2021 will see the number of devices owned and regular users reaching into the hundreds of millions.

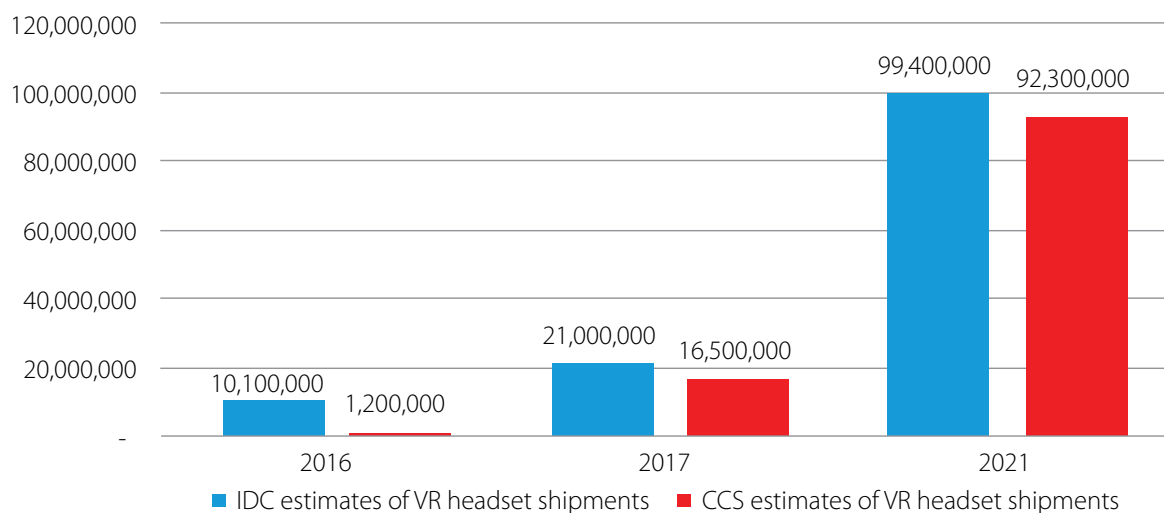
In terms of device shipments, both CCS Insight and IDC expect roughly comparable trajectories. In 2017 shipments will accelerate dramatically in both projections, to 21 million in IDC's forecast and 16.5 million in that of CCS. It is expected that the lion's share of this will continue to be smartphones. CCS Insight expects that 14 million smartphone VR headsets will be sold in 2017, rising to 25 million in 2018 and then 70 million by 2021. CCS expects the remainder of shipments to be largely tethered VR systems, such as Oculus Rift, with untethered systems picking up at the end of the forecast period (CCS Insight, 2017; IDC, 2017b; see Table 2).

CCS Insight's latest forecast estimates that the total VR device market (smartphone VR and dedicated VR) will be worth USD1.5 billion in 2017, rising to USD9.1 billion by 2021. The higher cost of dedicated headsets will see them accounting for 85% of total market value despite making up only 24% of unit sales (CCS Insight, 2017).

Both companies expect total VR device shipments to be just shy of 100 million by 2021, indicating a healthy market for VR if correct.

Although these estimates may seem high given the small number of headsets shipped globally in 2016, they make more sense in the context of how new this technology is from a mass consumption perspective and the fact that major markets are only just awakening to VR. For example, IDC estimates that in the Chinese market shipments of dedicated VR units were relatively unchanged from Q3 2015 to Q2 2016 but drastically took off in Q3 2016, indicating the world's second largest economy awakening to VR. In Q2 2016 43,646 dedicated headsets were shipped in China, followed by 204,207 units in Q3, or a rise of 367.9%. IDC also notes double digit percentage increases in the number of cardboard units delivered in Q3 2016, with unit shipments reaching 1,268,000. From here it expects a "more than four-fold" increase again in shipments in China throughout 2017 (IDC, 2017c).

With shipments per year of VR devices in major markets expected to grow by more than 400% from 2017 to 2021, the user base will also expand into a viable market over the next few years. SuperData estimates that the number of average monthly unique users of VR was 16 million in 2016. It expects this to rise by 80% in 2017 to more than 28.8 million, and then up to 81.5 million by 2019 (SuperData, 2017). If this trend were to broadly continue to 2021 then this would mean approximately 120 million monthly unique VR users – a growth of more than 300% from 2017 to 2021.

Figure 12: Estimated Shipments of Dedicated VR Headsets 2016-2021

Source: CCS Insight, 2017; IDC, 2017b

Table 2: Estimated Shipments of Dedicated VR Headsets 2016-2021

	IDC estimates of VR headset shipments	CCS estimates of VR headset shipments	CCS estimates of smartphone VR headset shipments	CCS estimates of tethered VR headset shipments	CCS estimates of standalone VR headset shipments
2016	10,100,000	1,200,000	-	-	-
2017	21,000,000	16,500,000	14,000,000	24,000,000	100,000
2021	99,400,000	92,300,000	70,000,000	19,000,000	3,300,000

Source: CCS Insight, 2017; IDC, 2017b

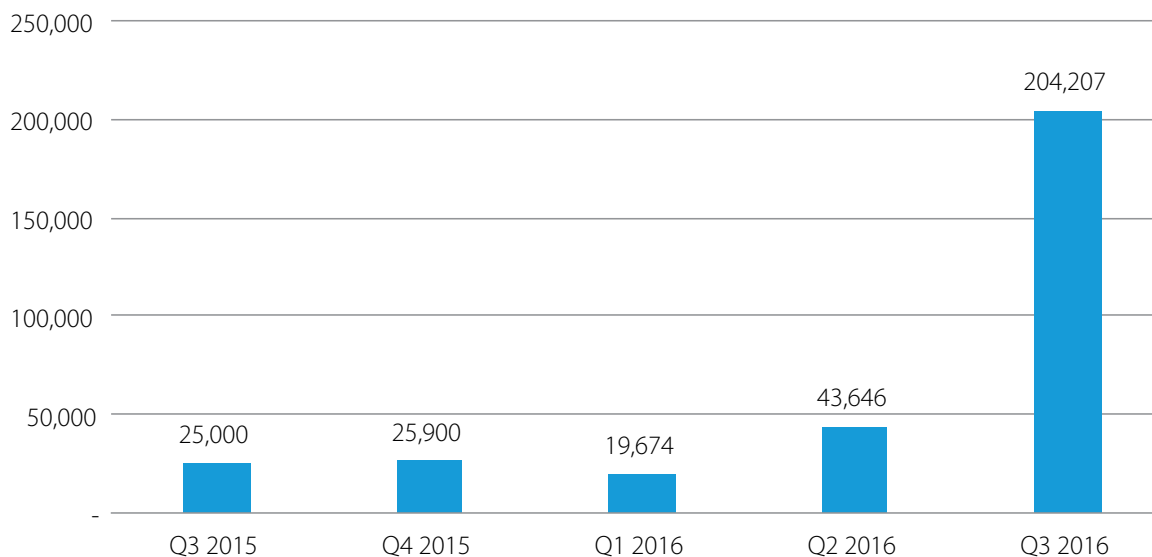
Overall then, the projections indicate considerable medium-term growth in shipments and users of VR. From a small market base in 2016, the market is expected to have a strong 2017, mature into an established content medium by the early 2020s, and should be a sustainable, substantial market with a strong user base by the mid-2020s.

However, currently there are two main barriers to major VR adoption – cost and content. As we have already covered in Section 2.1, cost is the top concern among consumers. Although this will fall with time and Google Cardboard and its imitators already exist, in 2017 thus far, and likely for the remainder of the year, fully immersive systems will remain too expensive for more than the leading edge of consumers. Manufacturers are still

probing possibilities, manufacturing scales still remain relatively small and the investments that companies are making have still not filtered through to the market. For example, Magic Leap have seen huge hype and massive funding but have yet to release a product.

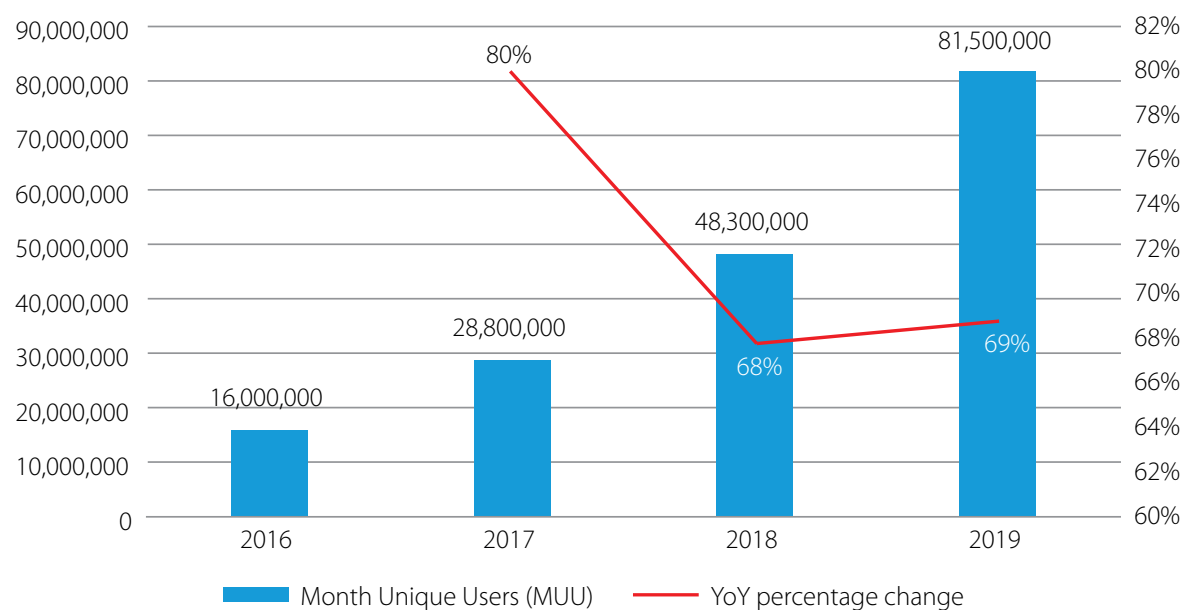
Content may be an even bigger problem than cost. Valeriy Kondruk, CEO of Ascape VR commented: “The main challenge is how to keep the audience engaged with the experience, how to tell a story in 360 degrees. In fact, the lack of good content might be the main barrier for large-scale implementations now. There’s no market for 360-degree stock footage despite some attempts to create it. And 99% of the attractions are not filmed in 360-degree yet. Thus, you’d need to film this tour to Yosemite yourself to have it on your website.”

Figure 13: Quarterly Dedicated VR Device Shipments in China in 2015 and 2016



Source: IDC, 2017c

Figure 14: Growth in Average Monthly Unique Users of VR 2016-2019



Source: SuperData, 2017

Even in gaming, where interest and products have been mostly strongly focused until fairly recently, companies are likewise still largely exploring and developing. There hasn't really been the "killer" app, game, or experience to drive extremely large-scale engagement.

Overall though, changes are afoot and releases are constantly being touted by various brands. Ben Wood, Chief of Research at CCS Insight, commented: "The technology continues to improve dramatically and 2017 will see the emergence of untethered solutions that will be more immersive than ever. Audiences will have

access to a more diverse range of ever-richer content and experiences that we believe will further boost the market. The proliferation of VR experiences in theme parks, at cinemas and in other locations such as car showrooms and travel agents offering 'look before you book' experiences will only serve to educate users on the potential of the technology."

This points to 2017 being a year where VR makes big strides but does not yet quite break out fully into the mainstream. Instead, it seems more likely that VR will become a major consumer technology closer to 2020. In the meantime, however, there is enormous potential for travel and tourism companies to use VR technologies to demonstrate their products to customers face-to-face and begin experimenting with VR content to try and optimize the experience and their ROI.

3

The Business Case for VR

Although VR devices are not yet widespread, as can be seen in Section 2 there is consumer interest that will drive considerable growth in the medium term in terms of devices sold and monthly users. Even so, VR is still quite an expensive investment for travel brands to make specialist content for. Can travel brands already justify spending and prove an ROI in virtual reality?

3.1 In-Store Virtual Reality

In Section 2.1 we saw that a large segment of the consumer population is willing to visit travel stores with virtual reality hardware, use the technology and allow themselves to be swayed into booking vacations through the experience. Already, brands are beginning to explore this clear commercial use of VR.

Thomas Cook is using VR to enhance the services it offers to customers. Partnering with Visualise, Thomas Cook used Samsung's Gear VR headset in ten of their stores to offer travelers the chance to experience several destinations, including Greece, Singapore, and New York.

In the first three months it generated flights and hotel bookings totaling £12k in the UK and Germany and has seen a 40% return on investment. There was an 180% uplift in New York excursions revenue demonstrating that visualization of tours and activities could be the most powerful use of VR in travel.

"Thanks to working with Visualise, Thomas Cook was the first travel company to deliver in-store virtual reality to customers. We've been nominated for numerous innovation awards, and we've seen a good conversion rate for bookings made after viewing the VR content," commented Lynne Slowey, Former Head of Digital Content, Thomas Cook.

Other companies that are exploring in-store VR are Flight Centre and Virgin Holidays. In the former's case Flight Centre initially trialled VR in-store in Singapore and New Zealand using the Samsung Gear system and has extended VR to further stores in both countries allowing consumers to experience a variety of destinations. It has been experimenting with VR since 2015. Virgin Holidays similarly has been using VR in-store since 2015 with Google Cardboard giving store visitors the ability to experience the Riviera Maya in Mexico.

Here, the high street is gaining a head-start on the OTA. As most consumers don't yet have personal access to VR, OTAs can't offer the personalized and immediate delivery of a VR experience that may be novel today, but may become commonplace over the next few years. Until VR technology reaches a critical mass, innovators in the travel industry can use the technology as a differentiator in the marketplace.

3.2 New Experiences

It is not only in store where VR has promotional uses; being able to demonstrate a service with VR technology is a focus for many businesses across travel and tourism, with airlines in particular keen to experiment with VR for marketing purposes. Passengers at Terminal 8 of JFK Airport in New York could get an introduction to VR with an initiative from American and Westfield Airlines as part of Facebook's Virtual Reality Roadshow. "Travelers are having an absolute blast participating in such a fascinating and enjoyable virtual reality experience," said American Airlines Managing Director, Mike McKanna. "We're always on the lookout for new ways to entertain travelers, and taking part in Facebook's virtual reality tour was too good to pass up."

Qantas have been developing VR apps for the past two years, which enable potential visitors to experience

Hamilton Island, Sydney and Uluru-Kata Tjuta National Park. The VR content has been created for all VR platforms, from Google Cardboard to Oculus Rift.

The level of investment being made illustrates that travel brands can see the long-term potential that VR could have for their overall profitability.

Outside of the airlines an innovative approach is also possible once the traveler has arrived at the destination to enhance their experience. French company Timescope has begun installing units in Paris that can

transport users to different time periods or experiences in the city. The Timescope units, which are mounted to the ground, can give users a 360° view of Paris in 1628 for the one mounted next to the Seine, another shows the Bastille in 1416 and 1798, and another at Charles de Gaulle Airport a variety of experiences in France. Its early days but it is a small demonstration of the possibilities for enhancing tourists' experiences, which can be extended and made more immersive when large numbers of consumers have smartphone devices.

3.3 In Focus: Lufthansa VR

Can you briefly outline how your company is using VR and what prompted the project?

VR is an integral component of our strategy. Traveling is both exciting and inspiring. VR is part of showing experiences and emotions that come with flying. By using virtual worlds and 360-degree views of sights, we can already send our viewers to their travel destinations with an emotionality that was not possible before.

Virtual Reality and 360-degree videos have been a topic for us since ITB 2015. We use this not only for our marketing, but also for B2B sales events and for staff trainings in the technical departments.

On board the maiden flight from Frankfurt to San Jose on July 1 2016, we organized a FlyingLab. The topic of this inflight conference was Virtual Reality. Besides the presentations onboard, our guests could also test the Samsung Gear glasses.

We are also very proud of our travel compass. This device won a Clio, the Oscar of the advertising



Lufthansa has experimented with VR both onboard its aircraft and on the ground, helping it win awards. Credit to Lufthansa.

industry. On winter days we positioned a rotatable touchscreen in the outdoor area of German metropolises. The travel compass is head-height and the screen has a diagonal of 127 cm, and looks like a door.

Through this door, the viewer could take a look at a beach or an Asian market. The viewer could enjoy the full 360-degree view of the travel destination through the rotation of the screen. With an integrated camera, we took a photo from the viewer, which then appeared as graffiti on a wall in a street scene. This impressive technical gadget generated a desire to travel and was well received by those passing by.

Is there an appetite from travelers to use more VR in their experiences?

There is a growing interest. Travelers keep asking about VR. By using VR, we offered customers upgrades for our new Premium Economy Class at the gates in New York and Frankfurt before the transcontinental departures. The guests were given a three-dimensional impression of the legroom with our VR-glasses. The test results were extremely positive.

What have you learned during your VR projects?

We realized that timing and relevancy are important. We were on the right track with our "Soccer Summer

Story in 360-Degrees" during the European soccer championship in France. Scheduling a storyline for a 360° video requires more time and energy than an average video. You must give thought to which scene you want the viewer's eyes to see. This is more challenging since instead of showing one particular scene in focus, the whole surroundings can be seen.

How do you expect to use VR in the future?

The topic VR will be developed in the marketing and sales department as we will use advertising formats like online ebanners and our social media channels. We will also use this technology more often in sales and training courses.

If we consider the technological development in five to ten years, we may say that it is exciting, as well as difficult to predict. The majority of users will probably already be spending their time in the virtual worlds naturally. Maybe our guests will then take VR glasses on board, just like they bring their smartphones and tablets. We will see how we will use this technological development in our favor. Nevertheless, one thing is for sure, a virtual trip will never replace the fascination and emotionality of a real flight to another country.

3.4 Producing VR Content

What is becoming clear is that VR is not just for gaming. This market sector will of course continue to drive the vast majority of the developments VR will experience, but the expansion of vendors and creative agencies set up to create VR content is opening the technology to businesses outside of the gaming specialty. Verizon Digital Media Services now offers an end-to-end VR platform called envrmnt [<http://www.envrmnt.com>], which simplifies the process for ingesting VR content, enhancing interactive experience, and delivering it to leading VR platforms and devices.

When it comes down to actually making the content Henry Stuart, Co-Founder and CEO at Visualise warns: "The biggest pitfall people make with 360°-content

production is assuming it is the same or very similar to traditional video productions – be warned, it is not! The pre-production and creative planning needed is greater and, crucially, needs a totally different approach. There are factors such as comfort, 'VR FOMO' (seriously!), and user empathy that need to be thought of.

"In post-[production] too, the process is longer and more complex with stages such as 'stitching' – the combining together of separate video streams into a continuous, immersive, spherical video. At this stage, it is apparent the size of the media you are working with – 6k master files are not kind to hardware or server space!"

"The production cost," says Kondruk of Ascape VR is another concern, as it "is not transparent, due to a novelty of this media itself. It's still an emerging market

and brands are trying to understand a fair value of this service. I mean, you know that a decent quality photoshoot in San Francisco would cost you anything between USD1,000 and USD3,000 per day – it's kind of a standard. But, there's no such standard for 360-degree video production yet – you can be charged USD5,000 or USD50,000 for the same project."

Tigerbay – a technology service provider for tour operators – used this year's Travel Technology Europe as the launch platform for its latest innovation, a Virtual Reality (VR) ski holiday simulation, which it has created in tandem with its client Mark Warner. A 360° video of a ski holiday experience (including plenty of slope action as well as chalet life) will be available to view through VR headsets on the stand, and will also be optimized to work across all flat screens.

"Currently our joint project allows the user to 'road test' their holiday in a way still pictures simply cannot," said Carl Morgan, MD of Tigerbay. "As technologies advance however, we can see videos like this becoming integrated into the booking process itself, enabling consumers to select room types, add-ons and more, from within the video experience. The potential is huge."

Many in the travel industry understand that content will drive the widespread use of VR and that it will have to be of high quality. Already content quality is the yardstick by which travel brands are judged before travelers book and this also applies to VR, so any brand looking to invest will need to approach wholeheartedly and with the aim of making consistent, interesting experiences.

3.5 A Sensible Investment?

Ultimately, the key question all travel and tourism brands are asking is whether VR is a sensible investment to make today. Gordon Meyer, Head of Marketing for YouVisit, told EyeForTravel: "Our platform captures detailed analytics about user engagement and interaction, so that we can work with brands to optimize your experience and maximize your results."

Meyer continued: "We've seen a 12.6% conversion rate for our travel clients from our experiences. Cost is ultimately determined by the scope of the project. What we can say from experience is 360° films without clickable interaction have significantly higher bounce rates and have already become passé. Whether it's gaze-based, clicking by focusing your view on an

object to click, or using a remote control such as the one paired with Daydream and Gear VR, or higher end devices like the HTC VIVE, consumers want to make active choices within the experience. In our experience, people convert at much higher rates when those options are offered."

"Clearly [VR/AR] is an area that is only set to grow," comments Tigerbay's Morgan. "Although we might not know what a VR/AR world could look like in 30 years' time, we do know change is ahead. Screens could become as anachronistic as the horse and carriage.

"At Tigerbay we have a team of super-innovative developers who are always looking to the future of development. Knowing AR/VR is here to stay, we made the decision to create a tool for tour operators which, although limited in its application today (video only) has the potential to evolve rapidly.

Clearly, several companies are already convinced of the value in investing in VR and deploying systems and their own content. For travel brands looking to jump in although content production costs vary highly and can be substantial, they can use Google and Samsung's smartphone-based VR technology as a low-cost way to test how the technology could be used without a substantial capital investment in hardware and offer consumers an experience both in-store and at home.

As long as travel brands are aware of what is required to deploy VR and have a plan for its use, then the expense of creating the VR experiences can be justified by, such as in the case of Thomas Cook's return on their investment.

4

Travel Brands Using VR Today

Hotels are also getting in on the VR act. Several leading chains are offering VR technologies to either enhance their services or communicate their brand values. At the moment, many of these initiatives are novel ideas using VR technology to speak to their curious clients. Still on a learning curve, the hotel sector does offer an indication of how VR could offer a practical proposition, which the tourism industry could leverage.

In 2015 Marriott and Shangri-La Hotels announced VR services. Both used the Samsung Gear VR headsets, offering guests the chance to borrow the VR headset and experience various VR environments, including enabling guests to “travel” the world from their rooms.

Best Western Hotels and Resorts have also been leveraging the burgeoning VR technology. Guests now have an immersive 360-degree look into all of the company’s North American hotels.

Through the Best Western Virtual Reality Experience, guests are now able to view a virtual reality tour of nearly 2,000 properties. These videos are reinventing how guests view hotels and choose where to stay. Best Western is the first major company of its size and scale to utilize this cutting-edge technology in this way, setting a new industry standard for how virtual reality can be used to enhance the consumer journey. Guests can access the videos from Best Western’s YouTube channel – BestwesternTV.

Dorothy Dowling, Senior Vice President and CMO, Best Western Hotels and Resorts, explained: “Currently all of our branded hotels in North America have the Best Western Virtual Reality Experience, where travelers can see each property’s rooms, lobbies and amenities before they arrive on-property. We’ve been working with Google Street View to develop this product over the last few years and have gathered more than 1.7 million photos of our properties in North America.

“The 360-degree videos are viewed with a headset device and are available on Google Maps, Google Search, YouTube and Facebook. Additionally, we have launched the *I Care, Every Guest Every Time* VR simulator, enabling front desk, housekeeping, maintenance and breakfast staff to practise and develop their interpersonal and guest communication skills in real-life scenarios. We partnered with Mursion to develop the program, creating scenarios that are common challenges for our staff at Best Western properties.”

Theme parks are also using VR to enhance their rides. Alton Towers Resort, for instance, is now using VR to augment its rides. Galactica is the world’s first roller-coaster entirely customized for the full VR experience, transforming riders into astronauts and plunging them into outer space with a G force more powerful than a real rocket launch according to the company.

Theme parks have often harnessed new technologies to enhance the experiences of their patrons. For the tourism industry, the innovations at Alton Towers could serve the wider travel community, as more of the public will be exposed to VR technologies through the ride and become more comfortable with the experience.

Gaining an advantage from wider public understanding and acceptance of VR outside of early adopters can be seen in many other industries: In sport, to launch the new Merrell Capra hiking shoe, Framestore worked with agency Hill Holliday to design a virtual reality world in which the capabilities of the kit were showcased in extreme scenarios – the kind of landscapes that would really speak to Merrell’s thrill-seeking, outdoor-loving audience. And in the automotive sector, Audi created the A5 VR driving experience.

More exposure to VR in other sectors should only benefit travel and tourism, as it will feed consumers’ curiosity about how VR could enhance their travel experiences.

4.1 Matoke Tours: Virtual Gorillas

Wim Kok, Owner and MD, Matoke Tours

How is your company using VR today?

Matoke Tours was the first travel agent in the world to launch a virtual reality travel application. Consumers can experience virtual travel at home by simply downloading an app and ordering a cardboard viewer. Once they have downloaded the “Virtual Gorilla application” and inserted their smartphone into the cardboard viewer, the virtual travel experience can begin.

The app enables us to convey the intensity and emotion of the travel experience before the journey has even started. Travelers are then better able to decide which excursions they want to book. In addition, as a travel provider, we can use virtual reality to highlight specific unique selling points. For example, by filming the lodges where our clients can stay overnight on their travels, as well as by introducing the tour guide.

Is there an appetite from travelers to use more VR in their experiences?

I believe so, as it gives a real experience. Photos can be misleading and the best shots are always put in brochures but, in reality, it will often not be as great as the photo in the magazine. A photo is also static. Virtual reality gives you a real experience. The app enables a potential client to convey the intensity and emotion of the travel experience.

What were the pitfalls your business had to overcome with your VR project?

It is very expensive to make and there are also physical limits to the technique. The idea is that you

can look in any direction. If you look up, you see the sky, when looking down you see the soil and when looking around you, you will see all that happens around you. This worked extremely well with the gorilla tracking in the rainforest. We also created an app for a balloon safari. Looking up was fun, as you looked straight inside the balloon and as well into the flame.

Looking around was okay, but what you really want is to look down and see the landscape and wildlife below you. This is, however, technically not possible as the camera stands in the middle of the basket and cannot look over the edge. We decided therefore to hang the VR camera outside the basket on a stick, so you could look down to see the wildlife. However, looking down was great now, but the balloon was now flying next to you and you were flying in the sky yourself. People were actually scared to look down as it seems very real, as there is no basket below you.

How do you expect to use VR in the future?

It's an absolutely great way of showing people what they can expect from a trip. It worked for Matoke Tours, because we were the first ones and everyone was excited. However, to make VR work in the tourism industry in future, it needs to develop more technically and needs to become much cheaper. Our investment was about USD30,000 and not every company is able to afford that.

Much more important though, is that it can only work when more companies/ destinations are offering it, so potential clients use it to compare destinations, rather than being excited about the technique itself. It should replace photo albums and magazines as it gives a much better picture.

User Generated VR Content

One area where VR could prove to be highly lucrative for all travel and tourism brands is user-generated VR content. Currently, VR is in early adopter mode and social functions are only just beginning to be properly explored by both big brands and social media users. Tapping into the online world's largest user bases through social media will be a key step for VR's success, especially given the prevalence and importance of conventional User Generated Content (UGC) to the travel and tourism industry. There is also the confluence of demographics, with under-35s more likely to use social media and to use it more heavily than older generations, as well as this age range of consumers being the principal VR adopters. Greater creation of VR content from social media users could be one of the key pieces to expanding VR's popularity and solving the relative lack of content in VR currently.

Previous studies have indicated the importance of imagery and, within that, videos to the travel inspiration and research phases. A 2014 study conducted by Google with Ipsos MediaCT (Google, Ipsos MediaCT (2014), found that two out of three US consumers watched online travel videos when they were thinking about taking a trip and that this was rising, with travel-related content up 118% year on year (YoY).

Following on from this, it seems that growth is continuing in the number of views of videos focusing on travel and those posted by travel brands. A 2017 study from Hitwise found that TripAdvisor, Booking.com, Skyscanner, Expedia and HotelsCombined have all seen double digit growth in traffic generated from YouTube. Skyscanner saw the highest growth out of all of the aforementioned brands, seeing referral traffic from YouTube grow 59% YoY from 2015/16 to 2016/17 (Hitwise, 2017).

YouTube has the potential to capitalize on its strength in conventional videos and turn that towards VR. It

launched its VR service in the latter half of 2016 and this could represent a huge leap towards not just easing the distribution of User Generated Virtual Reality Content (UGVRC), but also to VR video content overall.

As yet, the service, much like VR headset ownership, remains niche. As of April 2017 there are 60,800 VR videos with the tag "travel" on YouTube, compared to around 34 million conventional travel videos (YouTube, 2017). Given YouTube's huge audience platform, with more than 20 billion visits a month (SimilarWeb, 2017), this represents the best hope yet for major growth in user-generated VR.

It could also further propel YouTube's importance as a marketing channel. In EyeforTravel's Marketing Executive Survey 2015, YouTube was rated as the third most used social media network and amongst marketers in EyeforTravel's State of Data in Travel Survey 2017, it was also rated the third most effective social media network – although far behind Facebook and Instagram in the latter survey.

The other side of getting VR video content into the mainstream is the users themselves who will need specialist equipment to create VR videos. Thankfully, technology is advancing to the point where UGVRC is affordable to use. The Ricoh Theta S is one of the most affordable 360-degree cameras for personal use. Also available is the Samsung Gear VR Camera, Bublcam and VUZE VR Camera, all costing under £1,000.

If VR content creation from the ground-up by members of the public takes off, then this will help travel brands with these costs. It will make brand advocates even more valuable and increase the immersion of an experience from a traveler's point of view, making it a powerful area for travel brands to keep an eye on.

Conclusion

For the travel industry, VR continues to be a new technology to explore. Technology savvy travel brands have always experimented with the latest technology to ensure they speak to their customers. VR however, could offer a shift in how consumers access tourism and its allied services.

Currently VR is in its infancy. The high level of investment that is needed by consumers to purchase

dedicated VR hardware places this technology firmly in the early adopter category. However, VR does seem to be developing a two-stream approach to its development: One stream is typified by Oculus Rift; the second stream is defined by Samsung's Gear VR, Google's Cardboard and, more recently, Daydream. From a consumer's point of view, VR is currently a curiosity that defines how much they are willing to invest in gaining the experiences on offer.



Oculus Rift is one of the leaders in VR technology thanks to the investment made by Facebook into developing the technology. Credit to: Marco Verch [<https://goo.gl/8qx3JF>]. Some Rights Reserved [<https://creativecommons.org/licenses/by/2.0/>]

6.1 Keep One Eye on Augmented Reality

One big element that might both hinder and help VR is Augmented Reality (AR). AR, like VR, also currently feeds off the established popularity of smartphones, although some are working on dedicated devices, and some, like Magic Leap, are claiming that they are blurring the lines between the two.

AR's big advantage is that it already has a truly enormous installed user base in everyone that owns a capable smartphone and that smartphone is all it requires at its most basic. This is a big advantage over VR, where a separate device will be required, unless headset bundles giving consumers VR devices with new contracts and purchases become the standard in the future. Naturally there are also some flaws, in that AR requires quite a lot of work on the part of a traveler in terms of interaction, and it increases data usage and decreases battery life – the effect of the latter potentially being particularly noticeable.

Much like VR, this is early days, with PokemonGo really the only stand-out result of an AR app that has driven high value for the investor and reached a major user base. Nonetheless, it was quite the demonstration, exploding out to a huge demographic and eclipsing usage of many massive apps.

Indeed, Digi-Capital predicts a combined USD108 billion market in 2021, but with AR dominating, with USD83 billion of revenue versus USD25 billion for VR. Similarly, it expects the vast majority of the installed AR/VR base to be AR application operating on smartphones (Digi-Capital, 2017).

From a travel perspective one can understand why, as the possible options for a travel brand of AR are huge, such as providing directions around destinations, guides to attractions, and helpful information on the move. Facebook seemed particularly invested into this latter feature. At its 2017 F8 conference, Facebook heavily emphasized the role it believes AR will play, much of which was following in the wake of Snapchat and WeChat innovations. One element the company was keen to play up was using augmented reality to allow users to place reviews and information on to real world locations that other users could then see. Given the size and weight of social media giants lining up behind AR technology it seems inevitable it will have a role to play alongside VR.

6.2 Realizing a Virtual Reality

GfK's Paul Simpson says: "To date it has been difficult, perhaps impossible, for consumers to imagine how VR and AR might fit into their lives. We believe something changed with the launch of PlayStation VR last year, albeit amongst a small – but influential – group of consumers. For the first time, people had an exceptional VR experience, and many more people heard about it. This has provided the opportunity for brands, businesses and other organizations to apply the capabilities of VR. Indeed, the upcoming launch of Microsoft's HoloLens will mark the beginning of the tech giant's AR offering. From retail to travel, education to health, design to media and entertainment, consumers are ready for a fresh, new approach. We believe 2017 will be an exciting time and real turning point for both VR and AR."

How travel and tourism brands choose to use VR is completely open. Whether the technology is used as a try-before-you-buy message, or is used to enhance trips and services, the rules of engagement here are still being defined. "One key question to address is whether a VR experience is better or worse than the real thing," Andrew Newton, Head of Corporate Travel, Colpitts World Travel told EyeForTravel.

"Travel-focused businesses must also keep an open mind to the broad range of uses that this technology might bring in the future. I think we are currently limited in our view of VR as we think of it as something that requires goggles to view an alternative, and often intense, experience. While it may be a long way from the minds of the average travel service provider today, this is something that might be common to us all in ten years' time."

Alex Hadwick, Head of Research at EyeForTravel believes that, "In 2017 the market will still be quite small overall and only just beginning to mature from a consumer perspective. A dedicated set with a PC could easily see a consumer set back by more than USD1,000. Likewise, content is quite limited at this stage, although growing rapidly and investments by big companies in the area have also not yet been fully realized. Therefore, going all-in as a travel brand seems premature at this stage. However, big changes are afoot, with new offerings pushing prices down.

"I would advise travel brands that can see a way in which they can get VR face-to-face with the consumer

to get engaged with this medium straight away. This shows real returns on investment today. Similarly, if travel brands can see a cost-effective way to make VR content they should also experiment. Getting in at the ground level now should help when this technology is more widely adopted in three to four years' time. In particular, experimenting with VR content for activities at the destination and trying to upsell these to consumers could yield real rewards, as allowing consumers to get a taste of experiences they may not have even considered could spur many to action. Already, videos have been shown to increase conversion rates for travel consumers, so there is no reason not to project this over to VR and expect at least the same effect, if not a more pronounced one.

"Travel brands should also keep an eye on AR in the future and how this interacts with VR. Already, the vast majority of VR device shipments in the medium term are expected to be smartphone systems, which is also where practically all AR applications will be hosted. Given that everyone already owns an AR device, albeit one with a few limits, the possibilities are enormous and there is room for conflict with VR in getting the consumer's attention as well as co-existence. Perhaps we can expect VR to take a major role in the inspiration phase and AR to be a major aid to the traveler once they begin their physical journey in the future."

No matter the way these mediums develop, it is clear that there is enormous potential in VR and AR, particularly for travel. Consumers are open to VR and, in particular, to travel content, as we saw in Section 2.1. Consumers can envision potential use-cases even at this early stage. Similarly, from the business side, there are travel brands that are making a success of VR today. When this potential will be fully realized and exactly how consumers will engage remains to be defined, but VR is worth travel brands' careful consideration already.

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