

Growing VR/AR companies in the UK

A business and legal handbook



In association with



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This report forms part of that work along with the following complimentary reports:

- [The Immersive Economy in the UK](#)
(Innovate UK, Immerse UK & Nesta)
- [Immersive Content Formats for Future Audiences](#)
(Digital Catapult and Limina Immersive)
- [Evaluating Immersive User Experience and Audience Impact](#)
(Digital Catapult, Nesta and i2Media Research)
- [Immersive technologies in manufacturing - the adoption and use of immersive technologies in manufacturing and a report covering the feasibility of the use of immersion in a digital twin](#)
(High Value Manufacturing Catapult).

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FOREWORD

Digital Catapult, in collaboration with PwC, has produced this handbook for the benefit of VR/AR companies in the UK, and those new to the industry planning to build such companies.

Insight and recommendations will be offered from both a business and legal perspective. Organisations seeking to adopt VR/AR solutions may also find this information useful.

Whether these groups are currently developing VR/AR solutions or considering it in the future, they will be collectively referred to as VR/AR companies in this handbook.

OBJECTIVES AND METHODOLOGY

The purpose of this handbook is to encourage the creation of more, high quality, VR and AR content. It has been written primarily for current and potential content creators but it also draws out relevant points for service and technology companies.

It aims to analyse the VR/AR industry, mainly from a business and legal perspective, to examine its current and likely future in the short term (1-2 years), medium term (2-5 years) and long term (5-10 years).

As a result, the handbook:

- Provides guidance on current challenges.
- Raises concerns to be aware of and understand, now and in the future.
- Makes recommendations to leverage opportunities and mitigate concerns.

The handbook has been designed so that key points are quick to access and easy to digest. Each topic area begins with some example questions to help VR/AR companies determine the relevance of each section to their own circumstances and quickly review the issues and possible solutions.

A wide range of topics are discussed at a high level rather than a deep dive into one particular area with the aim of consolidating areas of interest in a methodical and intuitive way. The aim is to promote a quick high level understanding of the industry that will allow the reader to assess which topics are relevant for further investigation.

Note that a lot of the information provided is based on current knowledge as of Q1 2018 and is likely to change as the industry and associated stakeholders (including the UK Government) develop and adapt in the future.

The hope is that organisations and individuals with a stake in the VR/AR industry are able to make use of the knowledge, foresight, and recommendations here to achieve their objectives, grow their business, and ultimately push the VR/AR industry forward here in the UK.

CHOICE OF TAXONOMY: VR AND AR

Despite the growing number of acronyms in the VR/AR industry, the terms VR and AR have been used as these terms are simpler and well-known amongst users and the public. VR and AR are spectrums (rather than singular points) containing different types of content, some of which are more immersive or powerful than others. The term immersive technology is also used to refer to both VR and AR.

Formal definitions are below:

Virtual reality (VR) refers to a completely immersive virtual and aural world that a user experiences, usually through a head-mounted display (HMD). The research considers 360 degree media to be a form of content within the spectrum of VR.

Augmented reality (AR) refers to a real-world environment on which digital objects and/or information is overlaid either through a head-mounted display or via a handheld device with a camera such as a smartphone or tablet. Devices and applications that simply layer digital elements on top of the real world and those that are able to place such objects in context with the environment (e.g. on top of tables) are both considered within the spectrum of AR.

EXECUTIVE SUMMARY

OVERVIEW OF THE MARKET

VR/AR DEVICE TYPES

Users can consume VR/AR experiences in a number of ways. From a VR perspective, these range from smartphone-based devices made of cardboard to tethered devices and headsets that use a powerful computer to run the experiences. AR applications can run on handheld devices or through a headset that is either tethered or standalone. All of these device types offer different qualities of immersion and user experience at a variety of price ranges. Portability and durability levels also differ.

VR/AR COMPANY TYPES

The VR/AR industry extends beyond the obvious businesses involved in headset manufacturing and content development.

At a high level, there are three main types of VR/AR companies:

- **Content companies** that develop VR/AR content to sell to enterprise or directly to the consumer market.
- **Service companies** that use their time and expertise to provide a valuable outcome to VR/AR customers.
- **Technology companies** that create the platforms, tools, plugins and other solutions that provide value to the VR/AR industry.

There are currently relatively few VR/AR companies with a sole focus on VR/AR activity. This is due to the higher risk involved but is expected to improve as the market develops and the business case becomes more attractive.

CHALLENGES

There are four main challenges facing mainstream adoption of VR/AR technology:

- **Content:** the lack of quality content limits consumer interest which hinders the business case for more VR/AR content development and so the vicious cycle continues.
- **Education:** few members of the public have an accurate understanding of the technology due to a lack of first-hand experience.
- **Cost:** the cost of high-end VR/AR systems is still out of reach for the average consumer. This is less of a concern for enterprise.
- **User experience:** from both a software and hardware perspective, setting up and running high-end VR/AR systems and experiences is not a simple task.

STAKEHOLDERS

There are many stakeholders in the VR/AR industry, not just the VR/AR companies themselves. It is important to understand who else is involved, how they influence each other and how to engage with them.

For example, immersive companies need to connect with government agencies to keep updated with legislation, establish feedback loops with customers, and engage with academic researchers to offer input and access the latest research.

BUSINESS MODELS

A company's business model is critical to its success. This section provides a high-level overview of the areas which need to be considered when conceptualising, building and selling ideas in addition to the operational aspects of running an immersive company.

Divided into sections about strategy, operations, development, and marketing and sales, this section examines the end-to-end journey for taking an idea through every stage to a commercialised product for sale.

STRATEGY

The VR/AR industry represents a relatively high risk venture with the potential for large rewards. The exact approach of VR/AR companies will depend on their appetite for risk but a cautious approach is advised for most. Start by targeting businesses, prove that a market exists for any product ideas and check that it would deliver more value than traditional alternatives. Be mindful of the fallacy of the single 'killer application' and concentrate instead on use cases across industries. When considering which device or system to build content for consider all the factors relating to the product objectives and its target audience.

There are multiple funding alternatives to venture capital including government support. Generally, access to funding becomes easier with more mature products. A range of revenue opportunities is available, including advertising, depending on the type of VR/AR business and the timeframe being considered.

OPERATIONS

Identifying team roles, where to find the corresponding talent, and whether significant VR/AR specific experience is required are key issues discussed for VR/AR companies. Beyond experienced hires, this talent pool extends to school leavers, university graduates and self-taught individuals, both in the UK and abroad. Costs can be reduced by analysing alternative options regarding equipment, space, talent, software and professional services. Additionally, there are numerous tax benefits available to many VR/AR companies who are involved in research, development and intellectual property creation.

DEVELOPMENT

Developers should maximise user comfort by applying a user-centric design focus. Alternative input systems such as gaze control should be considered to increase user accessibility. To introduce advertising, consider a number of ethical guidelines. Cyber security protocols and safeguards should be built in to products from the start.

MARKETING AND SALES

To successfully market products, a community of early adopters should be built and maintained.

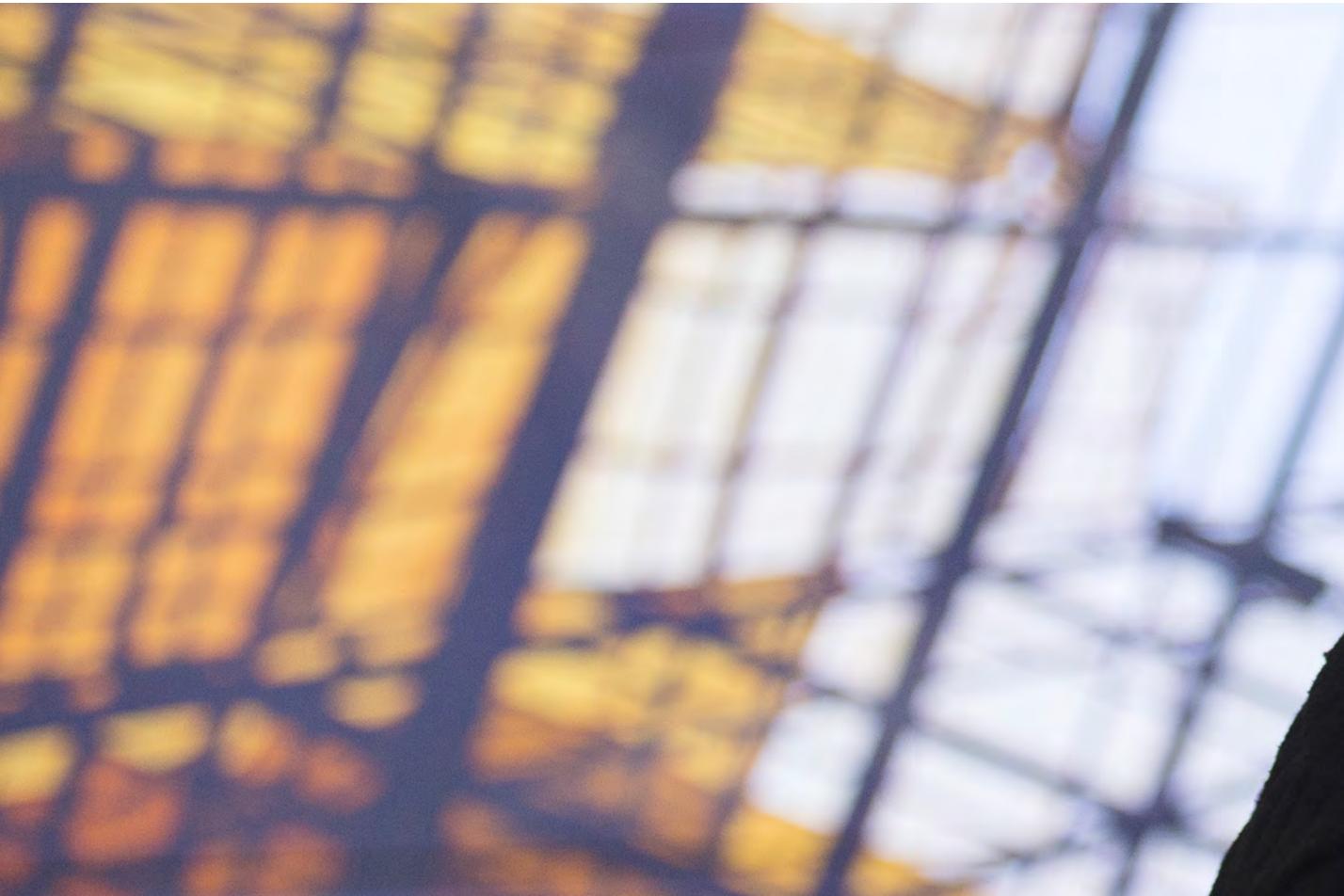


LEGAL

As VR/AR applications and technology are relatively new, there is not a great deal of related legislation or case law. Applying the existing laws to new scenarios experienced through a new medium poses numerous challenges. Over time it is expected that more specific regulations may be introduced or laws updated to address some of the issues raised by VR/AR, but in the meantime courts and regulators will seek to apply existing laws to new situations.

The legal issues in this review focus on the following areas:

- **Intellectual property issues** such as the development and exploitation of intellectual property rights, enabling value protection in the chosen VR/AR system, content or platform; licensing rights, to maximise exploitation of rights and avoid infringement of third party rights; and intellectual property issues arising from creative activities within the VR/AR environment.
- **Property issues** such as use of money, virtual currencies and payments, and ownership of property in a virtual environment, as well as risks arising from counterfeiting, impersonation and fraud.



- **Liability and regulation** such as health and safety and product liability issues arising from the risks of deploying or using VR/AR; regulation of content standards and services; criminal activities in a VR environment; liability of VR/AR platform and service providers for illegal activities by users; and jurisdiction and applicable laws in a VR/AR environment.

The issues flagged will be relevant when drafting or negotiating commercial contracts such as licences with third parties, drafting terms of use, end user licences or user instructions as relevant for VR/AR systems, content or platforms. These will also be relevant when understanding the type of laws, regulations and liabilities that should be considered when developing and exploiting a VR/AR system, content or platform.

The review and recommendations contained are based on English law, but companies should bear in mind the potential for other laws to apply where VR/AR services are deployed or made available in other countries. Recommendations will also depend on the facts and specific legal advice should always be sought in particular cases.





OVERVIEW OF THE MARKET

VR/AR DEVICE TYPES

There are a number of different devices through which users can consume VR/AR experiences, each with its own pros and cons. They are categorised and summarised below. Some of these are referenced throughout the handbook.

TETHERED (VR/AR)

Tethered devices are connected to a powerful computer or console which processes the applications through a cable, although wireless solutions are becoming more available. VR examples include Oculus Rift CV1, HTC Vive, and PlayStation VR. On the AR side, the same definition applies, and a good example is the Meta series of headsets.

STANDALONE (VR/AR)

Standalone devices are self-contained in that all the processing capability is located within the headset itself. VR examples include Oculus Go, HTC Vive Focus and Lenovo Mirage Solo. AR examples include Microsoft HoloLens, ODG R-series, and Epson Moverio series.

SMARTPHONE (VR)

Smartphone-based solutions are placed inside a head mounted chassis and all the processing power is done by the smartphone. VR examples include Google Daydream View, Google Cardboard series, and Samsung Gear VR. AR applications are usually accessed straight from the handheld device without the use of a headset. This is categorised separately below.

PROJECTION-BASED (VR)

Hardware solutions that use projectors on internal walls to provide users with an immersive experience. Cave automatic virtual environment (CAVE) solutions and dome projections are included within this category.

HANDHELD (AR)

Handheld solutions usually comprise a smartphone or tablet that is used on its own to run AR applications.

COST RANGE	PORTABILITY	DURABILITY	USER EXPERIENCE	GRAPHICAL FIDELITY	QUALITY OF IMMERSION	BATTERY LIFE
TETHERED (VR/AR)						
High	Low	High	Low	High	Medium – high	Medium (accessories)
STANDALONE (VR/AR)						
Medium – high	High	High	High	Medium – high	Medium – high	Medium
SMARTPHONE (VR)						
Low – medium	High	Low – medium	Medium	Medium	Medium	Low
PROJECTION-BASED (VR)						
Extremely high	Extremely low	High	Medium	Medium – high	Medium – high	-
HANDHELD (AR)						
Low – medium	High	Medium	Medium – high	-	Medium	Low

VR/AR COMPANY TYPES

The VR/AR industry is incredibly complex and diverse. It is obvious that developers of such content and headset manufacturers would be included within the industry but businesses should also be mindful of adjacent products and services. At a high level, VR/AR companies and offerings are split into three areas:

Content companies develop VR/AR content to sell to enterprise clients or directly to the consumer market.

Service companies use their time and expertise to provide a valuable outcome to VR/AR oriented customers.

Technology companies create the platforms, tools, plugins and other solutions that provide value to the VR/AR industry.

The table below shows a list of examples within each category to provide further understanding. These lists are not exhaustive, not solely exclusive to VR/AR and are likely to expand in the future.

CONTENT	SERVICE	TECHNOLOGY
<ul style="list-style-type: none">• Agencies and studios• Video game developers• B2B and B2C single application businesses	<ul style="list-style-type: none">• UX and UI design experts for VR/AR applications• Event management for VR/AR events• VR/AR headset branding• Recruitment for VR/AR talent• Consultancy on VR/AR activity• Professional (legal, tax and grants) advisers on VR/AR activity• Consumer research using VR/AR technology• News providers on the VR/AR market• VR/AR kit hire	<ul style="list-style-type: none">• VR/AR headset manufacturers• 3D audio platforms• Haptic solutions• AR optics hardware• In-VR 3D modelling solutions• VR live streaming platforms• VR/AR controller solutions• Locomotion solutions• Analytics platforms for VR/AR• Non-technical VR/AR development platforms• Content management systems for VR/AR

Short term M L

Businesses with a sole focus on VR/AR activity are rare but will increase in number

Not all VR/AR companies, especially at this stage, will be solely dedicated to VR/AR activity. This can be seen most easily with video games developers, many of whom are hedging their bets by developing both VR and non-VR content.

This is understandable as it is a way of reducing risk in the early stage market of VR/AR. As the market develops so will the business case and, consequently, the number of dedicated VR/AR companies will increase.

CHALLENGES

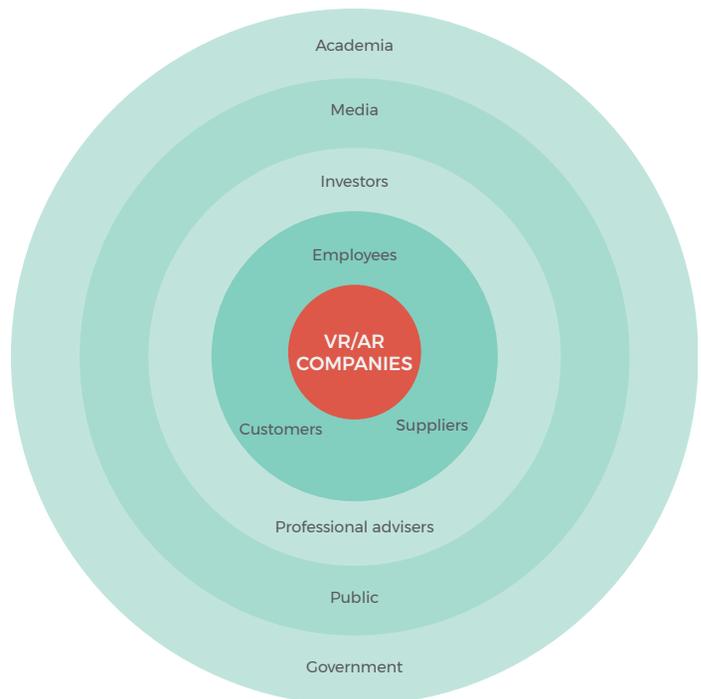
There are four main challenges facing mainstream adoption of VR/AR technology:

- **Content:** there is currently not enough quality content available to consumers to justify their purchase of VR/AR hardware.
- **Education:** there is a lack of public knowledge of what VR/AR technology actually is and what it can do which is exacerbated by a lack of first-hand experience with the technology.
- **Cost:** although prices have fallen drastically in the past few years, the cost of high-end VR/AR hardware is still a major deterrent for consumers. This is less of a concern for enterprise.
- **User experience:** the experience between unboxing some VR/AR hardware and being able to use it is still relatively arduous from both a hardware and software perspective. The headsets themselves are heavy and unfashionable, and users are used to far higher fidelity screens.

STAKEHOLDERS

In order for the VR/AR industry to progress, there needs to be acknowledgment that VR/AR companies are not the only stakeholders involved and that they cannot operate in silos. The public, the UK government, academic institutions, and others all have varying degrees of influence over the future of the industry.

In the following graphic and table is a list of key industry stakeholders with notes on how VR/AR companies should engage with them.



Overview of the Market cont.

STAKEHOLDER	DESCRIPTION	RECOMMENDATION TO VR/AR COMPANIES
Government	All UK government entities with a potential influence on VR/AR companies (e.g. Innovate UK and HMRC).	Keep updated on upcoming legislation and funding opportunities, engage with industry networking groups, and look to join lobby groups where possible to influence decision making.
Customers	Individual purchasers of VR/AR technology and content.	Establish a continuous feedback loop with customers about products and services, both existing and upcoming.
Professional advisers	Organisations involved in providing legal, tax, consulting, or funding advice to the VR/AR industry. Includes industry analysts.	Identify the company's requirements in its current and near term future state and seek out individuals/companies for legal, tax, consulting, or funding advice as appropriate.
Investors	Non-governmental organisations and individuals who could provide funding to a VR/AR company.	Practice elevator pitches, attend investor events, and build individual connections with investors.
Media	Journalists, digital and print news outlets.	Seek out opportunities for commentary on the industry or product and be prepared to handle difficult questions during challenging times.
Public	Members of the public who are not consumers of VR/AR technology.	Where the opportunity arises, educate the public and correct false perceptions through first-hand demonstrations of the technology.
Employees	Staff members of VR/AR companies.	Promote a culture of equality, diversity and autonomy, keep utilisation of employees balanced, and motivate with meaningful work.
Suppliers	Suppliers of key technologies (e.g. headsets) to VR/AR companies.	Consider new product announcements and their place in the strategic roadmap.
Academia	Universities and other mainly research-oriented organisations, including medical professionals.	Keep updated on upcoming research papers and studies and offer input if helpful.

BUSINESS MODELS

An organisation’s business model is central to the success or failure of the company. This section is intended to provide a high-level overview of the areas to consider when conceptualising, building and selling ideas in addition to the operational aspects of running a VR/AR company.

The Business Model Canvas is a useful tool of interlinked topics that together represent the key business model elements on a single page. The canvas is set out below with a summarised explanation of each topic. The canvas will be referenced throughout this section where relevant, by use of each topic’s icon.

 KEY PARTNERS	 KEY ACTIVITIES	 VALUE PROPOSITIONS	 CUSTOMER RELATIONSHIPS	 CUSTOMER SEGMENTS
<p>What partners and suppliers is the company working with to deliver key activities?</p>	<p>What is needed to deliver value propositions?</p>	<p>What do customer segment groups find unique and valuable about the product?</p>	<p>How does the company interact with each of the relevant customer segments during the sale and use of the products?</p>	<p>What are the groups of customers being sold to, and how do they think and feel about the product?</p>
	 KEY RESOURCES		 CHANNELS	
	<p>What assets are needed to deliver key activities?</p>		<p>What entities and avenues are used to communicate and sell products to a company’s customer segment?</p>	
COST STRUCTURE	REVENUE STREAMS			
<p>What are the costs associated with key activities and key resources?</p>	<p>Which customer segments are paying for which value propositions and how?</p>			

Source: Business Model Canvas framework and titles by Strategyzer.com under Creative Commons BY-SA 3.0 licence

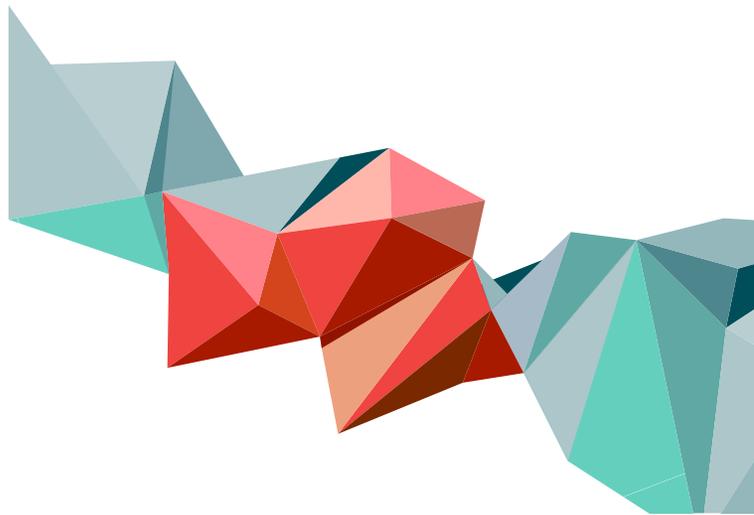
This section is split into Strategy, Operations, Development and Marketing and Sales which chronologically represent the end-to-end journey for taking an idea to a commercialised product for sale to customers.

STRATEGY

Relevant questions

- An individual or group has an idea involving VR/AR technology and is thinking of building a company around it – what strategy should they pursue in terms of the product and target market?
- When deciding which headset to focus a product around – what factors should be considered before making a decision?
- When should a target market be considered during development of an idea?
- A company is proposing an immersive solution to compete with an existing traditional technology solution – how can it ensure its solution will be preferred over the incumbent technology?
- The immersive world keeps talking about VR/AR's 'killer application' – what is it going to be?
- Where is the VR/AR market heading in the future?

Defining the strategy for a VR/AR organisation sets the foundation for its entire venture and is a key building block for success. If this is not set clearly upfront it can quickly lead to misspent time and funds. This section will look at areas to consider when it comes to defining products, target markets, and how these two fit together. It also provides guidance on which VR/AR device to focus on as well as potential funding avenues and revenue streams.





QUESTION

What should be considered when selecting a target market for a VR/AR product or service?

There are a number of elements to consider. Some of the key considerations are:

1. AS A VR/AR CONTENT CREATOR, SHOULD THE COMPANY BE TARGETING BUSINESSES (B2B) OR CONSUMERS (B2C)?

Many industry specialists share the view that B2C propositions are riskier but generally have a greater upside. B2B propositions are widely viewed as safer, more reliable ventures with less of an upside. This is mostly due to market adoption: VR/AR has not yet penetrated the consumer market to a large enough extent to make most business cases viable. For businesses, this is less of a concern as adoption can be artificially developed through company policy.

The cost of VR/AR technology (mostly at the higher end of the market) represents another factor. A high-end device including accessories and computing power currently costs at least £1,500 – this is out of reach for the everyday consumer but is less likely to be an issue for most businesses.

Note that B2B propositions are often arduous to execute due to company procurement and other similar processes that need to be adhered to.



2. FOR B2C APPLICATIONS, CONSIDER PARTNERING WITH A BRAND LICENCE HOLDER TO TAP INTO AN ESTABLISHED LARGE MARKET

Getting audiences to engage with a new technology is challenging. One way to encourage the public to take this step is by leveraging an existing brand. This provides a hook to draw in audiences through a known and exciting name, usually in the film, TV, toy or video gaming space.

The 2016 hit application, Pokémon GO, is an example of where AR technology was targeted at an appropriate market and become a global phenomenon. Aside from the power of leveraging a popular brand, the application ran on handheld AR devices – effectively smartphones and tablets, which are ubiquitous in the world today.

Brand licences are discussed further in the legal section of this handbook.



3. WHEN CONCEPTUALISING A PRODUCT, IS THE COMPANY BUILDING IT FOR A MARKET THAT EXISTS?

The danger many VR/AR companies face is executing an idea without understanding whether there is a significant enough market for it. There is a need to conduct appropriate research to assess the existence of a potential market for the product. This represents the backbone of the idea and, without it, the project is unlikely to succeed or obtain significant investment.

\$10m

Pokémon GO amassed over 100m downloads during its first month and allegedly made \$10m a day

Build for a market, not an idea

Some VR/AR companies may argue that they are thinking ahead to a future market that is currently in a nascent stage. The issue is that the costs and complexity involved in building a VR/AR solution may overwhelm the company before this market is able to mature. The upside of being an early adopter can be significant, but this strategy comes with a high risk profile which is not recommended given that it will be compounded with the general risk of developing for VR/AR.



4. IS THE VR/AR PRODUCT AIMING TO REVOLUTIONISE AN EXISTING PROCESS?

Scenario

A VR application that allows users to meet and collaborate with colleagues virtually is being produced.

The major challenge here relates to the cost potential customers will have to pay to switch from the current process or system. Time and effort will be required to learn how to use a new product as well as grappling with the new medium of VR and how to use it. To overcome this challenge, the product has to offer significantly more value or convenience than non-VR/AR alternatives, otherwise the product will not convert customers from their current process/system.

In this scenario, the alternatives are video conferencing solutions allowing consumers to connect, communicate and collaborate in a convenient way. In contrast to video conferencing, VR meetings offer a more connected experience between individuals at a similar level of convenience. This latter point relies on intuitive headsets becoming readily available which is foreseen as a likely future.

In summary, it is recommended that VR/AR companies assess the value customers look for in the product category and outline the additional value that the VR/AR solution provides in those areas.

QUESTION

What should be considered from a market perspective when developing a long term business plan?

1. IDENTIFY ANY NICHE MARKETS THAT THE VR/AR COMPANY COULD BE OPERATING IN

The industry is at an early stage where VR/AR agencies are adopting a generalist approach by taking on a broad spectrum of projects across different industries.

As the use of VR/AR becomes more widespread and the technology is applied to a variety of use cases it is assumed that agencies will shift from being generalists to developing specialist niches – for example, training in sports – and being the go-to name to build an experience in that space.

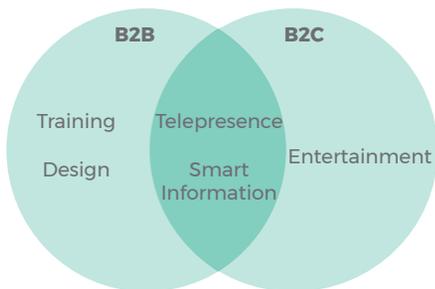
Business Models cont.

In the medium term, VR/AR companies should avoid offering a large menu of options to everyone. Instead, to make a greater impact, this handbook recommends focusing on a particular area to develop specialist knowledge and understanding.

Keep a record of what type of experiences are being demanded by clients and competition, and for which industry. As a result, VR/AR companies will be able to identify growing areas of demand and take advantage of this wave by positioning products accordingly to pursue this niche.

2. WHAT ARE THE KILLER APPLICATIONS IN THE VR/AR INDUSTRY?

The concept of a single killer application that covers the whole of the VR/AR industry does not make sense given the wide range of applications across different industries. The future of VR/AR is being driven not by a single killer application for the whole market, but rather by 'killer uses' of the technology. For example, both the healthcare and engineering industry need to train their staff to perform operations and maintain machinery respectively. Extending this exercise, the killer uses sits within the five areas below across the consumer and business markets.



Training: of employees in a virtual environment. This includes both hands-on and soft skills training.

Design: initial stage creation of what will be physical objects through prototyping and feedback in VR/AR. This includes automotive chassis design, architectural planning, and technology device design.

Telepresence: access to environments that users would otherwise be unable to physically visit due to financial, time, health and other constraints. This includes live events, on-site construction progress reviews and virtual meetings.

Smart Information: relating to a real world scenario to achieve a user's objective. This includes location navigation, visual search, and data visualisation.

Entertainment: experiences consumed during a user's leisure time. This includes immersive video games and film, VR arcades, and enhancements to theme park rides.

S — Medium term — L

Changes to headset age restrictions could potentially create a new market for VR/AR

There has not been much research into the effects of VR/AR on the younger population. As research advances in this area, these age restrictions may potentially be reduced (with an appropriate safeguard such as a daily usage time limit). This could lead to opportunities for VR/AR companies to develop products and services for a new range of customer personas. Technology companies involved in the manufacturing of physical hardware such as headsets and controllers will need to invest in further research and development to ensure a suitable and ergonomic fit for a wider range of user anatomies.

S M Long term

The late 2020s will represent an era of VR/AR enterprise integrations

VR/AR technology is already showing value in the enterprise space by creating more efficient or effective ways of training staff, designing physical products, and contextualising real world elements. As the technology develops, these applications will get stronger and it will become an integral operational tool for most businesses. Consequently, in a similar way to how ERPs of the nineties were integrated into IT systems, there is a potential future in which VR/AR enterprise tools become more widely adopted and integrated into IT systems.

CHOOSING THE RIGHT VR/AR DEVICE FOR AN APPLICATION

QUESTION

How do businesses choose which device(s) to develop a product for?

From an AR point of view, the high level choice is between building for a handheld device (smartphone or tablet) or a standalone head-mounted display (HMD). There are over one billion smartphones in the world whereas the number of AR HMDs is estimated to be less than one million (as of Q1 2018). This creates a clear distinction between consumer products which should be aimed at the handheld market, and enterprise products which would usually take advantage of the greater functionality and efficiencies of the higher end devices.

The VR headset market is flooded with hundreds of items. These can be roughly categorised into three main segments: a budget group comprising Google Cardboard and its equivalents, which offer a brief, inexpensive foray into a virtual world with

limited functionality and graphical fidelity. On the other side, the high-end market comprises tethered headsets which offer a more powerful experience at a higher cost and complexity. In the centre, the mid-range market consists of smartphone-based and standalone headsets which are simpler to use and offer a reasonable level of graphical fidelity at a reasonable cost.

The range of VR/AR devices available is large and constantly growing. As mentioned above, each segment has its advantages and disadvantages and a trade off is usually required. This should be determined based on the end user and the requirements of the application. It is not compulsory to select only a single device for development but this is generally a more cost effective approach than making the product available on multiple devices. This will become less of an issue with the development of standards through the OpenXR initiative.

From a user perspective, the factors to consider are:

- **Target market:** enterprise customers can afford more high-end hardware than the consumer market can. Additionally, businesses are often supported by a dedicated IT team who can help to resolve any technical issues that may arise. The everyday consumer does not have this luxury and often lacks the knowledge or patience to install and troubleshoot complex high-end headsets.
- **Attitude to price:** headset systems (including computing power and accessories) increase in price towards the higher end of the market. Users that are price conscious will prefer the budget end of the market.

1bn

There are over one billion smartphones in the world



- **Comfort with technology:** users that are familiar with operating different forms of technology will find it easier to use devices that are less complex at the budget end of the market.
- **Attitude towards technology:** innovators at the forefront of technological advancements are likely to appreciate the cutting edge nature of high-end VR/AR devices.

From a product perspective, the factors to consider are:

- **Length of time required:** for short experiences of a few minutes at most, the budget headsets will suffice. For longer periods of time, the comfort afforded by the higher end headsets will be required.
- **Interaction functionality:** if the product requires a user to interact in a deeper manner than simply point-and-click functionality, this will steer the suitable device towards the higher end of the market.

- **Graphical fidelity:** some applications such as data visualisation tools do not require a high level of graphical fidelity. For others such as video games this is often a priority. Where a high level of graphical fidelity is required, this can only be satisfied at the higher end of the market.
- **Field of view:** for AR applications which require a large field of view, the higher end devices are better suited.
- **Location:** if the headset needs to be transported regularly, the budget or mid range part of the market would be more suitable. For scenarios where it can be permanently installed (e.g. VR arcades) businesses can take advantage of the higher end devices.

A summary of the above factors and corresponding recommendations is available in the following table for quick reference. These are not conclusive for all situations but provide an initial steer to consider.

FACTOR	RELEVANT TO	USER ATTRIBUTE	
Target market	VR and AR	Consumer	Enterprise
Attitude to price	VR and AR	Price conscious	Indifferent to price
Comfort with technology	VR and AR	Uncomfortable with tech	Tech savvy
Attitude towards technology	VR and AR	Laggard	Innovator

HEADSET RECOMMENDATION	↓	BUDGET	↓	HIGH-END
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FACTOR	RELEVANT TO	PRODUCT ATTRIBUTE	
Length of time required	VR	Short	Long
Interaction functionality	VR	Not needed	Core feature
Graphical fidelity	VR	Low	High
Field of view	AR	Unimportant	Important
Location	VR and AR	Mobile	Fixed

HEADSET RECOMMENDATION	↓	BUDGET	↓	HIGH-END
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Outside of the budget to high-end model of VR/AR devices, there are other factors to consider which will influence choice:

- **Weight:** is the headset of the correct weight so that it feels comfortable on a user's head given how long they will be immersed in the experience for?
- **Durability:** how long will the headset last before it succumbs to wear and tear and needs to be replaced?
- **Self-consciousness:** how anxious are the target users about how they are being perceived by others? In addition to feeling vulnerable when disconnected from the real world in VR, the fashionability of the VR or AR headset plays an important role in influencing how comfortable some users will feel around others.

A VR/AR table outlining the types of headsets and the assessments of a number of these factors can be found in the overview of the market section of this handbook.

FUNDING A VR/AR COMPANY IN THE UK

Relevant questions

- A VR/AR company is seeking funding – what options are available?
- Are there any investors specifically focused on VR/AR that could be approached?
- A company is struggling to secure funding despite repeated attempts – what can it do to enhance its pitch to investors?
- What support can the Government offer to VR/AR companies?
- A company is disconnected from its local startup community and local authority – what groups could it join and what value can they provide?
- A company has built a market-ready product – which pricing approach should it adopt?
- A company is collecting a large amount of data from the users of its product – how should it handle the data and what value can it generate?

QUESTION

How do businesses decide which funding approach is most appropriate?

Before a company can assess an appropriate funding option, it needs to identify what stage its product is at. In increasing order of progression, these are:

- **Idea:** the product only exists in conceptual form and no technical development has taken place.
- **Minimum Viable Product (MVP):** this is the most basic form of a fully functional technical product.
- **Market ready product:** the product is feature complete and in a state that is customer-ready. No revenue is being generated yet.

Funding VR/AR companies through revenue generation provides validation for products and creates a stronger case for future investment

- **Market ready revenue generating product:** the product has been fully released to the market and is generating consistent revenues.

Potential funding avenues include:

- **Venture capital (VC):** companies that invest their clients' funds in relatively risky businesses with the expectation of high returns on the equity received in exchange.
- **Angel investors:** wealthy or high net worth individuals that invest their own money into a venture in exchange for equity.
- **Corporate venturing:** similar to VC company funding except the funds are being provided by a corporation.
- **Crowdfunding:** public call for funding where everyday individuals can pay in their own money with the expectation of kick-starting a company or bringing a particular product to market. In exchange, these individuals are either offered equity in the company, a reward for investing, or a mixture of both.
- **Crowdlending (peer-to-peer lending):** funding in the form of a loan from individuals through an online platform that usually results in lower interest rates for borrowers and higher returns for lenders than traditional lending schemes.
- **Revenue funding:** funding received directly through the successful sale of a company's products or services.
- **Government funding:** funding received from Government entities usually in the form of grants to achieve a specific purpose such as supporting the research and development costs of companies.

While most of these funding methods are technically available at all product stages, some are more suitable at different stages. See the table below for an indication of the earliest appropriate time for various funding avenues. As a general note, ease of access to finance increases with the maturity of the product.

The recommendation to VR/AR companies is to consider the investment required and the stage a business is at to identify the most appropriate funding options.

IDEA	MVP	MARKET READY	MARKET READY (revenue generating)
<ul style="list-style-type: none"> • Government funding • Crowdfunding • Crowdlending 	<ul style="list-style-type: none"> • Venture capital companies • Angel investors 	<ul style="list-style-type: none"> • Corporate venturing 	<ul style="list-style-type: none"> • Revenue funding

1. IN ADDITION TO VENTURE CAPITAL FUNDING, CONSIDER OTHER INVESTMENT SOURCES

Venture capital is a popular and valid source of funding for a number of VR/AR companies. It is also one of many options in a spectrum of funding opportunities. To find the most suitable investment source, this handbook recommends that VR/AR companies assess both VC and non-VC forms of funding (as outlined above).

2. CONSIDER REVENUE FUNDING – IT IS CHALLENGING BUT WILL BECOME EASIER OVER TIME

Given the nascent stage of the VR/AR industry and many of the companies within it, revenue funding is often not an option. For those who are able to pursue it, it represents one of the most stable forms of funding.

Wherever possible, this handbook advocates funding VR/AR companies through revenue generation to retain full ownership and control of the company and still retain the option to pursue other forms of funding on more favourable terms given the relatively high maturity of the business.



VR/AR companies should consider VR/AR specific accelerator programmes such as Augmentor which is based in London and run by Digital Catapult

As the industry matures, this form of funding will become a more viable and regular occurrence.

3. CONSIDER WHETHER DEBT OR EQUITY FUNDING WOULD BE MORE APPROPRIATE

Equity financing refers to the sale of part of a company in return for a monetary sum. Debt financing refers to access to money in return for its repayment (with interest) at a later date.

For most VR/AR companies it is too early to accurately predict revenue generation from their products and therefore whether regular debt repayments can be made. Consequently, it will be difficult to satisfy lenders that any money provided will be successfully repaid under a debt financing agreement. Equity funding is therefore the preferred method for VR/AR businesses currently, particularly at an earlier stage. It is also advantageous in that the funder has an interest in the longer term success of the business and can grow over time.

4. CONSIDER TARGETING AR/VR SPECIFIC INVESTORS

The Virtual Reality Venture Capital Alliance (VRVCA) is comprised of 49 investors globally and represents an effective gateway to better understand VR technology and its potential. This will help to alleviate the challenge of education of this technology amongst investors. While such initiatives are currently a rarity abroad and are yet to be set up in the UK, it is expected that they will be more commonplace in the future. It is recommended that VR/AR businesses connect to these as a priority over more generic funding pools to understand if there are any opportunities available.

5. INVESTIGATE VR/AR SPECIFIC ACCELERATOR PROGRAMMES TO HELP COMPANIES GROW

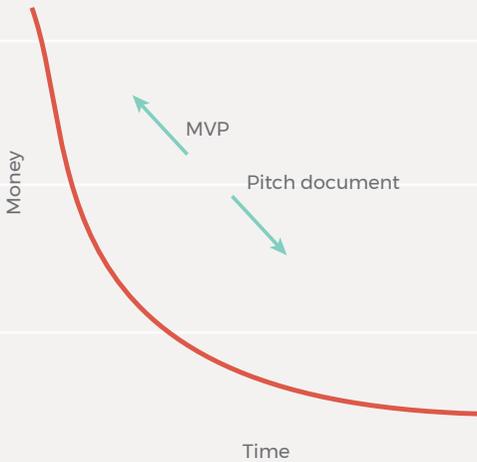
VR/AR companies should consider VR/AR specific accelerator programmes such as Augmentor. Physically based in London and run by Digital Catapult, Augmentor provides early stage immersive businesses ten weeks of equity-free support through connection to investors, access to state-of-the-art immersive facilities, and business and technical mentorship. The programme brings together a large group of UK-based VCs to support VR/AR startups with investment.

6. LARGER VENTURE CAPITAL FIRMS WILL WANT TO SEE RECURRING MONTHLY REVENUE BEFORE INVESTING. A PITCH DECK IS NOT NORMALLY ENOUGH

With the base resources of time and money, the primary approach to funding opportunities can be focused on developing a minimum viable product or a powerful pitch document. Both of these represent a form of communicating a product's value. The latter can be produced with little money given enough time. With enough funding the former can be developed in a short period of time. At a minimum, a basic pitch deck is required to communicate ideas.

Business Models cont.

MVP vs pitch document approach



Access to VC money is competitive and VCs are in a position to be highly selective of which companies receive funding. Companies at a stage prior to the development of a minimum viable product may struggle to secure funding with VCs in the UK, some of which will even want to see a product generating recurring monthly revenue. If these companies still do intend on approaching VCs without an MVP, the hard work that would have been put into building the product will need to be applied to conceptualising and communicating its idea effectively.

"We will not invest in a VR/AR company on the basis of an idea and a pitch deck – we need to see a minimum viable product"

UK seed stage VC

7. CONSIDER INVESTMENT FROM OVERSEAS SOURCES

The UK provides a small percentage of worldwide total venture capital funding in the VR/AR industry (less than 10% as of Q1 2018). As a result there is an overseas VC market approximately ten times as big as the market available in the UK.

In addition to this, the size of funding rounds as well as the risk appetite from VCs varies from country to country. The US for example, offers seed rounds in the region of £3m, in comparison to £300k in the UK. Likewise the risk appetite of VCs in the US is greater than those in the UK.

UK VR/AR companies should consider taking advantage of the opportunity presented by international investors especially given the funds available overseas as well as the increased risk appetite in certain countries. Note that professional advice should be sought to fully understand the tax implications of international investment.

QUESTION

How can a company differentiate itself when pitching to investors?

1. ARTICULATE THE FINANCIAL AND NON-FINANCIAL BENEFITS OF THE APPLICATION

VR/AR companies do not always clearly articulate the full suite of benefits involved with implementing a VR/AR solution and as a result are not selling the full value of their products. The benefit of implementing a VR/AR solution may be very clear to those in the industry but, given that a large portion of the population does not fully understand the technology, this needs to be explicitly outlined and ideally demonstrated first-hand.

Scenario

A VR company is aiming to move hands-on training of an engineer from a physical site to a virtual reality experience.

Training in virtual reality versus a physical site could result in a number of cost savings and efficiencies as a result of not having to travel to/from or maintain a physical site. These financial and non-financial benefits are summarised below.

FINANCIAL

Travel costs saved between the office and training site.

Property costs saved including rent and maintenance.

Facilitation can be provided through the VR experience itself saving on the cost of human facilitators.

NON-FINANCIAL

Reduced carbon emissions as a result of less travel.

Time spent setting/resetting the physical site and facilitating the training session is freed.

Improved scalability in being able to run multiple training sessions simultaneously.

2. LOOK BEYOND THE 'VR/AR' LABEL - WHAT OTHER INDUSTRIES IS THE BUSINESS ALIGNED TO?

For many VR/AR companies, the technology is the lens through which they see themselves. However, when seeking investment there may be more effective ways to present their company. Potential investors may also have preconceived ideas about VR/AR technology which will handicap the investment case before it is fully delivered.

This handbook therefore advises to consider adjacent industries that the product is targeting and represent the company not solely as a VR/AR company but as an innovative solution provider within that industry.

For example, a company specialising in VR conference software may seek investment as an innovative event solution rather than positioning the VR element front and centre of its pitch.

QUESTION

Where can government grants and other support for VR/AR companies be found?

Innovate UK drives productivity and growth by supporting businesses to realise the potential of new technologies, develop ideas and make them a commercial success. Typically their support is provided in the form of grants, loans, networks, and partnerships with other entities in the UK.

1. FOR COMPANIES INVOLVED IN RESEARCH AND DEVELOPMENT, THERE ARE GRANTS OFFERED BY INNOVATE UK TO SUPPORT THIS WORK

Grants are provided by Innovate UK to cover costs associated with research and development on specific innovation related initiatives. These initiatives are posted online as competitions that businesses can apply for.

The exact funding available is dependent on the particular competition but, as an illustration, small and medium-sized enterprises can receive funding of approximately £100k for idea testing and approximately £1m to develop a prototype. Some competitions are targeted at very specific technologies while others have a wider remit covering a diverse range of industries or technologies. This handbook recommends VR/AR companies keep track of the competitions running (<https://apply-for-innovation-funding.service.gov.uk/competition/search>), and apply to those that clearly have eligibility criteria that meets with their development pathway to promote the best chance of a successful application.

One challenge VR/AR companies will face when applying is the resource and time required to put together an application, including evidencing eligible costs which must be directly related to the project the grant is being sought for. If time and/or expertise is required, consider seeking external help from specialists in grant submissions.

£1m

Small and medium-sized enterprises can receive funding from Innovate UK of approximately £100k for idea testing and approximately £1m to develop a prototype



Business Models cont.

The table below sets out the typical intervention levels applicable to the different types of grants available through Innovate UK. For example, for a micro or small business undertaking feasibility

studies, a typical intervention rate of 70% means that 70% of the costs associated with that study would be reimbursed if a successful grant application was made.

APPLICANT BUSINESS SIZE	FUNDAMENTAL RESEARCH	FEASIBILITY STUDIES	INDUSTRIAL RESEARCH	EXPERIMENTAL DEVELOPMENT
Micro/Small	100%	70%	70%	45%
Medium	100%	60%	60%	35%
Large	100%	50%	50%	25%

Source: <https://www.gov.uk/guidance/innovate-uk-funding-general-guidance-for-applicants>

2. INNOVATE UK'S NEW INNOVATION LOAN PROGRAMME

Innovate UK is running a pilot until 2019 with £50m of loans available from £100k to £1m for up to 10 years. These will be offered through loan competitions to UK small and medium-sized enterprises (SMEs) that want to scale up and grow through the development of products, processes or services.

To be eligible, SMEs will need to show that they can afford the interest and repayments on the loan and that they cannot obtain finance from other sources such as banks and equity investors.

3. CONTACT DIGITAL CATAPULT FOR SUPPORT

Digital Catapult is the UK's leading advanced digital technology innovation centre, driving early adoption of technologies to make UK businesses more competitive and productive and grow the country's economy.

The company offers facilities such as Dimension and the Immersive Labs, and runs innovation programmes including Augmentor and CreativeXR. It provides unrivalled access to the latest developments in virtual and augmented reality and supports the development of a strong immersive ecosystem in the UK.

4. EXPLORE EUROPEAN UNION (EU) FUNDING FOR RESEARCH AND INNOVATION

The EU offers funding via multiple programmes including Horizon 2020 – the biggest EU Research and Innovation programme with nearly €80bn of funding available over seven years from 2014 to 2020. Given the EU's size there is far greater competition for funds, with only 5% of applications being successful in some cases in comparison to around 20% of applications being successful via Innovate UK. Nonetheless, it offers another source of funding that VR/AR companies can explore.

Short term — M — L

Brexit does not imply all EU funding will be unavailable

Brexit is a complex process with a number of different possible outcomes. In relation to EU funding, one of these potential outcomes is the model that Switzerland currently follows where it is not a member state but can participate in Horizon 2020. In such a case, EU funding would still be available to the UK.

€80bn

Horizon 2020 – the biggest EU Research and Innovation programme ever has nearly €80bn of funding available over seven years

5. GET IN TOUCH WITH A LOCAL ENTERPRISE PARTNERSHIP (LEP)

Local authorities in England have set up partnerships with businesses since 2011 to help stimulate the economic growth of target areas. These partnerships are called LEPs and each LEP typically has funding available to companies that are undertaking activities in one of their priority areas.

LEPs usually have their own Growth Hub, a specific team that supports new and growing business within their local area. These Growth Hubs are often given funding by the LEP to support the business when undertaking R&D, creating jobs, or when investing in significant new capital expenditure. There are likely to be less relevant opportunities for VR/AR companies than Innovate UK's R&D grants as it is less about bringing research to market and more about generating economic growth, but they are still worth tracking in the local area the company is based in, or is intending to relocate to.

Note that if located in an assisted area (see <http://www.ukassistedareamap.com/> for an interactive map), the company could be eligible for an elevated grant rate.

Generally, LEP grants are smaller than R&D grants provided by Innovate UK and are focused more on areas in need. Hence, London, the biggest VR/AR hub in the UK, may not have as large a fund available as other regions.



6. FOR COMPANIES BASED IN SCOTLAND OR WALES:

Scotland and Wales do not have LEPs but have other grant schemes supporting R&D activities.

For VR/AR companies in Scotland (or planning to set up in Scotland), Scottish Enterprise runs its

own R&D grant competitions. The sum which they offer is at their discretion and is dependent on a thorough appraisal of the project. The following table illustrates the level of grants that are available through this scheme.

INTERVENTION RATE*			
SMALL ENTERPRISE	MEDIUM ENTERPRISE	LARGE ENTERPRISE	GRANTS
35% up to 50%	35% up to 50%	25% up to 40%	£100k+

Source: <https://www.scottish-enterprise.com/services/develop-new-products-and-services/rd-grant>
 *Grants above £100k must demonstrate a positive impact on R&D jobs in Scotland

In Wales, the Welsh Government provides funding in the form of a Research, Development and Innovation (RD&I) grant which can help businesses at all stages from idea to market

exploitation. The financial support available is based on the research and development phase the company is at, and the size of the organisation. Full details are provided in the table below.

R&D PHASE	SMALL ENTERPRISE	MEDIUM ENTERPRISE	LARGE ENTERPRISE	LIMITS
Technical and Commercial Feasibility	Up to 75%	Up to 75%	Up to 65%	£15,000
Industrial Research	Up to 70%	Up to 60%	Up to 50%	£100,000
Experimental Development	Up to 45%	Up to 35%	Up to 25%	£200,000
Exploitation	Up to 50%	Up to 50%	Up to 50%	£20,000

Source: https://businesswales.gov.wales/sites/business-wales/files/documents/Growing%20a%20business/SMARTCymru%20Brochure%20Eng_growing.pdf

QUESTION

When a company is approaching investors but struggling to yield results, how can investment appeal be maximised by leveraging local resources and programmes?

KTN also manages ImmerseUK which supports the UK VR/AR industry by connecting industry, academia, and other stakeholders. It has many high-profile members including the BBC and is free to join. This handbook recommends all VR/AR companies to take advantage of the ImmerseUK membership to keep up-to-date with VR/AR activity and opportunities in the UK.

1. CONNECT WITH LOCAL VR/AR MEETUP GROUPS AND GENERAL ENTREPRENEURIAL NETWORKS

VR/AR companies are not alone in their pursuit of entrepreneurial success. The startup community is alive and vibrant across the country and different sectors – accessing this group can provide insights that could save both time and money to those in the VR/AR space.

Almost every city and region will have networks that can be tapped into, including local angel/entrepreneur networks and local innovation centres. Some will also support partnerships where a corporation can offer guidance/mentorship to a company. In addition to this, universities and Local Enterprise Partnerships (LEPs) can also help advise on decisions and link companies to potential funding opportunities.

2. TAKE ADVANTAGE OF FREE TO JOIN SOCIETIES IN THE UK VR/AR SPACE

The Knowledge Transfer Network (KTN) facilitates connections between businesses, research institutions, ideas, markets, and available support to help UK organisations make the most out of the opportunities available both from UK and EU sources.

3. REGULARLY READ AND KEEP UP TO SPEED WITH PUBLIC MARKET REPORTS

Publicly available reports provide valuable insights into the industry, and a number of these are being commissioned specifically for the UK VR/AR market. VR/AR companies should take advantage of these documents to better understand the high level movements of the industry and the position of the UK immersive market. Tech Nation reports, for example, provide a comprehensive analysis of the UK Digital Tech Ecosystem and can provide a lot of value if used in the correct way <https://technation.techcityuk.com/>.

4. EXPLORE GOVERNMENT INVESTMENT SCHEMES TO MAKE PRODUCTS MORE APPEALING TO INVESTORS

Companies should also understand the various investment schemes offered by the Government including the Seed Enterprise Investment Scheme (SEIS) and the Enterprise Investment Scheme (EIS). Participating in these investment schemes creates greater appeal for investors given the associated tax relief benefits.

REVENUE OPTIONS FOR VR/AR COMPANIES

QUESTION

In which ways can VR/AR companies generate revenue?



1. CONSIDER DIFFERENT PRICING STRATEGIES

The pricing model options for content, technology and service companies will all differ slightly. Recommendations are summarised in the table below.

REVENUE MODEL	DEFINITION	CONTENT	TECH	SERVICE
Subscription/licence	The purchase of a product or service for a specific period of time for a set price. Subscribers typically prepay on a monthly or annual basis.	✓	✓	✓
Freemium	A base product is provided free of charge, but additional purchases (e.g. extra features, services, or virtual goods) are paid for.	✓		
One-off sale	A product is purchased once and no further payments are made.	✓	✓	
Pay-per-view	A set payment is made each time a piece of content is accessed.	✓		
Value model	A price is set based on the benefit it provides to the customer.		✓	✓
Free with paid-for services	The product is given away for free and the customers are charged for installation, customisation, training, etc.	✓	✓	✓
Advertising	Advertisements sit within the experience and advertisers pay the creator.	✓		
Time and materials	A fee is paid based on the time spent by employees to perform the work.			✓
Contingency	The final fee charged is contingent upon the level of performance or customer satisfaction.			✓
Leasing	Renting a physical product (such as an AR headset) for a set period of time before returning it to its owner.			✓

S Medium term **L**

Advertising in VR is reliant on mass adoption of the technology

Film, TV, radio and the internet have been benefiting from advertising revenue for many decades now. The first paid-for radio advertisement took place in 1922, almost a hundred years ago. Since then, society has had time to adopt, grow comfortable with these mediums and accept the introduction and mainstream placement of advertisements within them. VR represents a new medium early on in its journey to mainstream adoption. The current small number of users makes advertising a difficult revenue model to pursue but as the technology and its adoption grows it is believed to represent an inevitable future for virtual reality.

S Medium term **L**

Data from VR/AR experiences today could be a revenue generating asset tomorrow but take note of related data and tax regulations

Data is the currency powering a number of the services in use everyday including those provided by Facebook and Google. There is a vast amount of data that can be recorded from a VR/AR experience, some of which is very specific to the medium. This includes eye tracking details and behavioural patterns which will likely prove valuable in the future.

VR/AR companies should consider what data can be captured from their experience, who it would be valuable to and why. This should be done in a responsible manner ensuring adherence to the latest regulations such as GDPR. This point is explored later in the Legal section.

Note that advertising revenue based on user personal data is in the scope of short term measures proposed for taxation of the digital economy by the UK and EU. See the section on taxation under operations for more information.

OPERATIONS

Relevant questions

- A company is looking to recruit team members – what are the key roles that sit within a VR/AR company?
- A company is struggling to find correctly skilled people to fill a vacancy – where can it find people with the right skills?
- What steps can be taken to reduce the level of cost being incurred by a VR/AR company?
- What are the key tax incentives that VR/AR companies should be aware of?
- How can a VR/AR company grow its knowledge base in order to create better products/services?

A company's people and knowledge are two of its greatest assets. This section discusses the makeup of a VR/AR content development team, how to source and retain appropriate talent, how to grow knowledge, and how to manage costs to keep the organisation as lean as possible.

While discussing costs, this handbook places a particular focus on tax matters including the opportunities that can come from tax reliefs relating to expenditure on research and development and the development of video games. This guidance is provided at a high level and is not bespoke to the organisation so it is recommended to use this section to identify areas for further investigation. Pursue advice from a certified tax professional.





Key
resources

OBTAINING THE RIGHT TALENT

QUESTION

What are the team roles required to create a fully in-house VR/AR development capability?

VR/AR teams vary by company but the tables that follow provide a high-level view of the main roles that would be included in a complete VR/AR team. The connected industries column provides a view on which other industries these roles are heavily employed in and therefore where they can be found. This handbook also provides a view as to whether it is critically important that potential candidates for these roles have prior VR/AR experience and/or knowledge.

These roles are largely focused on content producers. Service and technology companies will require other specialist roles in addition to management and marketing/sales teams.

Early stage VR/AR companies should consider hiring individuals who can fit multiple roles then look to recruit for specialist roles as their company grows.

Development

JOB ROLE	DESCRIPTION	CONNECTED INDUSTRIES	PRIOR VR/AR EXPERIENCE/ KNOWLEDGE MANDATORY
DEVELOPER	Developers are responsible for writing the code that enables functionality in a VR/AR experience.	Found across most industries involved in producing or maintaining software for either enterprise or consumer purposes. The video gaming industry in particular holds a lot of the talent in this space.	No, as these skills are largely transferable to VR/AR scenarios. For any unique VR/AR skills, these can be developed on the job.
QA TESTER	Quality assurance testers are involved with testing, debugging and proposing refinements to a VR/AR application.		

For most cross-platform projects, specific skills include development on game engines like Unity and Unreal which require C# and C++ programming knowledge respectively. Developers with this knowledge can be found on social media, online freelancing platforms, specialist recruitment agencies as well as local development meetup groups. The predicted uptake of WebVR will see a percentage of the future skills required move to JavaScript.

Customer experience

JOB ROLE	DESCRIPTION	CONNECTED INDUSTRIES	PRIOR VR/AR EXPERIENCE/ KNOWLEDGE MANDATORY
UX AND UI DESIGNERS	User experience (UX) and user interface (UI) designers design parts of the software that the user sees in such a way that it is intuitive and pleasant to interact with and experience. They are ultimately focused on how the application feels for the end user.	Found across all industries as they are generally aligned to product teams focused on producing software for the company.	Yes, as UX for traditional platforms such as mobile and web differs greatly from UX for VR/AR.

Creative

JOB ROLE	DESCRIPTION	CONNECTED INDUSTRIES	PRIOR VR/AR EXPERIENCE/ KNOWLEDGE MANDATORY
CREATIVE DIRECTOR	Creative directors lead a creative team (consisting of designers, artists and copywriters) to shape the style of the VR/AR application in order to deliver on a client's strategic vision.	Video gaming, film, music, advertising and marketing.	Yes, the creative director needs to understand the nuances of VR/AR as a medium to be of value.
2D ARTIST	2D artists create the textures that are applied to characters and the environment in the virtual world to achieve a desired style.	Video gaming and film.	No
3D MODELLER	3D modellers create the three-dimensional assets used in a VR/AR experience.	Video gaming and film.	No
ANIMATOR	Animators bring a sense of dynamism to VR/AR experiences by enabling 3D models to move in a way that makes sense for different scenes.	Video gaming and film.	No
AUDIO ENGINEER	Audio engineers use equipment and tools to mix and record sound effects, voices and songs such that they can be used effectively in a VR/AR experience. 3D audio will eventually become a default customer expectation and that journey will drive the growth of the specialist 3D audio role.	Video gaming, film and music.	No
NARRATIVE COPYWRITER	Narrative copywriters take responsibility for drafting all the written pieces within a VR/AR experience.	Video gaming, film, advertising and marketing.	No

Management

JOB ROLE	DESCRIPTION	CONNECTED INDUSTRIES	PRIOR VR/AR EXPERIENCE/ KNOWLEDGE MANDATORY
PRODUCER	Producers supervise and manage the high-level delivery of VR/AR projects to ensure they are delivered on time and to budget.	Video gaming, film and music.	No
PROJECT MANAGER	Project managers devise and supervise a timeline of activities to ensure their assigned projects are delivered to specification and on time through the effective organisation of individuals and other resources.	Project managers can be found across most industries.	No

Marketing/sales

JOB ROLE	DESCRIPTION	CONNECTED INDUSTRIES	PRIOR VR/AR EXPERIENCE/ KNOWLEDGE MANDATORY
PRODUCT/ BRAND MANAGER	Brand managers aim to ensure that their brand or product is successful by ensuring that it resonates with existing and prospective customers.	Video gaming and music.	No
SALES MANAGER	Sales managers are responsible for managing and coaching a group of salespeople within a company to drive sales of the product.	Marketing, advertising and media.	No

QUESTION

How do VR/AR companies find the right people given that there is a shortage of skilled workers?

1. LOOK BEYOND THE TRADITIONAL CHANNEL OF EXPERIENCED HIRES

The experienced hire pool is the most convenient source of talent for VR/AR companies as high quality candidates are already trained and experienced with the required skill set and should be able to start providing value very quickly. Where this pool is exhausted, however, there are other options:

- **School leavers:** those who finished education after high school/sixth form and joined the labour force.
- **University graduates:** those who have finished a university course with a relevant degree.
- **Self-taught:** those who have taken the initiative to build an immersive skill set from scratch either through hobbyist projects and/or online and physical courses, but do not have significant experience yet.

'Demand for online freelancers with VR expertise grew far faster than for people with any other skill last quarter (Aug 2017)'

Bloomberg

The disadvantage of hiring from outside of the experienced hire pool is that some level of resource and training will be required to bring candidates up to speed. Nonetheless, VR/AR companies should be encouraged to engage with this idea as it widens the talent pool and benefits the whole industry. Training of non-experienced hires can take place through apprenticeships, on-the-job experience, and/or a selection of immersive classroom and e-learning courses.

Larger players such as Oculus are helping developers through programmes like Oculus Start which provide access to hardware and tools, support networks, and cost savings.

Geographically, companies are not limited to the UK market when it comes to sourcing the necessary talent. Importing talent from abroad or working remotely between countries is a valid option for a number of roles but it is important to consider that a higher level of scrutiny and coaching may be required in such instances to maintain high standards as well as adhering to potential immigration issues.

For roles that require a specific skill set but do not require specific VR/AR experience (e.g. C# developers) consider sourcing these individuals from the connected industries outlined in the previous table and aligning them to VR/AR projects.



MANAGING COSTS

QUESTION

How can costs be minimised?

The key costs for a VR/AR company are outlined below with recommendations to consider on how to minimise them.

COST	DESCRIPTION
EQUIPMENT	<ul style="list-style-type: none">• Buying equipment outright is the most expensive way of obtaining the benefit of its use. Additionally, given that it will need to be upgraded at some point, it is worth considering purchasing VR/AR kit second-hand.• When it is needed only sparingly or for particular events, renting is a viable proposition.• The VR/AR community in the UK is generally helpful so a company could also consider borrowing the equipment required. <p>The ideal procurement options for equipment (in order of preference) are:</p> <p>Borrow → Rent → Buy second hand → Buy brand new</p>
PHYSICAL OFFICE SPACE	<p>The overheads of physical premises are a major cost for businesses. Although it is tempting to set up in London as the key VR/AR hub of the UK, office rental costs can be up to three times that of other cities, which presents a large opportunity for savings.</p> <ul style="list-style-type: none">• VR/AR companies should avoid basing their whole team in prime real estate locations such as central London and instead base themselves primarily in more affordable areas.• Remote working should also be encouraged to reduce the space required within the office.

COST	DESCRIPTION
TALENT	<ul style="list-style-type: none"> Overseas talent may cost less per hour but bear in mind any differences in knowledge or skill levels, or communication difficulties may increase the time spent providing support and guidance to teams. Regardless of talent source, it is important to ensure teams understand the wider strategy of a product to reduce the need for development reworking time and costs.
SOFTWARE	<ul style="list-style-type: none"> Clearly understanding how many licences are required to develop a product will ensure money is not wasted by buying more software licences than are needed. Consider applying for developer support programmes such as Oculus Start which provides a Unity Plus licence or a royalty free Unreal licence for one year.
PROFESSIONAL SERVICES	<ul style="list-style-type: none"> VR/AR companies will need to consider accounting and legal services at some point. These are unavoidable and difficult to reduce in cost beyond conducting fee comparisons between competitors. It is possible that some startup accelerators will offer some of these services as part of a wider package which is worth investigating. Investigate online tools that can assess the amount of tax relief on qualifying research and development work. Alternatively, companies can consider offering a small portion of equity in return for these services to avoid spending cash.



The UK government is considering introducing a new tax on transactions in the digital economy

QUESTION

There is a lot of tax related information and, as a small business, it is hard to understand how it all fits together. What tax incentives should companies be aware of from a VR/AR perspective?

There are significant tax ramifications across a number of areas that VR/AR companies may encounter. These include, but are not limited to:

- Satellite offices
- Freelance workers based in the UK and abroad
- International customers and suppliers
- Revenue thresholds (VAT limits)
- Legal entity structures
- Capital allowances for purchase of fixed assets
- R&D tax credits
- Patent box regime
- Taxation of certain digital services
- Transfer pricing.

This section does not aim to provide tax advice across all of these topics. It should act as a prompt to conduct further investigation where required in collaboration with a tax specialist.

Development and use of VR/AR from a tax perspective falls into the domain of:

- Development of intangibles
- Ownership and exploitation of intangibles
- Business profits generated from its use (either via higher sales or reduced costs).

Given the above, the following points need consideration from a taxation perspective:

1. UTILISING R&D TAX CREDITS

This is a government sanctioned relief introduced in the early 2000s to promote investment into research and development within the UK. The relief can provide a significant cost saving to companies performing R&D provided a number of conditions are met. There are two sides to the scheme, depending on the size of the company and how any R&D is funded – SME relief (worth up to 33%) and the Research and development expenditure credit (RDEC – worth up to 10%).

For example, if a loss making small or medium sized VR/AR company spent £500k in a year on staff working on R&D projects, they would expect to receive a cash credit of up to £167k (33%) from HMRC.

Broadly, a company is considered an SME for these purposes if it (and any groups of companies combined) has fewer than 500 employees and any R&D projects are self-funded, (e.g. a project funded by a grant would unlikely to be eligible for SME relief, but may still qualify under RDEC). More information can be found at <https://www.gov.uk/guidance/corporation-tax-research-and-development-rd-relief>.

Note that the rules are usually more complicated than the simplified example above, therefore professional advice should be sought before taking any action.

2. VIDEO GAMES TAX RELIEF (VGTR)

VGTR provides tax relief to companies developing video games considered 'British' that are intended for supply to the general public. This relief is worth up to 20% in cash terms of the development expenditure, and therefore provides a significant cost saving. For each game, a points based test is required to be completed which looks at a number of categories to determine whether the game is considered 'British' for these purposes. This includes where the game is set, where the game was developed, the language the script was originally written in and a number of other factors.

Note that a company cannot claim for the same expenditure to be included under both R&D and VGTR. Also, where an SME is claiming R&D tax relief for a project, it cannot claim for any other state aid relief (including VGTR and grants).

3. DOES THE COMPANY HAVE ANY IP THAT IS PATENTED OR COULD BE PATENTED?

The Patent Box enables companies to apply a lower rate of corporation tax (as low as 10%) to profits earned from its patented inventions. Companies can benefit from the Patent Box if they are liable to pay corporation tax and generate profits from exploiting patented inventions. The company must also own or exclusively license-in the patents and must have undertaken qualifying R&D on them. The rules for this regime can be complicated and it is therefore important to seek professional advice before looking to make a claim.

4. INCOMING LEGISLATION FOR TAXATION OF THE DIGITAL ECONOMY

The UK government is considering introducing a new tax on transactions in the digital economy. The long term measures are likely to include tax on profits derived from certain types of digital services (yet to be defined).

In the interim, a revenue based tax for businesses of a certain minimum revenue size (not yet set) is likely. If a business is above this threshold, tax would likely apply regardless of the entity being profit or loss making.

The interim measure is focused on two specific digital business models: collection and sale of personal data to third parties that 'generate revenues through directing adverts at that user base' – this could include the advertising revenue model discussed previously. The second group of targeted models is 'platform/marketplace' that takes a commission for matching users' common interests.

The European Commission has recently proposed similar interim measures for entities that are based in the EU or are selling into the EU. The details of the proposal for the UK and the EU and their respective effective dates should become clearer during 2018.



QUESTION

How can companies continue to grow their knowledge base and push the development of their products?

1. LEARN FROM ADJACENT INDUSTRIES

Learning opportunities for the VR/AR industry can be found in a number of other industries. The connection to video gaming is clear through the shared requirement to develop a product using a similar technical skill set. Consider immersive theatre where an audience is in the centre of a dynamic environment and the experience needs to be conducted in such a way to influence the audience's view and direct their gaze. This very same concept applies to virtual reality experiences.

When considering a problem that may seem unique to the VR/AR industry, look at adjacent industries for parallel problems to understand how they have approached and executed solutions, and apply that same thinking to the VR/AR problem being analysed.

2. INVEST IN R&D PROJECTS TO GROW THE EXPERIENCE OF THE COMPANY AND INDUSTRY

To advance an organisation's understanding and experience with VR/AR technology, client revenue generating projects are sometimes too cautious and may not push the boundaries of what is possible with the technology. Consider running regular R&D projects on the side which could lead to new projects and services, and may qualify for R&D tax reliefs.



DEVELOPMENT

Relevant questions

- A company is building a VR/AR experience for a culturally diverse audience – how can it alter the experience to take into account the various languages spoken across the world?
- A company is looking to integrate adverts into its experience – how can this be done in an appropriate way that is effective for advertisers whilst being sensitive to consumer preferences?
- A company is concerned about the increasing threat of cyber attacks against its experience or headset – what steps can be taken to best protect against such an attack?

When developing VR/AR experiences it is vital to take a user-centric approach and focus on the mindset of the end user. On this journey companies will encounter a number of challenges faced by developers of VR/AR content such as ensuring experiences are accessible to different user groups.

In addition to the risks there are also opportunities to take advantage of new revenue streams from advertising which comes with a set of caveats, all of which are explored here.

Underpinning the delivery of any successful technology product or service is the topic on the mind of many CEOs across the globe – cyber security – which is explored in this handbook from a VR/AR perspective.





USER ACCESSIBILITY IN VR/AR

QUESTION

When a product is growing in popularity and more people than ever are using it, how can accessibility be addressed in a seamless way?

1. CONSIDER REMOVING WRITTEN LANGUAGE AND REPLACING IT WITH VISUALS TO OVERCOME LANGUAGE BARRIERS

Over 7k languages are spoken across the world. As VR/AR becomes more popular, the user base will increase to encompass a large number of these languages. If these users are not able to engage with the experience due to a language barrier this could represent a lost customer base. One obvious solution is to produce content in multiple languages but this is not cost effective. If within the constraints of the creative vision, consider designing the experience such that spoken/written language is minimised. Use pictures, icons, animations or graphical representations to depict actions and instructions. This will make the experience accessible to a wider audience and simultaneously reduce the cost of development.

IKEA provides the same instruction manual to various countries using mostly graphical representations to communicate instructions and therefore circumvents the language barrier.

2. CONSIDER HOW TO CATER TO THOSE WITH DIFFERENT ABILITIES

In addition to reaching audiences of different cultures, VR/AR will also reach audiences of different abilities. This presents a number of challenges, one of which is to ensure a disabled user's experience is as close as possible to that of an able-bodied user. Developers should consider various input options such as gaze tracking, eye tracking, gesture control, and voice control.

S Medium term **L**

Prescription VR lenses to be installed during the headset order process

Users with glasses struggle to wear them comfortably while using some headsets meaning they have to wear contact lenses or forego the full experience. An alternative is to install prescription lenses in the VR headset itself which creates a more seamless experience. In the future, headset manufacturers may offer an option to customise the prescription of VR lenses during the online checkout process of a headset.

7K

There are over 7k languages spoken across the world



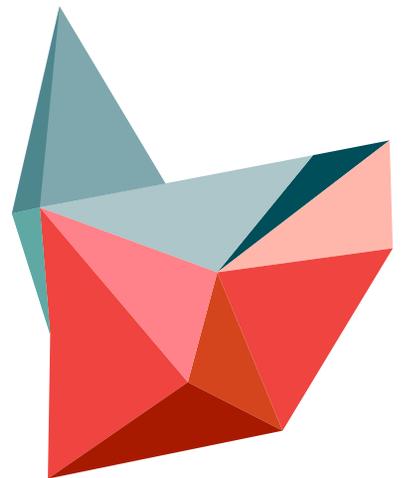
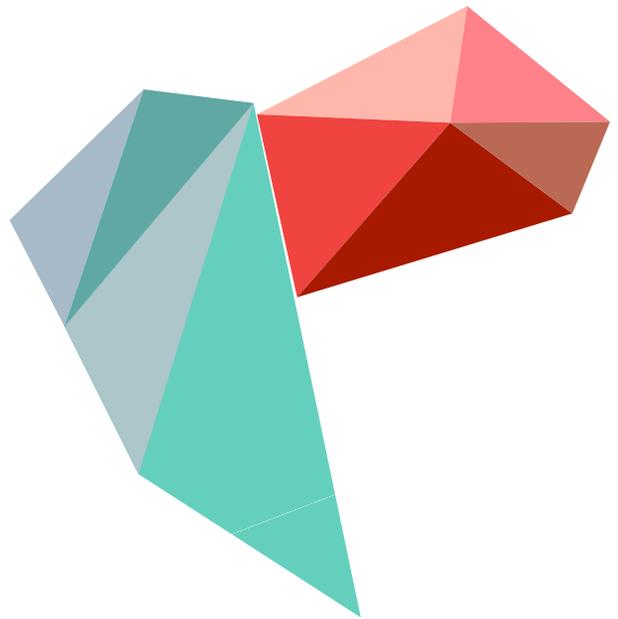
ADVERTISING WITHIN VR/AR

QUESTION

What needs to be considered when introducing advertising within a VR/AR experience?

The current model of advertising on a platform like YouTube is that free videos are provided to users in exchange for viewing adverts, some of which are skippable (these are less expensive for the advertiser) and some that are not (these are more expensive). The user has the option to hide irrelevant or offensive ads. This model can apply directly to both VR and AR content. In doing so, this handbook recommends VR/AR companies adhere to the following guidelines:

- The consumer should always have the ability to look away from an advert – it should not follow the gaze of the consumer but can be automatically paused when attention is directed away from the advert.
- Adverts in AR represent a serious risk to the consumer if not designed and delivered carefully. Assuming a future where AR glasses are a normality, potentially hazardous real world elements can be blocked from view through a misplaced advert. If the hardware detects an individual is on the move it should seek user confirmation to display the advert and take up only limited screen real estate.
- AR adverts should not attempt to detect and replace real world adverts with their own as this would represent an ethical concern.
- Adverts as virtual world elements in context with a scene are acceptable within the same boundaries of real-life non-digital adverts.



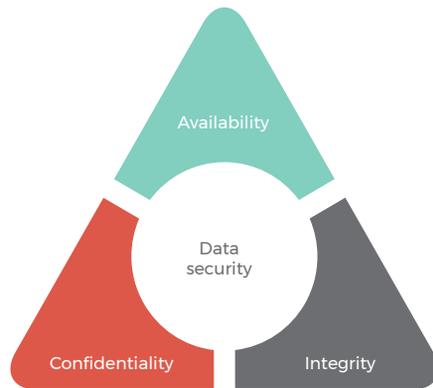
CYBER SECURITY CONCERNS OF VR/AR PRODUCTS

QUESTION

What safeguards can be put in place to keep applications that are vulnerable to cyber security breaches as secure as possible?

1. WHAT ARE THE MAIN OBJECTIVES OF CYBER SECURITY INITIATIVES?

Confidentiality, integrity and availability represent the core objectives in the mission to secure data appropriately.



- **Confidentiality:** is access to the information limited to the right people?
- **Integrity:** is the information correct and unaltered?
- **Availability:** is the information available to the right people?

2 WHAT DOES THE VR/AR APPLICATION DO? CONSIDER BOTH THE OBJECTIVE AND RISK PROFILE

While all three of the aforementioned objectives are important, if resources are limited, priority should be applied to the most important objective which will be based on the function of the VR/AR application. A surgeon using an augmented reality application to locate a patient's tumour would be far more concerned with integrity than confidentiality or availability. This is because the risk of making an incision in the wrong place as a result of false information could be life threatening. In the case of a VR executive board meeting, confidentiality would be the priority to ensure that issues being discussed can only be heard by authorised individuals.

In addition to the function of the application, consider the risk profile. A VR shopping experience with an attached payment platform represents a higher risk scenario than a video game due to the potential threat to the user's financial data. As such, the level of protection and cyber security focus should reflect this.

3. RELIANCE ON THIRD PARTY SOFTWARE

Consider what other technical dependencies the application has. Does it require extensive integration with third parties (APIs, code libraries, etc)? Make sure third parties are known and can be trusted with the security of the product. Simply documenting the dependencies and supply chain with the associated risks can be a big step towards building a resilient application.

4. IS CYBER SECURITY BUILT IN FROM DAY ONE OR IS IT AN AFTERTHOUGHT?

The mentality among many startups is to produce a working product and get it out the door as soon as possible. This is risky as cyber security is often neglected in the attempt to ship the product as soon as possible. Take the time upfront to develop applications with security in mind. Otherwise, there is the risk of developing unsecure software which will cost more later on to retrospectively protect. Having to recall a device or application because of a significant vulnerability can be extremely expensive.

5. HOW ARE THE HEADSETS PROTECTED FROM MALWARE?

There is no anti-malware software currently running on VR/AR devices. Tethered headsets are primarily protected from threats via the PC they are connected to. Mobile security is an area which is yet to be properly addressed at an end user level potentially exposing smartphone and handheld VR/AR devices. Standalone headsets with their self-contained systems and connections to the internet represent a potential risk.

Short term **M L**

Cyber security protection tools to be incorporated into enterprise VR/AR headsets

As a result of the potential risks, and the increasing use of these devices in enterprise, there will likely be a push to build in cyber security tools such as anti-malware software and intrusion detection systems.

As dedicated VR/AR software is developed, headsets will form the only interaction that a user has with an application. They may also be assigned to a specific user in the same way that laptops and smartphones are. Therefore, there is potential for a rise in the use of Technological Protection Measures (TPMs) as a second factor for user authentication where a user can only log in from their specified headset.

6. CONSIDER USING VOICE INTERACTION AS AN AUTHENTICATION LAYER

Voice interaction capabilities on VR/AR devices may allow non-present individuals to influence a headset. Consider the example of 'Alexa' being called from TVs triggering a smart home device.

This handbook suggests VR/AR companies implement a voice profile calibration process where the device only recognises certain voices it has been taught. Recommendations also include that the device seeks verbal confirmation for higher risk actions including financial transactions. Finally, enable the customisation of the trigger word (e.g. 'Alexa' vs 'Echo') so the trigger word is not automatically known to everyone by default.

7. WHAT ARE THE PROS AND CONS OF BIOMETRIC VERIFICATION FOR VR/AR DEVICES?

As VR/AR devices are worn on the face or held in hand, they are in a suitable position to make use of biometric verification options such as face recognition or fingerprint scanning. They are convenient as they are with us at all times (naturally) and do not require any memorisation of a password. For example, web applications which allow a user to create a digital voice with only one minute of audio could allow someone to potentially impersonate an individual virtually.

Normal procedure following a stolen password would be to change it, but unlike a password biometric information cannot be changed – once it is compromised, it is no longer a secure verification option. Careful attention must therefore be paid to securing biometric information and it is recommended that biometric data remain on the device and is validated locally.

MARKETING AND SALES

Relevant questions

- A company has developed a product and would like to gain a following – how can it attract users and maintain existing ones?



Customer relationships



Channels

BUILDING A COMMUNITY AROUND A PRODUCT

QUESTION

What is the best way to build a community around a product so that its consumers promote it?

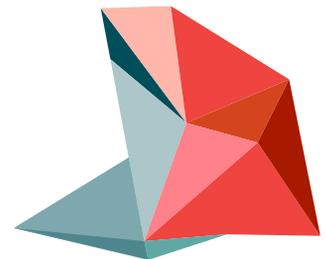
1. HOW TO REACH AN AUDIENCE OF EARLY ADOPTERS

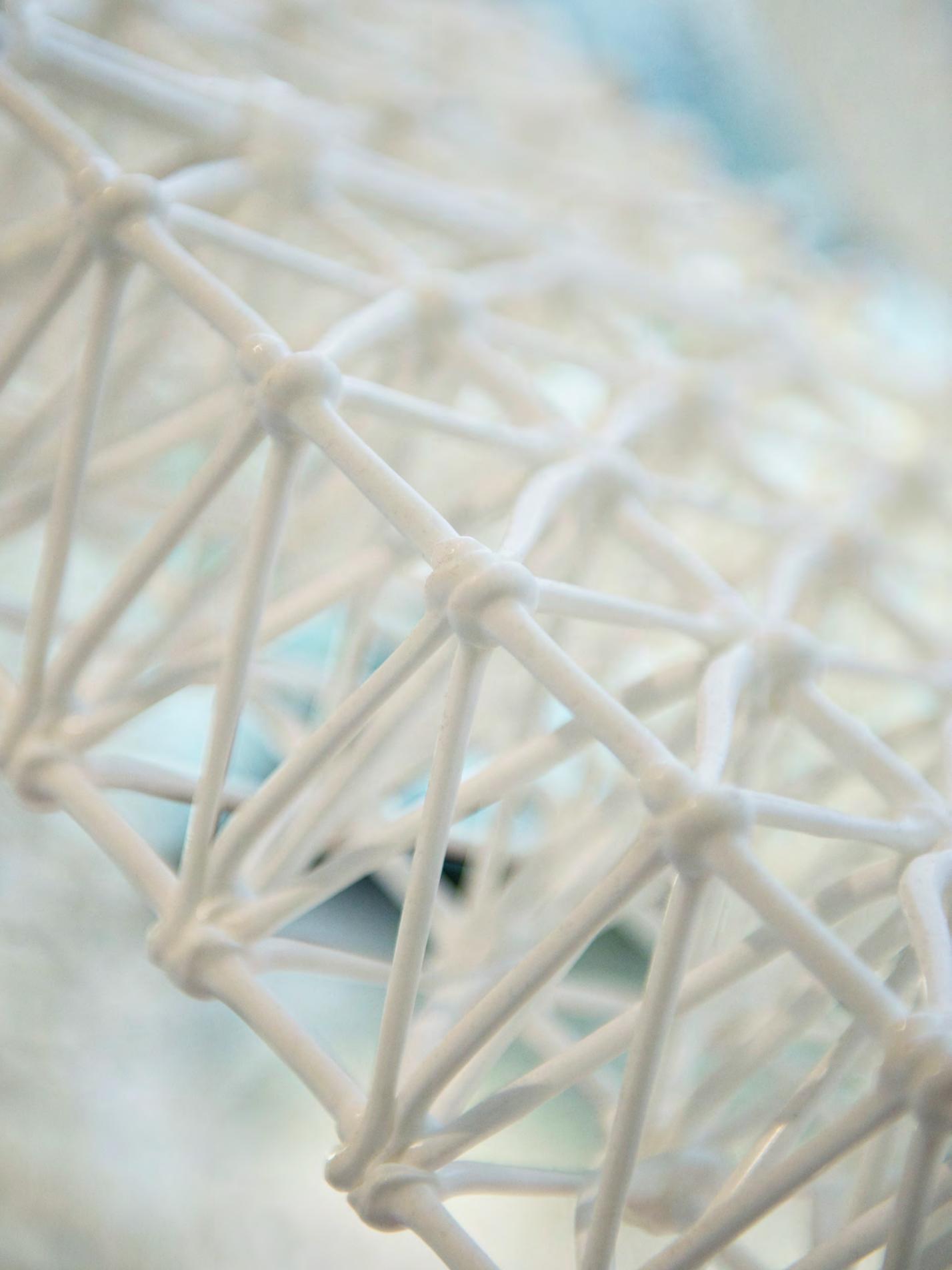
To build a community around a product a company will need to find the early adopters who will be willing to engage with it in its initial stages. Steam's Early Access platform is a powerful marketing avenue which allows companies to connect to a large number of users who could also potentially be paying customers during the development of a product. The application process is relatively simple and at a low cost comprising a single application form and a £70 one off fee per application.

Social media marketing is another significant avenue with a number of options including Facebook, Twitter and Instagram. The focus of attention should be based on what social media platform potential customers are using. The VR/AR community is particularly strong on Twitter and Reddit.

2. CONSIDER HOW TO MAINTAIN THE COMMUNITY

Once a company has obtained its initial user base, it is important to keep them engaged. Whether on social media or other platforms, regularly monitor what users are saying about products and plans. Respond to queries and concerns and engage in general discussions. Run competitions to create excitement and generate referral codes for the community so they can market the product through word of mouth.





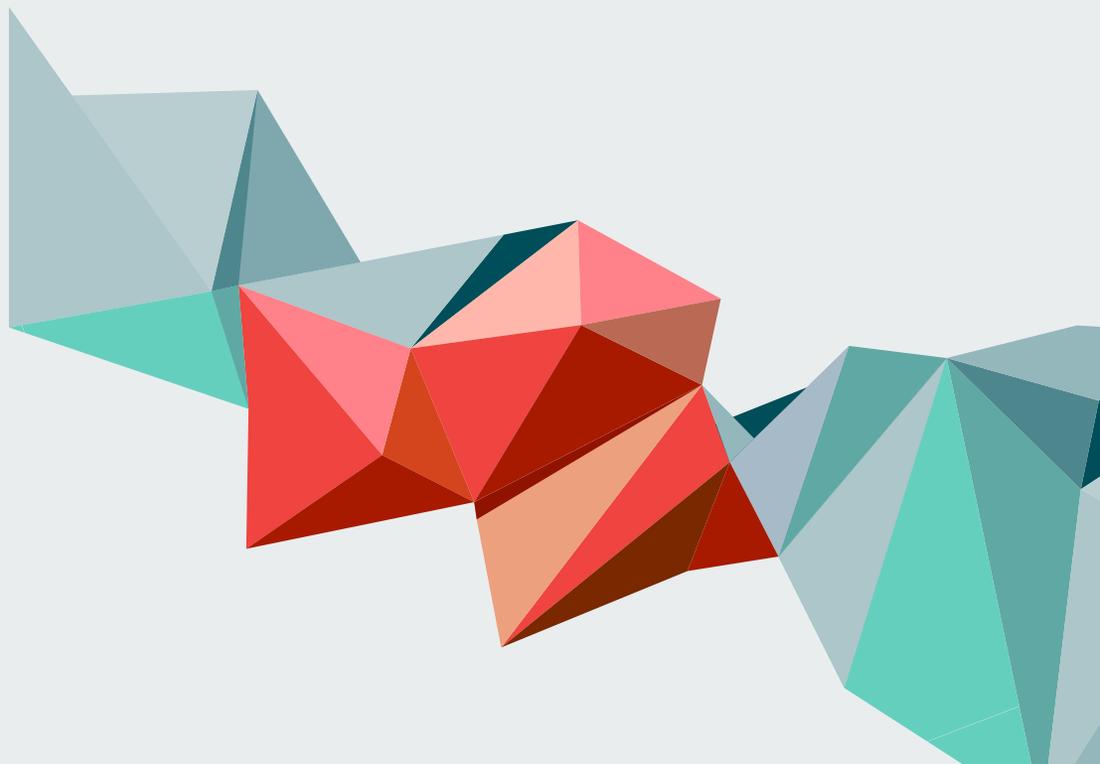
LEGAL

This section considers some of the main legal issues which need to be considered when developing, using and commercialising VR/AR systems, content and platforms.

This handbook begins each topic area with some examples of related questions. Through these questions, it aims to help VR/AR companies identify the relevance of the section and the material and then set out a review of issues and possible solutions based on the nature of the VR/AR system and the company's role in its development and deployment.

By its nature, this is an overview of potential issues and cannot be exhaustive. Recommendations will depend on the facts and specific legal advice should always be sought in particular cases.

As VR/AR applications are relatively new and rapidly developing there is not yet a great deal of legislation or case law relating specifically to VR/AR. It raises some novel questions which in many cases will have to be resolved by applying existing law to new scenarios. Over time it is expected that more specific regulations may be introduced or laws updated to address some of the issues raised by VR/AR. The handbook's review and recommendations are based on English law. Make sure to bear in mind the potential for other laws to apply where VR/AR services are deployed or made available in other countries.



IP RIGHTS RELATING TO VR/AR SYSTEMS – DEVELOPMENT AND EXPLOITATION

Relevant questions

- A company invests in a new concept for a VR/AR system – how can a company ensure that infringement of existing IP rights does not occur?
- How can a company protect its VR/AR content, platform or system?
- Two companies collaborate on different aspects of a VR/AR system development – how do these companies manage IP ownership and returns from exploitation between them?
- A developer engages a third party contractor in system development – how can the transfer of IP and no infringement of third party IP be ensured?
- A company develops a new design for VR glasses with improved user features – how can it best protect against copying?
- A company works on developing new data compression technology – how can the company ensure it does not infringe any existing IP rights? Should it be adopted as an industry standard to allow interaction with other suppliers (similar to 5G, Bluetooth etc) and what are the terms of use for third parties?

QUESTION

A company is thinking of bringing a new AR service to market using a new 3D image processing system which it has developed to place images more realistically in the real world. It doesn't think anything quite like this has been done before – what are the key IP issues it should think about?

There are a number of Intellectual Property Rights (IPR) issues which should be addressed. Some of the key considerations are as follows:

1. IDENTIFY AND SECURE OWNERSHIP OF THE IP RIGHTS IN THE TECHNOLOGY

This could take several forms including unregistered rights such as copyright in software and specifications, database rights and confidential information (trade secrets such as source code and algorithms) as well as potentially registered rights such as patents (which protect inventions), trade marks and registered designs.

IP rights are important to protect investment in the creation of a product and service. They can help protect businesses from copying by competitors, provide revenue streams through licensing of software or subscription to services, and also demonstrate the value underpinning the business to potential investors.

Patents are a highly complex and rapidly developing area, so always seek specialist professional advice

IP rights in a technology may also enable businesses to commercialise the development through licensing to others to incorporate into their platforms or solutions. Many important technology companies (e.g. ARM) derive significant proportions of their income from licensing their inventions or designs to others (such as global technology businesses) to incorporate into their own products, rather than manufacturing or marketing the products directly themselves.

Is there an inventory of the company's IP and who created it to ensure that the business can prove ownership later if needed, and demonstrate it to potential investors?

Are there legal arrangements in place to ensure ownership of IPR has been validly transferred to the company by employees, contractors and others (such as founders) who may have been or will be involved in its development? This is particularly important for technology and content created by contractors as IP rights in work done by contractors will not transfer automatically, even if they have been paid – the company may just receive an implied licence.

Are there confidentiality and security measures in place to protect trade secrets and confidential information?

For example, ensuring that secure storage arrangements and access controls are in place, and that anyone who has access to plans or technology has signed a confidentiality agreement.

2. CONSIDER WHETHER THE TECHNOLOGY COULD BE PATENTED

Patents are available for inventions which are new, not obvious (inventive) and don't fall into one of a number of specified exceptions below. Patents can cover products (specific components, solutions or systems) and processes (methods of achieving a particular result or effect). They have to be applied for, and cost money, but if one (or more) is obtained they will give more powerful rights against competitors (no one else can use the invention without permission, even if they don't copy the technology directly), and can help demonstrate to investors that there is something unique. Obtaining a patent may also enable the company to benefit from Patent Box tax incentives giving a lower rate of tax on future profits (see below and also see the tax-related opportunities for VR/AR companies in the Operation subsection of Business Models).

Some types of inventions, e.g. those which are only a new form of software or business method, may not be patentable under the law in the UK and Europe. However those which have a 'technical effect', will qualify. This could cover many VR/AR related inventions, for example, speeding up data processing, presenting VR/AR images to a user in a different way, or an innovative new application for a VR/AR solution.

There are already many examples of patents and patent applications covering a wide range of technical fields such as different types and modes of display devices, user interaction, movement tracking, content capture, creation and display, data processing and display across the full range of VR/AR categories. This is a highly complex and rapidly developing area, so always seek specialist professional advice.

Legal cont.

It is vital to keep a company's developments secret until it has applied for a patent as any advance publication will invalidate a future patent.

This handbook talks through some of the other issues that might be encountered in relation to patents in response to some of the other scenarios set out below.

3. CONSIDER TRADE MARKS AND OTHER PROTECTION

Has the company decided on branding for the new product/service and if so has it applied for a trade mark? Strong brand protection will make the product stand out in the new VR/AR marketplace and help differentiate from competitors.

Appropriate trade mark registrations will help protect against 'copycats' and others free-riding on the goodwill and reputation developed.

For hardware manufacturers and designers, design right protection may also be available to protect the design of the products, particularly as the industry develops attractive styles of hardware.

It's worth bearing in mind that, with patents and registered designs, a company can only register them while they are new. Once it starts using them publicly, or once it has disclosed them publicly, then the opportunity may have been lost to get these types of protection. Clearly this needs to be weighed against deciding when the technology/design is sufficiently developed and when a company has the funds for the registrations. It is worth taking related advice early on to keep in mind as the company develops. In contrast, however, a company can register the name or logo at a later date as long as no-one else has done this first.

As well as these 'legal' forms of IP protection, also consider registering appropriate domain names, and perhaps registering key words for internet searches and app stores to protect against others free-riding on reputation.

If registered IP protection is not available, or a company chooses not to pursue it, then it may still qualify for unregistered IP rights, such as copyright, database rights and unregistered designs. These rights arise automatically, as long as the work satisfies the relevant requirements for originality. Some of the issues that might arise in relation to copyright in particular are explored below.

Ideally consider the markets in which the company is most likely to trade and try to seek protection in advance to avoid 'squatters' registering rights which might obstruct entry to new markets. Again, it's important to have a strategy for protection from the outset, even if registrations are not immediately pursued.

4. KNOW WHERE IP REGISTRATIONS WILL BE PROTECTED

Consider in which countries to apply for patent, trade mark and registered design protection. All IP registrations are territorial, so will only provide protection in those countries where registered applications are made and relevant filing and renewal fees are paid. Companies therefore need to consider which markets will be key to achieve cost-effective protection. The patent, trade mark and registered design systems have processes by which companies can apply for protection across a number of countries or for a whole region, and which can allow a delay in decisions about which countries to apply in (and therefore when to pay fees) for a period while the commercial potential is established. Again, professional advice will help to design the optimum route.

5. INVESTIGATE WHETHER ANY EXISTING THIRD PARTY IP RIGHTS COULD IMPACT ON THE DEVELOPMENT OR MARKETING OF THE TECHNOLOGY

Some potential issues which could impact on future plans and need to be considered include:

Does the solution or platform use or depend on any third party proprietary software, data or other enabling technologies in order to function? Have the licence terms been checked to see how these will apply to any commercialisation, are any permissions needed, and what royalties would be payable? Who should obtain any necessary licences?

Have there been any patent, registered design and/or trade mark searches undertaken to check for any existing rights owned by others which might be infringed by the solution or marketing? As the VR/AR area is developing so rapidly, many businesses and inventors around the world have been filing a rapidly increasing number of patent applications for many different aspects and applications of VR/AR solutions.

There is a delay between application and publication of patent applications, and comprehensive searching can be challenging, so it is impossible to eliminate risk completely, but a search will help give an indication of potential problems to avoid, and help to identify where licences may be needed. Different types of searches can be undertaken, e.g. to identify existing 'prior art' before an application, to assess 'freedom to operate' for a new technology, or to investigate rights owned by a potential competitor or business partner.

If a company knows about or identifies other existing IP rights which are needed to use in the solution, it may need to negotiate a licence. This will be much easier if done before becoming committed and embedding it in the solution – a claim at that stage could be disastrous, leading to claims for damages, account of profits, or an order to cease use of the technology entirely.

Does the system or solution use open source code or technology? Companies should identify any such use, and the relevant licence terms. Using open source components can bring significant benefits, but can also give rise to legal issues (as the terms may require contribution back or disclosure of the technology) and potential information security risks, if not properly managed. It is a good idea to keep a log of what open source technology is being used and to check the terms on which it has been made available – it comes with more catches than one might realise.



6. WHAT INDUSTRY STANDARDS ARE RELEVANT TO VR/AR, AND WHAT ARE THE IP IMPLICATIONS?

As the VR/AR industry develops it is likely that industry standards will emerge for solutions and protocols used across different platforms and devices – similar to existing technologies such as Bluetooth for wireless, 4G/5G for mobile communications, and MPEG for video. Some of these existing and developing standards for traditional technologies will also be highly relevant to components of VR/AR platforms, and VR/AR specific standards are also being developed by bodies such as:

- IEEE, which is conducting Project 2048.5 to develop a standard for VR and AR: Environment Safety.
- 3GPP (the mobile standards organisation), which conducted a workshop in December 2017 reviewing VR standardisation issues.

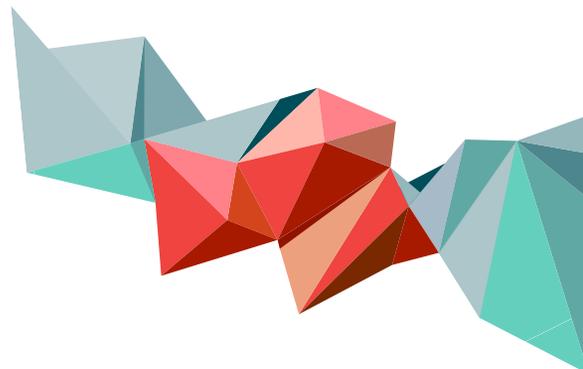
- Global Virtual Reality Association (GVRA) – supported by Acer, Google, HTC Vive, Oculus, Samsung, Sony, and StarVR Corp.
- OpenXR, which aims to provide an open standard for applications to run across different VR systems and devices without having to be ported from one to another.
- The Virtual Reality Standards Board, which recommends standards for commercial VR facilities.

In some cases use of these standards is free of charge, but others may require payment of royalties for the use of patented technologies (which are generally required to be made available for use by any interested party as part of a bundle of rights on fair, reasonable and non-discriminatory terms). In a situation where relevant formats and standards are still developing, selecting the appropriate ones for the system or platform to adopt is a critical commercial decision. If technology becomes incorporated into a relevant standard then companies may also be entitled to a share of income from other users.

7. IF PLANNING TO COLLABORATE WITH SEVERAL OTHER TECH PARTNERS TO DEVELOP A COMPLETE SOLUTION, IS THE COMPANY AWARE OF THE MAIN AREAS THAT SHOULD BE COVERED IN THE AGREEMENT?

It is increasingly common for several parties to collaborate in developing different aspects of a solution together (e.g. hardware, software, content, marketing and distribution). It is important to have clearly documented agreements to cover this to avoid arguments and claims later. Some of the key aspects include:

- **Legal arrangements:** what type of legal arrangement best suits the project? Many are managed through contract arrangements, but in some cases it may be better to set up a company or partnership vehicle, which the participants can invest in, to run the project.
- **Obligations:** what is each party bringing to the project in terms of technical resources, money, time commitment, existing IP etc. What are the timelines and what does each party commit to deliver?
- **Project management and decision making:** what development processes will be used? How are decisions made? Who has the final say over specifications and acceptance testing?
- **Exclusivity:** is this an exclusive arrangement, or do the parties remain free to also work with others in the same area?
- **Intellectual Property:** clearly define contribution of pre-existing ("background") IP which each party brings to the project, and the extent of rights of other parties to use this. Normally each party will want to retain ownership of its background IP.
 - Developed IP – who will own new IP developed in the course of the project? What if this is a development of one party's background IP? Many different arrangements are possible, for example, splitting ownership of different types of IP, results, territories or fields of use, depending on the parties' interests.
 - What licences rights do other participants have to use the developed IP themselves or to licence to third parties?
 - What licences of IP are needed from third parties and who is responsible for obtaining these?
- **Commercial exploitation:** what forms of commercialisation are envisaged? Who will be responsible for managing this? How will the proceeds be shared?
- **Liability:** how will the parties manage and share in any losses or claims from third parties (e.g. product liability or IP infringement claims)?
- **Term and termination rights:** when and how can the project be brought to an end, and what will the consequences be in different scenarios? What protections are needed to ensure continuity in case one of the participants is in financial difficulty, or withdraws from the project?



IP RIGHTS RELATING TO VR/AR CONTENT AND TALENT (LICENSING IN AND LICENSING OUT)

Relevant questions

- An avatar wearing branded clothes in a VR world or racing branded motor cars in a VR game – does it need owners' consent?
- Usage of music in a bar within a virtual environment – how are licences obtained? What if the consumer controls how much of the music plays as they explore different parts of the bar?
- Attending a real sporting or entertainment event by virtual presence – what licences are needed? How does this interact with other existing licences and rights granted?
- The VR world includes representations of existing buildings, statues or works of art – is a licence needed? How will copyright over these works be dealt with in relation to AR where a user may make changes (albeit transient) to the work within the platform?
- The VR world includes representations of real celebrities – is their permission needed? What if they act in a manner inconsistent with the views of the real person?
- A user designs a car (with a manufacturer's logo) in the virtual world. If the car is sold in the VR world, can the owner apply for registration of the logo as a trade mark for goods or services, and in which countries? If the car copies a real car design can the original car designer sue for infringement?
- A sporting organisation may sell VR access to a football game – how would such access be reconciled with broadcasting agreements? VR access is neither real life attendance nor broadcast content.

QUESTION

What are the key licensing issues that need to be considered if developing VR/AR content that uses third party content/IP?

As part of creating VR/AR content, there is a need to consider legal issues relating to licensing, use and exploitation of content:

As with content produced for more traditional media and platforms, a company may wish to use existing third party content such as third party owned software, capture ideas from existing materials (such as a book or film), footage from well known locations (such as a landmark or museum), third party owned music or celebrity talent to feature in their content.

A company should ensure it has all the right clearances to use such IP rights as part of its VR/AR content and that the licence terms capture use cases and commercial needs. Where the content provider supplying the content to the company is itself acting under a licence, it is important to make sure that its licence covers use in VR/AR technologies.

Due to the interactive nature of VR/AR content, right owners may not have as much editorial control regarding how their rights are exploited and this may be an issue to consider when negotiating such licence agreements. Once the company's content is created, it may wish to exploit it by licensing it to other parties, either in a B2B or B2C business model, and similarly should pay attention to the licence terms to ensure they capture the commercial intentions including the specific rights that are granted to other parties.

Some key considerations are as follows:

1. IDENTIFY WHETHER A LICENCE IS REQUIRED TO CAPTURE IDEAS FROM EXISTING MATERIALS SUCH AS FROM A BOOK OR FILM IN VR/AR CONTENT

This depends on whether the company is merely getting inspiration from an existing material or taking a 'substantial' part of it. This is a qualitative assessment, and quite a small part such as use of a character can be 'substantial' in copyright terms. It is recommended to consult a lawyer to help with a risk assessment if unsure if the use would be considered 'substantial'. If the company would like to base its VR/AR content on existing IP, such as using storylines, imaginary locations, characters and imagery from an existing work, it will need to approach the rights owners to be granted a licence to use their copyrighted work from their existing work. Already there are examples of well known movie franchises such as Star Wars being used as the basis for a VR experience.

2. DOES AN EXISTING LICENCE ALREADY COVER THE INTENDED USE OF THE VR CONTENT BEING DEVELOPED?

Scenario:

A VR/AR company already has a licence to develop a video game based on a famous film. Does this extend to video games in VR?

This depends on the terms of the licence agreement. Agreements to date are unlikely to have explicitly referred to VR/AR, so do check whether the rights are granted a broad enough way to capture VR/AR. Does the licence grant rights in 'all media and formats now known or developed in the future'? Or is it a more specific and restricted licence?

Consider how to incorporate existing third party content into the VR/AR content and enter into a licence agreement with the third party rights owners for permission for intended uses.

If there is an interactive element to the VR/AR content, do the licence terms permit such uses? For example, if the viewer has control such as how much of a piece of music they listen to based on the viewer's movement or presence in a certain virtual room, are such uses permitted by the licence agreement between the company and the music rights owner?

3. IF USING EXISTING COPYRIGHTED WORK FOR PARODY OR HUMOUR, IS A LICENCE NEEDED?

Scenario:

A VR/AR company would like to imitate themes and characters from a film for humour and satire in a virtual world. Is permission still required from the original rights owners?

The law allows fair dealing with a copyright work for parody and if a company is able to rely on this, it may not need a licence from the original copyright owners. Whether the work will fall within this exception however, will depend on its facts – key considerations are whether the court would interpret work as humorous, the proportion of the original work that has been reproduced, necessity of using the original work and whether such reproduction will be in competition with the original work.

Avoid taking such parody out of the VR content environment and exploiting it independently. See the section on using likenesses and images of celebrities for further information.

4. WHEN FILMING ANY BUILDINGS FOR VR/AR CONTENT OR RE-CREATING A BUILDING IN THE VIRTUAL WORLD USING COMPUTER GENERATED IMAGERY

Consent may be needed to be able to film or re-create certain buildings in computer generated imagery based on whether it is a private or public building, whether the building is protected by IP rights such as copyright, and whether filming was incidental.

Many buildings in London for instance are no longer protected by copyright as the copyright lasts for the life of the architect plus 70 years. Newer buildings are however likely to have copyright protection. In the UK companies may be able to rely on the 'incidental inclusion of copyright material' or the 'freedom of panorama' defences granted by the law:

- Copyright in a work is not infringed by its incidental inclusion in an artistic work, sound recording, film or broadcast. If inclusion of a copyrighted building, or a copyrighted logo on a building which is no longer protected by copyright is incidental which is then included in VR/AR content, this will not breach copyright. However, to avoid any legal issues, consider including a clear disclaimer that the content is not endorsed or licensed by any connected businesses, to the footage of a particular business or a building/logo on a building representing a particular business.

- More specifically to buildings, creators have the right to make a graphic representation, photograph, film and make a broadcast of buildings protected by copyright law without permission from the copyright owner. While this defence does not include making 3D reproductions of buildings, as an extension, one would expect that this could allow footages or computer generated imagery of such buildings to be included in a VR content, but this has not yet been tested.

If filming on privately owned land, permission is needed from the landowner. While certain buildings may appear to be in a publicly accessible place, it may in fact be on privately owned land.

If filming the interior of a building, there may be other restrictions imposed on filming by way of terms and conditions for access to such buildings, such as complete or restricted prohibition of filming. In these circumstances, a licence agreement will be needed with the property owner to be granted the right to film and provided with the required clearances for use of such footage in the VR/AR content.

If including footage within a VR environment that has been shot in a busy city where trade marks feature, this might not result in infringement as identifying goods or services of the owner in accordance with honest practices is not an infringement

5. INTENTION TO USE SOMEONE ELSE'S TRADE MARKS IN VR/AR CONTENT

While in some instances companies may be able to use a trade mark without permission, consider obtaining permission from the trade mark owner by way of a licence to clear intended use as this may be a safer and less costly option than trying to deal with any issues that may arise in the future. The owner of a trade mark has exclusive rights in the use of the trade mark. In the UK and EU, trade mark infringements arise if another party makes 'use [of a sign] in the course of trade' which is (broadly):

- An identical mark used for the same goods or services as an existing trade mark.
- An identical or similar mark used for identical or similar goods or services as an existing trade mark and there is a likelihood of confusion on the part of the public, including 'association' with the earlier trade mark.
- A sign which is identical or similar to an existing trade mark that has a reputation in the UK/EU and the use of the sign takes unfair advantage of or is detrimental to, the character or repute of the trade mark.

Scenario:

A VR game gives players the opportunity to experience driving different branded sports cars, and the players pay money for this experience. In another virtual world users are required to pay money to buy branded virtual clothing for their avatars in the virtual world.

In such instances, through using other trade mark owners' trade marks, it would be making an economic gain which is likely to be deemed as taking 'unfair advantage' of the goodwill created by another party and so would likely be infringing unless permission is obtained.

If considering including any third party trade marks in content intentionally, or expect that there will be inclusions inadvertently, it is recommended to consult a lawyer so that they can advise on the risks, and any negotiation of the licensing terms with the trade mark owner granting the right to use it in VR/AR content.

Scenario:

A company decides to use trade marks such as clothing and car brands or restaurants and retail stores in its virtual world. Could this be an infringement of the existing trade marks?

If including footage within a VR environment that has been shot in a busy city where the trade marks feature, this might not result in infringement as identifying goods or services of the owner in accordance with honest practices is not an infringement.

Legal cont.

If using a trade mark in respect of supply of goods or services for which it is registered (other than the sale of genuine products) or in a way which implies the use is licensed or authorised, infringement is likely.

Infringement may also occur when taking advantage of or bringing the trade mark to disrepute, for instance by associating the trade mark brand with illegal activities. This may not always be easy to assess.

The assessment may also depend on the classification and description of the goods and services for which the relevant trade mark has been registered and whether this explicitly includes or could be interpreted to extend to include the way in which the mark is 'used' in the virtual world:

- While explicit inclusion of 'VR/AR' may not be likely with older registered trade marks, other registrations covering uses in computer games, entertainment etc. could in some cases be interpreted broadly to capture use in some forms of VR/AR content.
- For instance, inclusion of a trade mark on a computer generated image of a car is not the same as use of the trade mark of an automotive vehicle in real life. There have been court cases which have considered the distinction between different uses. Consider the use of an automobile trade mark on a replica toy car: the important question will be how the courts will interpret the average consumer's understanding of the use of the sign in the content and if there could be a likelihood of confusion regarding the origin including association between the content and the trade mark owner. Owners of well-known brands tend to register their marks broadly, and over time may update their registrations where they see potential for exploitation through VR/AR media.

6. DOES THE CONTENT INCLUDE PRODUCT PLACEMENT?

Sometimes trade mark owners will pay for their brands to be included in content and inclusion of branded goods in films and TV content is likely to expand to VR content in instances where brands see this as a good opportunity to advertise their brands. In such instances, attention should be paid to any requirements by the brand owner around how the branded goods are included in VR content.

Be mindful of any regulation around product placement, in particular any restrictions for specific goods such as tobacco and alcohol. As a way of example, Ofcom's Broadcasting Code contains specific rules on product placement on TV, while product placement in films is not as strict. At the moment it is not entirely clear how product placement in VR content will be regulated, whether there will be new regulations and how existing laws will be applied to VR/AR. (See section on Regulation of Content Standards and Services for more guidance around regulations.)

7. ARE AGREEMENTS IN PLACE WITH THE TALENT CONTRIBUTING TO THE VR/AR CONTENT?

A company should ensure that it enters a contract of employment, engagement or simple contributor agreement with all contributing talent, including employees, contractors and freelancers, those that are contributing for free, in the background or foreground. Ensure that rights are granted to use or ownership of all the IP rights they may have developed (including performers' rights) and any rights, including a waiver of 'moral rights', which they may have in the content which they contributed to.

8. IF DEVELOPING AN AR APP THAT WILL TRACK THE USER'S POSITION USING GPS AND INCLUDE AN ELEMENT OF MAPPING

Consider using an API for mapping such as Google Maps API to build a location relevant AR service. In such instances, consider the terms of use and pricing of any such API.

Once the feature is integrated into the application, ensure that as part of the terms of use that the user accepts in order to install and use the app, the user grants the app the right to access their device location and GPS information.

9. IF CONSIDERING INCLUDING LIKENESSES AND IMAGES OF CELEBRITIES IN VR/AR CONTENT

Scenario 1

A company is producing VR content which allows users to train for different sports and computer generated likenesses of relevant sports personalities will be available for the user to train with and compete against.

Scenario 2

What if a company creates characters and avatars in its virtual world which imitate real film stars and music icons in its virtual content?

Use of celebrities to endorse a product can lead to a significant increase in sales and celebrities have been monetising this by entering agreements with companies to sell their 'image rights' for particular uses. This is a growth area and while certain jurisdictions such as the US and a number of European countries have a well-established right for an individual's right in their personality including use of their name, signature and physical characteristics, there are no specific 'image rights' in the UK.

The position in the UK is not as straightforward as there is no one single right that individuals can rely on. Instead celebrities need to rely on a patchwork application of different laws such as privacy and breach of confidence, human rights (including an individual's right to reputation which has been recognised by the law forming part of the right to respect for private life), advertising codes and IP rights infringement (such as copyright, trade mark or passing off) to protect their image. For instance, some celebrities have trade mark registrations for their names or images, and others have been able to prevent use of their likeness where this has given rise to an impression that the use is licensed through 'passing off'.

By way of example, the famous singer Lady Gaga's trade mark for 'Lady Gaga' is owned by Ate My Heart Inc and in 2011 the court granted an injunction against Mind Candy Ltd's release of a song by a character called 'Lady Goo Goo' on the basis that it would constitute an infringement of the 'Lady Gaga' trade mark. 'Lady Goo Goo' was a cartoon character reminiscent of Lady Gaga, in the online game Moshi Monsters. Ate My Heart Inc objected to the release of the song by Lady Goo Goo which resembled Lady Gaga's song 'Bad Romance'. The court decided that the use of Lady Goo Goo gave rise to a link with the Lady Gaga trade mark which had a reputation and the Lady Goo Goo song could lead to tarnishment of that reputation or take unfair advantage of it.

Legal cont.

It would normally be advisable to obtain permission by entering an agreement with celebrities, and in scenario one above it would be recommended that entering a licence agreement with the sports persons is considered. If footage or photography of the sports person from the rights owner (which may be a different party to the sports person e.g. an image library) has been purchased, it is important to ensure that the permission to use it for intended purposes is in place. Ensure that the licensing agreement grants the required rights for the intended uses to avoid any infringement claims in the future.

10. IF PRODUCING CONTENT WHICH IS AVAILABLE IN VR AND NON-VR

Scenario

A live sporting event is made available on live free-to-air TV, VOD and VR.

As live sporting and music events, games, TV and film content availability in VR become more widespread, the licensing terms between content owners, distributors, broadcasters and game consoles will need to effectively deal with the exploitation of such rights.

When producing content, which will be made available in VR and non-VR, for licensed third parties to distribute to end users, consider how the different exploitation rights are split and interact with one another.

For example, the Winter Olympics 2018 was made available to viewers in the UK, including live coverage and video on demand clips, through the BBC and Eurosport. While the BBC made it available on a free-to-air basis on a traditional TV platform, Eurosport was the only provider making the footage available live in VR in Europe. This allowed viewers to select their preferred viewing point from up to six camera positions and, immersing themselves in all the sights and sounds within a venue during the live sport.

Will a company grant all exploitation rights through any media existing now or in the future to one distributor? Will it split the VR and non-VR rights across different distributors? Will it exploit some of these rights directly? Consider how the exploitation rights, exclusivity and holdback clauses are drafted to achieve end commercial goals.

Checklist of key terms of a licensing agreement

Scenario 1

A company has created a film available in traditional format as well as VR which it would like to license to third party platforms to commercialise its work through a B2B model. What are the key licensing considerations?

Scenario 2

A company has created VR content for schools to exploit through use of their VR hardware. What are the key licensing considerations?

Generally, ensure that the licence clearly grants the required rights and permissions for the intended uses. If licensing VR/AR content out and granting third parties rights to content, check that there are not more rights granted than intended. The licence agreement should further reflect the commercial terms with regard to fees and term of agreement.

The following are examples of some of the issues which might need to be addressed:

Grant of and exploitation of rights

- Specify clearly the material/content which is being licensed.
- Set out scope of licence rights, e.g. rights to copy, distribute, communicate, adapt and create derivative works – these need to be appropriate for the intended use.
- Consider waiver of moral rights, if required.
- **Licensing in:** are the exploitation rights and means (e.g. format/platform) defined broadly? Does the company have the right to exploit the licensed rights by way of VR/AR content?
- **Licensing out:** is the company splitting the different exploitation rights and means in its content? For example, free-to-air, subscription, video on demand, VR/AR rights to one company and non-VR/AR rights in the content to other companies?
- **Territory:** is this worldwide or are there restrictions?
- Is there a right to grant sub-licences?

Exclusivity/holdbacks

- **Licensing in:** is there a want for exclusive rights to use the third party content? Consider the inclusion of a warranty that the licensor has not and shall not grant the rights to other parties during the term of exclusivity. Is the exclusivity limited to making it available in a VR medium? Will other VR/AR content developers have the right to exploit the same rights to the third party content being licensed? Will the licensor be held back from exercising certain rights?
- **Licensing rights out:** will the company grant a particular platform exclusivity or will several platforms have the right to exploit the content? Will exclusivity be granted within specific territories, for different exploitation means e.g. a VR film and rights to exploit via free to air, subscription and/or video on demand. Will the company agree to being held back from exercising certain rights during the licence term?

Royalties and licence fees

- Depending on whether there is a B2B or B2C model, will there be a fixed, subscription, pay per use/view or revenue based fee?
- Are there any minimum requirements, commitments or up front payments?

Term

- **Licensing in:** any third party content licensed in should usually be perpetual to ensure that it is able to be exploited for the final VR/AR content containing such third party content on a perpetual basis.
- **Licensing out:** consider how long to grant the rights set out in the licence agreement. If it is an exclusive licence, should this be for a shorter term followed by a further non-exclusive term? Will there be any automatic renewal rights?

Legal cont.

Warranties, representations, and IPR indemnity

- Ensure that the party entering the licence is reputable and warrants that they have the rights to grant the rights and permissions.
- Does the licensor provide an indemnity against any costs and damages occurred as a result of IPR claims from the use of such third party content? The licensor should have acquired all the relevant clearances for their content and such an indemnity is an added level of security. When licensing content, licensees are likely to request the same.

Editorial control

- Check whether the licence grants the right owner any editorial control over the use of their content in VR/AR, and whether this will be commercially and practicably viable.

Governing law and jurisdiction

- Specify whether the laws and courts of England and Wales, Scotland or Northern Ireland will apply to the agreement and to resolve any disputes, or if dealing internationally, will another country's laws apply?



IP RIGHTS ARISING WITHIN THE VR/AR ENVIRONMENT

Relevant questions

- A group of individuals conduct an experiment in a VR/AR lab, creating a new product – who does the patent belong to? The coders, platform, participants or program provider?
- A person ‘simulates’ an experiment previously simulated in a VR/AR lab, in real life, resulting in a new product, which is then designed in the real world – does the right to apply for the patent belong to those who first conducted the experiment in VR/AR or to the individual who worked out how to create the physical product in the real world?
- How do IP rights apply to VR/AR works which are created by the users?

VR/AR raises many novel issues relating to the creation of new content, works and inventions within the virtual world – how will existing IP rights frameworks address these and is there anything which technology and service providers can do to address the uncertainties? Existing copyright law in the UK was originally written in the 1980s – patent and registered designs law are even older – and has been updated many times since to reflect the advent of the internet and other technology developments, but they do not yet specifically address many of the novel issues raised by VR/AR technology. Some of the issues which could arise in a VR/AR environment are illustrated in the following examples:

Scenario 1

A VR system uses computer generated imagery to render a new environment which can be explored by the user, including scenery, paintings on walls, buildings and sculptures which have never existed in the real world. What IP rights protect this invented environment?

At present, this is not as clear as it could be. Current copyright law protects specific categories of original ‘copyright works’ such as ‘literary, dramatic, musical and artistic works’, ‘sound recordings, films or broadcasts’, and ‘databases’. Some of these are themselves further defined. For example, an ‘artistic work’ is defined to include a graphic work, photograph, sculpture or collage, a work of architecture or a work of ‘artistic craftsmanship’.

In order to qualify for copyright protection (in the UK) most forms of copyright must first be recorded ‘in writing, or otherwise’ which may give rise to problems for transient creations which are only perceived by the user but never recorded in any form.

Whilst some elements of the VR environment could fall within certain categories (especially if they have been originally derived from a traditional work such as a photo or drawing in the real world), there is not yet any single category which protects the VR environment as a whole. For example, a ‘film’ means a recording (on any medium) by which a moving image may be produced, but a fully immersive VR environment (rather than a 3D film) is not ‘recorded’ as it is created afresh for the user each time, so may not qualify as a ‘film’.

Legal cont.

Similarly, the VR environment is unlikely to qualify as a 'broadcast' as this requires that information is transmitted for simultaneous reception by multiple users. It may therefore be difficult to define IP rights which apply to the environment as a whole.

The compilation of data, data structures and the software which are used to produce the environment, however, are likely to be protected by a combination of copyright and database rights, and so copying elements of these without permission could well give rise to a claim for IP infringement.

This is not a new problem – many business models have developed without specific forms of IP protection. For example, similar issues have arisen for many years in relation to TV formats which are also not protected as such. In practice, the overall bundle of IP rights which protects the production and presentation of the VR/AR environment is likely to provide adequate protection in most situations.

Scenario 2

A VR environment enables users to create new pictures or designs using paint and design tools made available within the VR environment – do any IP rights attach to these, and if so, who owns them? What happens where the VR environment allows the user to design their own avatar or import other user generated content such as their own photos into the environment?

Generally, the law will recognise IP rights in works created using computers or digital tools, provided they otherwise qualify for copyright protection – that is, they are original, fall in one of the recognised categories, and are recorded in some form.

Where the VR environment provides a tool to enable the creation of the work, the person using the tool would normally be regarded as the author and so would normally own the work. This would be similar to using a pen, or a traditional computer aided design (CAD) system where the user is still the author of the resulting work. The provider of the system would not normally obtain ownership of any resulting IP, unless this is overridden by an agreement such as the system's user terms.

The work would have to be recorded in some form for copyright to apply, so it would have to be downloaded from or recorded in some way in the VR environment. No IP rights would normally arise if the work is purely ephemeral and is never recorded in any form.

Scenario 3

How do IP rights apply to VR/AR works which are computer generated (e.g. scenery, music or pictures created by an algorithm and not by a human author)?

English law also recognises that copyright can subsist in computer generated works, even where there is no human author. These works would still have to meet the other requirements for copyright protection to apply, as above.

However, the law is not very precise as to who would be the owner of the works in this case – it states the owner is 'the person by whom the arrangements necessary for the creation of the work are undertaken'. This could be the platform provider for the VR/AR environment or others involved in creating the software and systems necessary for the creation of the work. There have been relatively few cases clarifying this provision, and other legal systems could also have different provisions.

There could also be systems which fall between the two situations in scenarios two and three, so the output is a mixture of human input and computer generation. In this case there could be rival claims to authorship, or even joint authorship between the user and the provider of the system.

In light of the potential uncertainties about ownership, clear agreements would be advisable between the various parties involved in the development, provision and use of the system, where any significant works could be created wholly or partly by computer generation in a VR/AR environment.

Scenario 4

A group of individuals conduct an experiment in a virtual lab, creating a new invention – does it matter whether the invention has been created in reality or only in the VR environment? Can it be patented and if so who does the patent belong to?

VR/AR can provide an excellent environment for a group of people located in different places to collaborate in a scientific process to develop new inventions in different scientific fields. Where an invention is generated in this way, can it still be patented?

In general, it should not matter how the invention has been generated, provided it meets the various criteria for patentability (e.g. novelty and inventive step). One important requirement is that the invention must be capable of being put into practice ('enablement'). To apply for a patent (in most countries) it is necessary to provide enough information to allow a person skilled in the relevant field to actually put the patent into operation. It is not usually necessary however that this has actually been done in the real world,

so under UK/EU law it should not matter that an invention has been made in a virtual environment, provided that enough information is given to show how it can actually be produced in the real world.

By contrast, if a virtual environment allows the creation of something which would not actually work in the real world, or it is unclear how it would be made to work (such as a flying car), that would not be sufficient to support a patent application.

Issues could arise over who is entitled to apply for the patent where a number of different people have contributed to its creation. It is important to determine who has contributed to the invention and so is entitled to own the patent. This may not be a significant issue where the participants all have a common employer (as the employer will generally own the rights), but if the platform allows collaboration by third parties, it will be important that they have some form of agreement between them governing who is to own the rights to any product of the collaboration (either through the user terms for the platform, or some other overarching content).

For most types of inventions, the place of creation/invention should not be particularly relevant, so it should not matter where the various collaborators, and platform providers are located when applying for a patent. However, the UK (and other countries) have rules restricting the making of patent applications overseas for some types of inventions, e.g. those with military applications. Additional consideration may be needed as to what laws apply, and how best to comply in those circumstances.

Scenario 5

A VR or AR environment could also be used to enable users to create and modify designs for articles such as furniture, vehicles or clothes. What IP rights would apply to these?

Additional questions may arise where the environment enables design of objects such as furniture or other articles, which might potentially be protected by design rights.

The UK has a complex system of overlapping national and (currently) EU registered and unregistered design rights which can apply either automatically or be obtained through registration, provided certain criteria are met for different types of articles.

Currently the law related to designs does not cater particularly well for designs made or reproduced in a VR environment. For example, for design rights to subsist, a design must either be recorded in a 'design document', or an actual article must be made to the design. Similarly, design right is infringed by making articles to substantially the same design, or by making a design document for the purpose of making articles to be made – this might not cover reproducing a representation of an article in virtual reality, unless this is done for the purpose of making further physical articles, e.g. as part of a VR-based CAD process. In this latter case it might be argued that the VR-based design is a form of design document which enables the creation of real-world articles.

Recommendation

A VR/AR platform provider should include in its terms of use provisions which specify ownership and usage rights for IP rights arising from activities within the VR or AR environment.

Some platforms seek to obtain an assignment of IP rights from users, but that may not always be effective under local laws in all countries where users may be located. If the user retains ownership of rights, consider whether any licences may be needed for the use and presentation of those creations in the VR world – do those need to continue when the original user is no longer present? Do they need to extend to other users?

COUNTERFEITING, IMPERSONATION AND FRAUD

6.5%

A report by the OEC in 2017 estimated that nearly one in four video games consoles shipped internationally and 6.5% of trade in global ICT products in 2013 were fake

Relevant questions

- In a VR game, a player sells a highly prized asset (e.g. a mythical sword) which is not in fact genuine but has been created without authority – how can the authenticity be verified?
- How can one avoid counterfeiting of VR/AR content and products?
- Real people meet in a VR environment to discuss a business proposition – how do participants confirm that the other people are who they say they are and not a competitor or journalist?
- A VR store allows shoppers to purchase goods in-store – what payment mechanisms are allowed? How are transactions verified? How will VR interact with e-currency such as bitcoin?
- How can companies deal with fraudulent transactions and the like if platform specific currency with no actual value in the real world is used?

QUESTION

What precautions can be taken to prevent piracy or counterfeiting of a VR/AR product or content?

More traditional media industries such as film, music and gaming have been increasingly affected by piracy of content and counterfeiting of products as content has moved to digital and online channels, making it easier for criminals

to monetise illegal content and products. This has damaged legitimate businesses as well as potentially harming consumers with substandard or dangerous products, and funding other illegal activities. A report by the OEC in 2017 estimated that nearly one in four video games consoles shipped internationally and 6.5% of trade in global ICT products in 2013 were fake. As VR/AR products and services move into the mainstream, and given their potentially high value, they are also likely to attract the attention of counterfeiters – and this could affect both provision of VR content and hardware. Recent experience shows that accessories and consumables which could form part of a VR/AR systems are also particularly vulnerable to piracy.

Attention should therefore be given to incorporating protection against counterfeiting in the design and manufacture of products, content and distribution systems. Many large suppliers and manufacturers have extensive anti-counterfeiting programmes. These may need to be adapted, and smaller VR/AR content, hardware and service providers could learn from these approaches in protecting their products and services. A wide range of technical measures (e.g. tracking and encryption software and decoders), products (such as labels and holograms) and related services are available to assist in providing protection. These should be combined with consumer education and information, monitoring and reporting programmes, co-operation with trading standards and other law enforcement agencies, and precautions in the supply chain to provide a comprehensive anti-piracy protection programme.



QUESTION

Could counterfeiting also be an issue within a virtual environment?

Where VR users interact, it is possible to see the potential risk for counterfeiting and piracy activities to take place within the virtual environment, as well as in relation to the VR/AR products and services themselves. For example, if a VR world enables participants to buy and sell virtual assets (e.g. a prize which can only be won by a certain level of participation), would it be possible for a user to create and sell a fake item instead and so defraud other users? Depending on the nature of the service, consider whether this type of abuse is possible, and if so whether any mechanisms or processes might need to be built into the environment to enable users to verify the authenticity of virtual objects (for example, through use of digital certificates to guarantee authenticity).

Another example would be a VR store, in which vendors can offer (real world) products for sale to participants, who can use the virtual store to inspect and examine the products on sale in the virtual marketplace. What happens if following the purchase those products turn out to be fake? This is an issue already faced by existing online market places that offer systems for rights holders to complain about and prevent the misuse of their trade marks and copyright. See for example, the 'Alibaba Big Data Anti-Counterfeiting Alliance', launched in 2017.

In this type of scenario, the provider of the virtual environment might also need to consider the issue of liability: if someone is defrauded by another user of the system, could the system provider have any liability for this? What warnings might need to be given to users to ensure they check the veracity of those they deal with, and what processes are available to enable them to do so? What happens if those processes fail? There is no single answer to these questions, but they may need to be considered in designing a system where this could happen.

QUESTION

How can a company verify the identity of participants in the virtual environment (and should it)?

Since the very early days of the internet, one of its defining issues has been the anonymity of users, encapsulated in the famous cartoon 'On the Internet, nobody knows you're a dog' by Peter Steiner, originally published in the New Yorker in 1993. Issues of identity, anonymity and identity fraud have continued to grow in importance, especially with the growth of social media. Platforms such as Facebook, Twitter and Instagram have been used by some as vehicles for identity theft, and 'unofficial' accounts have profited from the reputation of celebrities and public figures. Some services have required users to identify themselves while others allow anonymous use. YouTube originally suffered a backlash from users when it required them to disclose their identity (or at least to have a logged in account) in order to post comments in 2013 – though the practice has remained largely in place since.

VR applications share many of the same attributes as these earlier online services in this regard, but have even greater capability for users potentially to remain anonymous to other users, or the operator, or to appear in the virtual world as a completely different (real or imagined) person. System operators will therefore need to consider carefully how to approach these issues in relation to particular VR services. There is no single right or wrong answer to this, but relevant factors will need to be taken into account such as:

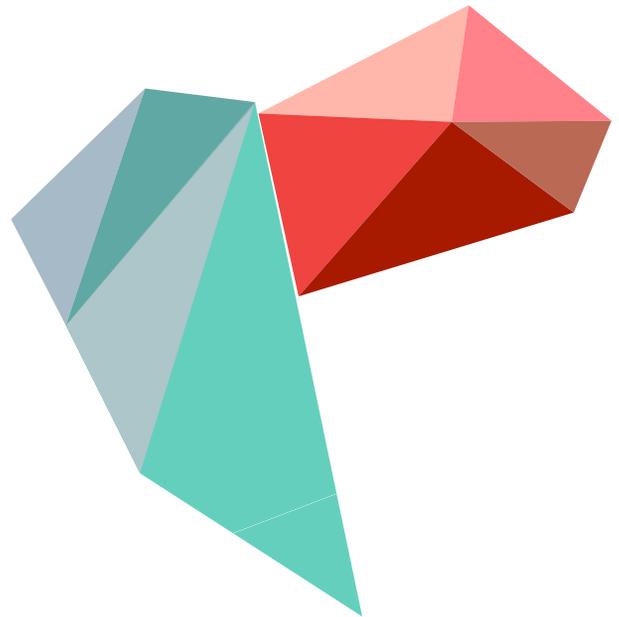
- Will a user need to create an account in order to log-in and use a service? If so, is any form of identification required to do this? For a paid service, obviously linkage to some form of payment will be required, but this may not always require full identification of the user.
- Within the VR environment, will the other users be able to identify who another user is? If they only appear as an avatar, and there is any issue of behaviour, can this be reported to the operator in any way, and will the operator be able to verify the identity of the real user?
- For provision of some types of services (e.g. financial services or gambling) there may be legal requirements to confirm identity (e.g. to comply with anti-money laundering legislation), or certain attributes (such as age) of users before services can be provided. In these cases system operators, and possible service providers within the environment, will need to consider how these will be addressed, and also how records will be maintained to enable compliance to be monitored and checked. For example, if a virtual world contains a gaming area which only over 18s may enter, while they can roam freely in the rest of the world, how will the operator of the gaming area ensure that this requirement is complied with? Is this something they must manage for themselves, or can the platform operator provide a system which automatically excludes under 18s from entering the prohibited area?
- For some types of applications, it may be very important to users that they are able to verify the identity of others with whom they meet or deal with in the virtual environment. For example, a B2B application provides a virtual 'meeting room' where participants can meet to discuss a confidential business deal, it will be vital that the identity of the participants has been checked and that they are not competitors, or others trying to seek out confidential information about the meeting.
- Verification of identity of participants may also be important in environments where transactions can be conducted, though in those cases it may be that reliance on a verified payment system (such as a credit card) will provide sufficient measure of security.

Legal cont.

- For other virtual environments (e.g. non-regulated games or social activities) there may be a greater desire amongst users for anonymity, at least to other users. However, even in these cases the system operator may need to consider the risks which could be presented if users are able to hide their true identity in order to act in an unlawful or threatening way – and whether to require identification of users in order to be able to address any issues. This may be more problematic for public VR environments, which could be accessed by users anywhere in the world (e.g. to participate in a VR game).
- Particular care should be taken in any situation where children may be participating, and operators should consider the need for child protection, already a major issue in relation to provision and use of certain online services. This area is rapidly evolving, and further guidance will certainly be needed as more children begin to participate in VR/AR offerings.

Most existing online systems in use in the UK rely on fairly simple user-registration systems, often linked to an email address or mobile number. Much more rigorous checking is needed where full-identification is required (especially in relation to financial services) and the FinTech industry in particular is now developing alternative and more efficient methods of ID verification.

- For certain higher-risk applications, VR/AR providers might need to consider similar 'strong ID' approaches rather than rely solely on traditional registration methods. VR/AR may give providers the opportunity to use new techniques such as biometrics within goggles or headsets not available in other media.





QUESTION

What laws exist to regulate identification of users in a virtual environment?

Technical solutions such as encryption and secure certificates are already widely available to verify authenticity and integrity of communications and electronic signatures. These can be used in circumstances where it is particularly important to be able to rely on a particular document or signature. These do not presently have direct equivalents in the VR/AR world, but it may well be that equivalent services are developed in the long term, for example, to allow a participant in a virtual meeting to sign a legally binding document transferring ownership of an item of real estate in the real world.

A legal framework already exists to regulate the use of these online 'trust services' within the EU and UK. This creates different levels of electronic signatures, advanced electronic signatures (A-eS) and qualified electronic signatures (QES) each with different requirements, and levels of legal effectiveness. For a virtual environment where trust and confidence between the participants is particularly important, it may be worth considering whether solutions can be developed which would be able to benefit from this framework in order to achieve full legal effect.

Digital signatures can also provide a useful method to track or verify user's consent to terms of use or liability waivers, or their agreement to participate in particular activities in a virtual environment.

VIRTUAL MONEY

QUESTION

What sort of currencies could be used in a virtual environment?

Virtual environments such as games and social platforms may already allow users to buy and sell items (or services) within the environment for virtual or digital currency. To date, virtual worlds created for gaming, though not full VR experiences, have generally created their own 'in-game' currencies such as Linden dollars (used in Second Life) and OMC (Open Metaverse Currency) which can be used between different worlds in the OpenSim Hypergrid. Virtual currencies also exist or are being introduced in other virtual worlds such as World of Warcraft and Minecraft. These currencies may also sometimes be traded between each other, and even in some cases exchanged for real money. This latter aspect could potentially give rise to tax and other legal or regulatory consequences, and if virtual currencies have a real value they could be treated as assets or income for tax purposes as well as giving rise to financial services regulatory requirements.

As VR/AR applications become more mainstream, it seems likely that content providers and operators may incorporate more traditional payment methods (e.g. credit and debit cards), and/or that payment service providers (PSPs) such as PayPal and others may start to offer services which can be used more easily through VR or AR applications.

The provision of such services is tightly regulated, and PSPs in the UK are regulated by the Financial Conduct Authority. PSPs can perform a variety of roles and will bear most (but not all) of the responsibility for compliance. If a company is developing a VR/AR service or solution that provides payment facilities, or makes use of payment service providers, consider carefully how financial service regulation could impact on the service to ensure that there is no inadvertent contravention of the regulations.

S — Medium term — L

Cryptocurrencies are likely to become more commonplace in VR/AR environments

With the recent rapid growth in use and value of cryptocurrencies such as bitcoin and ethereum, it also seems likely that their use could expand and become more commonplace in some virtual environments, and several VR-specific or targeted cryptocurrencies have already been launched. These cryptocurrencies differ from the 'virtual currencies' referred to previously in that they are based on blockchain technology which creates a decentralised ledger, creating a record of transactions independent of any single platform and controlling supply. They are also relatively new, volatile, and currently largely unregulated. Whilst they are becoming popular, this should be taken into account in designing any new VR/AR services which may use, accept or enable them to be traded. Changes may need to be allowed for as the regulatory position develops, or in the event of sudden value swings. In a small number of countries cryptocurrencies are currently unlawful and cannot be used. This might need to be considered if a virtual environment using these currencies can be accessed from anywhere in the world – should users from those countries be barred?

If the VR/AR solution uses or enables the use of credit card payments consider the requirements of the Payment Card Industry Data Security Standard (PCI DSS) which applies to anyone who holds or processes credit card information

QUESTION

For payments in a virtual environment, what issues should be considered?

Operators will also need to consider how payments should actually be made in a virtual environment. In the real world, physical cards and cash are used. In the existing online world, there are now well developed mechanisms to allow contracts to be completed and payment details submitted to complete a transaction. It may be that entirely new methods could develop in a true VR world (for example, presenting a virtual token, or even nodding or blinking to confirm a payment). It will be necessary, in designing any such process, to ensure that it meets requirements for security and transparency, so that it is clear to the user when a payment will be made, and that risks of fraud and theft are minimised.

In the UK and EU, existing e-commerce and consumer protection regulation has detailed requirements about the information which must be provided to a user entering into an online contract (for example, about the technical method of entering into the contract and how to correct any answers), and a user may also have cancellation rights which may need to be notified. In principle, these requirements would seem likely to also apply to contracts concluded through a virtual environment, and so consider (and possibly take advice on) how these consumer protection requirements can be met.

If a VR/AR solution uses or enables the use of credit card payments consider the requirements of the Payment Card Industry Data Security Standard (PCI DSS) which applies to anyone who holds or processes credit card information.

OWNERSHIP OF PROPERTY IN THE VR/AR ENVIRONMENT

Relevant questions

- A VR game player 'steals' virtual property from another player. Is this a property offence? What are the repercussions?
- As the owner of the systems underpinning the VR content, what can I do?

1. IS IT POSSIBLE TO 'OWN' VIRTUAL PROPERTY? WHAT OFFENCES ARE COMMITTED BY MISAPPROPRIATING VIRTUAL PROPERTY FROM ANOTHER USER? AS THE OWNER OF THE SYSTEMS UNDERPINNING THE VIRTUAL WORLD AND VIRTUAL PROPERTY, WHAT STEPS SHOULD BE TAKEN?

End-user licence agreements are a good start for establishing the terms and conditions that govern a user's interaction and participation in a virtual world, and may determine user rights with regard to buying, owning and selling property in a virtual environment. While some virtual worlds may choose to reflect the laws and rules of the real world and grant users with similar rights and protections, other virtual worlds may reflect a more lawless state and enable users to engage in virtual criminal activities, for instance, in a game like Grand Theft Auto.

Where the players or users in the virtual world engage in economic activities and real-world commodification of virtual property, courts may still decide that the virtual goods have a real monetary value. Even if they decide not to strictly enforce end-user licence agreements, if the terms specify that the items do not have a real monetary value or where such agreements allow the platform users to disregard valuable virtual property created and owned by users (e.g. by way of closing down servers or altering with coding

which defines the virtual property). As there have not been many test court cases in this area, if the virtual world will create such opportunities, commoditisation, payment services and an economic market, a company should consult its lawyers to help draft an end-user licence agreement and seek expert advice on current legal developments in this area, financial services and regulations.

Currently, the UK seems to be relying on the Computer Misuse Act 1990 for dealing with misappropriation or 'theft' of virtual property, as this tends to be achieved by hacking and unauthorised access to the computer systems underpinning the virtual environment. However, the position could change and there have been examples of other jurisdictions applying traditional theft laws to virtual property.

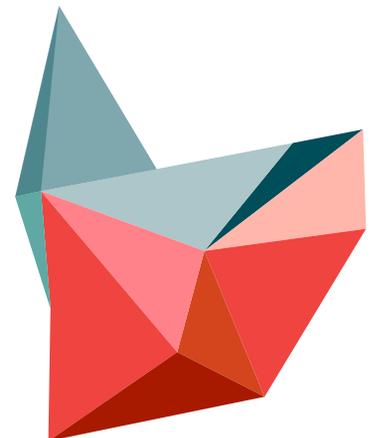
- In January 2012, the Dutch Court addressed the question of whether a virtual object is a good that can be stolen. In the worldwide online computer game RuneScape, players can gain points and virtual items which have a virtual value expressed in coins. The virtual items, however, also have a value in 'real' money as they are auctioned online through sites such as eBay. The defendants in this case assaulted and used physical coercion against a gamer, forcing the gamer to log into his account after which the defendants transferred the virtual items into their own accounts. The Court based its conclusion on a number of factors such as the items holding genuine value in the virtual environment and the claimant having had exclusive de facto control to the items within the virtual environment. The fact that the virtual environment owner could replace the items was deemed to be irrelevant, as the 'cheat' had taken the virtual item away from the original owner (against the rules), and the offence had been completed. The Dutch Court decided that virtual nature of these objects did not in itself preclude them from being considered as goods.

- While there has not been similar applications of the Theft Act in the UK, the courts have been applying the Computer Misuse Offences Act instead. In another case in 2013 involving RuneScape which was decided at a Magistrates court in England, a gamer that stole virtual items by hacking into other gamers' accounts was convicted for hacking offences.

Together with developments in virtual money (see previous section on Virtual Money) and identification of users through technology, there is a real trend towards recognition of ownership and value of virtual property, where they are being traded for 'real' money. Virtual monies are also being recognised by an increasing number of governments and public bodies.

Where VR/AR environments directly sell such items or items are commoditised outside of the virtual environment, giving them a 'real world' value, there are implications on the company as the owner of the systems underpinning such virtual environments to ensure that the system is secure and has sufficient safeguards in place to prevent viruses, hacking and related cyber attacks that could have an impact on the users' virtual property.

Furthermore, companies should be careful if making any amendments to the virtual environment which may impact users' existing ownership of virtual property such as taking away items or closing down a virtual environment.



HEALTH AND SAFETY, NEGLIGENCE AND PRODUCT LIABILITY

Examples

- An AR overlay on a car windshield places an advertisement over a stop sign causing a car to fail to yield, resulting in a collision. What is the platform operator's liability in this situation?
- The issue of overloading and distracting users with AR content to such a degree as to cause incidents, in a similar way to drivers getting distracted by mobile phones whilst driving.
- Unlike books or websites, VR/AR does more than convey information – it blends information and object; for example, an AR device determines that a particular type of mushroom is edible, but if it is mistaken and the mushroom is in fact poisonous, is the system liable?
- Users experiencing nausea and seizures as a result of using VR/AR – are the product warnings prominent enough and user guides sufficient to warn users of any potential dangers and side effects?
- Users suffering from a disease spread through contact with a VR/AR headset.

HYGIENE

Hygiene is a serious issue in VR/AR and the technology's introduction into the healthcare system makes it even more so. This is understood better through a parallel example of the mobile phone, a device that is used very closely to the face which can harvest a number of germs. One study by researchers from Queen Mary, University of London and the London School of Hygiene & Tropical Medicine looked into mobile phones across 12 cities in the United Kingdom and from the 390 samples that were analysed, they concluded that 92% of phones had bacteria present on them, including E.coli.

Given that VR/AR headsets pass between multiple users' faces more often than mobile phones, it is extremely important that VR/AR companies always implement hygiene procedures when using VR/AR headsets.

QUESTION

If there is a possibility of any detrimental side effects of participating in a VR/AR experience, could the company be held responsible or liable for this?

There are various legal bases on which developers, manufacturers and service providers could face risks of legal liability as a result of possible harm suffered by users.

The legal framework governing safety obligations and liability is complex, and varies country by country. In the UK, currently health and safety obligations are imposed by a combination of UK and EU legislation, and case law. Some of the main components to be considered include:

- Liability for defective products – laws impose strict liability (i.e. regardless of fault) on a producer, or importer where an individual suffers harm (including injury or sickness) as a result of a defective product – this could impose liability where a headset or other VR/AR device causes any sort of harm to the user.
- Safety of consumer products and regulations such as the UK General Product Safety Regulations 2015 and Electrical Equipment (Safety) Regulations 2016, and EU General Product Safety Directive (GPSD). As yet, these do not address VR/AR products and services specifically, but many components will fall within their requirements. The GPSD requires that any product placed on the EU must be a 'safe product' – this is broadly one which, under normal or reasonably foreseeable conditions of use, does not present any risk or only the minimum risks compatible with the

92%

From a sample of 390 mobile phones that were analysed, 92% of them had bacteria present

product's use, which must be consistent with a high level of protection for the health and safety of persons (bearing in mind any relevant instructions and warnings).

- Additional specific requirements apply to VR/AR products supplied for use as toys (under the Toys (Safety) Regulations 2011), and in some cases VR/AR applications may fall within other specific regulatory regimes. For example, if used for medical purposes they may need to meet the regulatory requirements for medical devices under the Medical Devices Regulations 2002.
- Liability for negligence – where a user suffers harm or injury which could have been foreseen by the provider of the service or manufacturer, they may have a civil claim for compensation. This may be most relevant where the hazard or distraction results from the nature of the VR/AR service and could (or should) have been foreseen by the service provider.
- Contractual claims – a purchaser of a product or service may also have a claim for breach of contract if the product or services is unsafe, under either express or statutory implied terms in the contract.
- Where a VR/AR application is provided at a particular premises for visitors to experience, there will be additional duties to ensure the location and experience is safe for visitors.

- Where a VR/AR application is provided for use by employees or contractors in the course of performing their work, there will be additional duties on the employer to ensure a safe working environment.
- Directors and other senior managers of a company can also incur personal liability where they fail to ensure that a business is conducted safely in accordance with relevant regulations (and the failure results from their individual consent, 'connivance' or neglect).
- In extreme cases, if a death were to result from a failure which amounts to a 'gross breach' of duty by senior management, an organisation could be prosecuted under the Corporate Manslaughter Act 2007.

Breach of the various requirements above could potentially give rise to a variety of civil claims (for compensation for harm suffered) or in some cases criminal prosecution resulting in fines or imprisonment, or other enforcement action by regulatory bodies such as HSE. Given the potential risks of harm which could be posed by some VR/AR applications, designers, developers, manufacturers and suppliers of VR/AR products and services should consider carefully, and seek to avoid or reduce as much as possible any risks which might be posed.

WARNING NOTICES

Certain risks may be addressed by way of warning notices to the user at the outset each time before they are immersed in the VR/AR content. These considerations may be similar to content produced for more traditional platforms, but given the immersive nature of VR/AR, these risks may be greater and as such there may be greater importance on the sufficiency and appropriateness of the warning notice.

By way of example, flash photography and strobe effects are a risk for people who suffer from photosensitive epilepsy which may be used in films, music videos, sporting events and games that are available on a VR/AR platform. Within a virtual reality setting, the flash photography risk may be heightened due to the immersive nature and also if this can be created by another user in a platform where different users can see the works of other users in the same virtual environment. A pre-warning that the content 'contains flash photography' should be included where this is a possibility in interactive virtual and augmented reality content.

Some developers may want to consider whether they can go further and control how the flashing lights are transmitted to users who have identified that they suffer from epilepsy and that such flashing lights can trigger seizures.

More specifically to VR/AR content, as users' vision of the real world is partially or completely obstructed, there are risks of walking into walls, other objects or other people, harming oneself and/or other users. In other instances, due to the immersive nature of VR/AR content, users may experience real symptoms such as vertigo in response to what they are experiencing in the virtual world or attempt to engage with virtual objects in the real world such as attempting to climb up or lean on objects which could cause the user to fall over and injure themselves.

Particular care should be taken with AR applications, if the intervention of augmented reality in the real world has the potential to cause harm or to distract the user in a potentially dangerous situation, e.g. while driving a vehicle or crossing a road. Warnings as to when it is safe to use the application may assist to manage the situation, but the provider should take care to ensure that the application will not be dangerous in 'normal' usage.

USER GUIDES

Where warning notices need to be comprehensive, on-screen or virtual reality notices at the outset can be used to refer users to detailed user guides and manuals, setting out recommended uses, health warnings and safety information to enable users to experience VR/AR in a safe way.

As a way of example, PlayStation's VR headset health warnings includes guidance such as 'review surroundings and clear obstacles before use. Take steps to prevent pets, children, or other obstacles entering the area during use'. Similarly, Nintendo provided detailed information on how to use the Wii controls to limit injury to people and damage to other objects, how much physical space they needed to play safely and warnings against repetitive motion injuries.

Specifically, as best practices around recommended use times of VR become better understood and researched, this handbook recommends outlining in user guides the appropriate length and frequency of VR experiences. This could be supported by in-VR prompts encouraging users to close their experience and take a break if they have played for too long or too frequently in a set period.

INSURANCE

Another way to mitigate liability risks is by taking out an insurance policy which sufficiently covers risks for liability resulting from the use of the VR/AR technology or content.

The risk of public liability claims should be covered in most normal business insurance policies, but insurers and underwriters may require additional information about the nature of the risks and steps which have been taken to address them. Whether the insurance sufficiently covers such risks will depend on the terms of the individual insurance policy. This needs to be checked carefully and discussed with an insurance broker.

QUESTION
Can all liability be excluded in terms and conditions?

In the UK, liability for death and personal injury caused by negligence cannot be excluded by contracts or notices. In an attempt to exclude such liability, the courts would find that these clauses are unenforceable and could go further by concluding that the whole exclusion of a liability clause is also invalid.

However, the courts will take into account warnings which are given to users (e.g. of risk of potential vertigo and nausea). If given effectively, these 'waivers' may help to reduce the risk of liability on the basis that the user voluntarily took on the risk, knowing the potential consequences, provided the notices and warnings given are sufficiently clear and accurate.

Consider including warnings or restricting access/usage if certain people (e.g. children, the elderly or those with particular health conditions) are more likely to suffer ill effects from participating in a VR/AR experience or service.

QUESTION
What practical steps can be taken to minimise the risks of harm and legal liability?

In general, ensure to:

- Assess the potential health and safety risks posed by the VR/AR products or service.
- Identify relevant legislation and any specific regulatory requirements for this service.
- Assign management responsibility and develop a plan for managing and addressing relevant requirements.
- Consider and incorporate any safety features within the product or service which might help to prevent or minimise the impact of any risk (e.g. is it practical to provide an alarm system if a user has, or sees another user suffering an adverse effect?).
- Provide appropriate warnings and user guides which detail how to use the product safely and any risks.
- Have a plan in place to review and audit ongoing safety.
- Provide contact details and have a response plan in place for dealing with any incidents.

Legal cont.

Choosing to ignore health and safety concerns will harm the VR/AR industry



CHOOSING TO IGNORE HEALTH AND SAFETY CONCERNS WILL HARM THE VR/AR INDUSTRY

Questions relating to VR/AR technology are likely to rise as the technology becomes more widely adopted. However, with greater adoption comes greater comfort in using the technology. We've seen this with mobile phones. A 2013 YouGov survey showed that between 2000 and 2013 mobile phone ownership had increased from 50% to nearly 100%. In the same period, public concern about mobile phones dropped from 27% to 9%.

This handbook advises VR/AR companies not to grow complacent with increasing public comfort. Companies should acknowledge, understand and engage with the health and safety concerns that this technology presents. To ignore them and allow them to loom in the background would be irresponsible to the public and wider stakeholders and could ultimately damage the business and the wider industry through public lack of confidence, ignorance and/or paranoia.

REGULATION OF CONTENT STANDARDS AND SERVICES

Related examples

- A VR service provided to consumers does not function properly and repeatedly freezes – it was purchased as a subscription service over the internet. Does the purchaser have any rights they can impose against the VR service provider?
- Does VR advertising have to comply with any specific codes of practice?
- If a virtual car showroom is used for the sale of cars, and the car is enhanced or misrepresented, or does not meet expectations upon delivery, how will this be dealt with from an advertising regulatory perspective?

QUESTION

Are there any other regulations about the type of content which can be included in a VR/AR application or experience, or how companies should contract with its customers?

As yet there are no specific rules about the type of content which can be included in a VR/AR application. However, developers and content providers will need to consider existing regulations and standards across a variety of areas, which could potentially impact on the content and delivery of the service. For example, in the UK, the points that follow could potentially apply, depending on the nature of the service and the customer.

CONSUMER LAWS RELATING TO THE SUPPLY OF DIGITAL CONTENT AND SERVICES

Where VR/AR services are delivered remotely to consumers they are likely to fall under a range of consumer protection laws relating to digital content and services.

These include detailed requirements on consumers' statutory rights in respect of digital content, requirements for consumer contracts and notices to be fair and transparent (and restrictions on certain unfair clauses), and cancellation rights for certain types of contracts concluded at a distance. Different rights and remedies apply to 'digital content' and services, covering both the quality of the content or service, and consumers' remedies for any failure. Digital content is broadly defined as any 'data which are produced and supplied in digital form'. Published guidance indicates that 'software, music, computer games and applications or 'apps' are all digital content', and there seems to be no reason why the definition would not also cover many forms of consumer VR/AR services. In some cases there may be a mixture of digital content and services (and also goods if hardware is bundled in). Full details are beyond the scope of this handbook, but a range of guidance is available for further details on these requirements:

- BIS CRA digital content guidance: <https://www.businesscompanion.info/sites/default/files/CRA-Digital-Content-Guidance-for-Business-Sep-2015.pdf>
- Trading Standards guidance on mixed contracts for goods, services and digital content: <https://www.businesscompanion.info/en/quick-guides/consumer-contracts/mixed-contracts>

Further guidance and/or specific legal advice should be sought in the event of any questions relating to how these apply to a VR/AR product or service, and the requirements should be taken into account in drafting UK specific terms of use or End User Licence Agreements (EULAs) for consumers in the UK.

GENERAL LAWS

General laws on matters such as offensiveness, indecency and incitement to hatred – any material presented in the VR environment should not contravene general legal standards. As well as ensuring compliance of their own content within the service, where a VR/AR application allows users to post their own content or interact with other users, the provider will need to consider how to enforce compliance with appropriate standards by the users (see section on Liability of VR/AR platform and service providers for illegal activities by users for a description of the circumstances in which the VR/AR service provider could incur legal liability for the user's content or behaviour).

ADVERTISING STANDARDS AND SALES PROMOTIONS

There are many ways in which a VR/AR environment could be used for sales promotion or advertising purposes. For example:

- A VR/AR store could enable visitors to visualise or experience products which are not physically present (e.g. furniture which is physically kept at another location could be placed within the user's living room), or have not yet been built (e.g. to visualise a bespoke design for a car).
- A VR environment designed for entertainment could provide advertising to users or product placement within the experience, to promote sales by a third party advertiser.
- An AR application could notify users of restaurants, bars or stores which are in their vicinity and provide them with directions or special offers.

There is limited research to justify the age guidelines which accompany both headsets and experiences

In these situations, consider both general laws on marketing and sales (e.g. the advertisements and product descriptions must be accurate and not misleading) as well as codes of practice on advertising and sales promotion. Though these do not yet contain provisions specifically addressing VR/AR, rules and guidance in a number of areas may be relevant, e.g. the Advertising Standards Authority (ASA)/Committee on Advertising Practice (CAP) standards and related guidance on many issues, such as:

- Marketing communications and promotions, which need to be clearly identifiable as such. This would apply in a VR/AR context just as in any other media. For the moment, the ASA has published guidance in relation to various forms of social media communications (e.g. vlogs and social media posts) and the principles should be followed by anyone conducting advertising through VR/AR: <https://www.asa.org.uk/advice-online/affiliate-marketing.html>
- 'Online, catch-up TV and radio, in-app and in-game' advertising (though not specific for VR or AR content).
- Rules on advertising directed at children, e.g. (i) adverts that are appearing during or adjacent to TV programmes commissioned for, principally directed at or likely to appeal particularly to audiences below the age of 16, and (ii) online marketing directed at children under 12.
- Endorsements and celebrities (whose likenesses might be used in a VR application to promote goods and services): <https://www.asa.org.uk/advice-online/celebrities.html>

- Guidance on a free trial prior to a paid for subscription would apply to an introductory offer for a VR service subscription: <https://www.asa.org.uk/resource/guidance-on-free-trial-or-other-promotional-offer-subscription-models.html>
- Advertising Guidance on the rules relating to the collection and use of web viewing behaviour for the purposes of Online Behavioural Advertising (OBA). Sophisticated targeting of OBA can help serve relevant ads to interested consumers but those consumers must be aware of, and able to exercise choice, over the collection and use of information for these purposes.

AGE LIMITS FOR VR/AR CONTENT AND HARDWARE

There is limited research behind the age guidelines which accompany immersive headsets and experiences. Studies are likely to take a few years to provide stronger evidence for the public, government and other stakeholders. These may change once further research has been conducted. However, even short term there is limited research behind the age guidelines which accompany immersive headsets and experiences. This handbook advises VR/AR companies to keep up-to-date with relevant research so to assist with its production and dissemination where possible.

On the content side, ratings have been developed for traditional films and video games, but there is no official ratings body that assesses VR/AR experiences specifically. As a result, such experiences are being age rated in the same way as their traditional counterparts. For example, Oculus VR, Google Daydream VR and Microsoft HoloLens AR applications use the International Age Rating Coalition (IARC) rating process which 'provides a globally streamlined age classification process for digital games and mobile apps'.



In the UK, content standards and ratings for video games are currently set by the Video Standards Council (VSC) through the PEGI rating system (most other countries have equivalent systems) – see <http://videostandards.org.uk/RatingBoard/>.

In the future, there is an expectation to see VR/AR experiences judged differently (and likely more strictly) than traditional media due to the level of immersion created. This handbook advises VR/AR companies to anticipate this change and consider the powerful effects of their experiences on consumers when developing applications. In conjunction with warning users of such effects, this will provide the public with the best basis of knowledge to make their decisions.

OTHER SECTOR SPECIFIC REGULATIONS

Where VR/AR applications provide content within a regulated sector such as gambling or financial services, they will need to comply with existing rules and regulations, regardless of the medium through which they are provided.

NON-DISCRIMINATION

A number of pieces of legislation and regulation also prohibit various forms of discrimination by service providers, for example:

- Prohibition of discrimination by anyone providing services to a section of the public (including a VR/AR service provider) on the grounds of certain prohibited characteristics such as age, disability, race, religion, sex or sexual orientation. Service providers also have a duty to make 'reasonable adjustments' in respect of disabled persons who may wish to use the service – VR/AR providers are therefore obliged to consider how they could make their service more accessible to those who might not otherwise be able to use them, e.g. are there technical means available which could be used to assist?

- Prohibition of discrimination on the basis of the means of payment for the service, or the location from which the service is accessed by customers (within the EU).

S Medium term **L**

The future of VR/AR media regulation may evolve from existing codes of practice relating to broadcast services

At present, it seems that internet-delivered VR/AR services would generally not fall within the scope of broadcasting regulation in the UK, but it is possible that existing regulations and codes of practice relating to broadcast services (which currently cover interactive services and 'enhanced programme services', video-on-demand and other 'over the top' (OTT) content) could evolve and be updated to cover certain VR/AR services, e.g. where these are provided by broadcasters as a supplement to existing services such as sports or nature programmes, or by certain types of dedicated VR services providers. If so, these could introduce more specific requirements on issues such as protection of minors and other vulnerable persons, and separation of advertising and content. This will likely depend on how the development of VR/AR services is seen to affect consumers.

OTHER CRIMINAL ACTIVITIES CONDUCTED THROUGH VR/AR

Cyber crimes such as fraud, computer viruses, hacking, harassment and stalking, obscene publications, sexual offences and blackmail are existing crimes conducted through the internet and are dealt with via laws such as the Computer Misuse Act 1990. Such crimes could potentially continue or increase through the use of avatars and interactions with other users in virtual environments. See sections on counterfeiting, impersonation and fraud; ownership of property in the VR/AR environment; and cyber security concerns of the VR/AR product.

Legal cont.

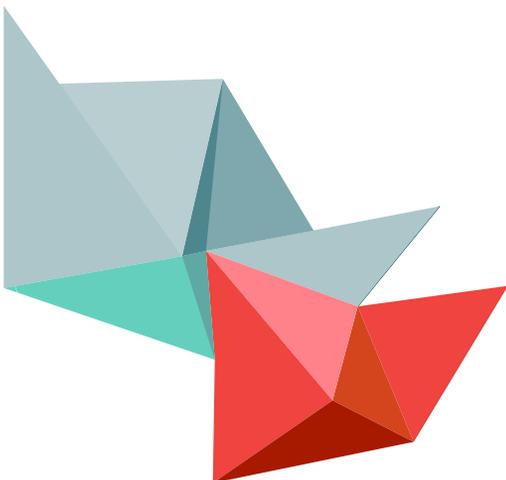
Due to the immersive nature of the VR/AR environment, a victim's experience of such criminal acts may be heightened, feeling more intense and invasive. For instance, verbal harassment experienced in the virtual world or through physical violence by or of an avatar may be psychologically more damaging than harassment experienced through words or even video via a more traditional 2D screen of a computer or smartphone. While the current criminal laws have not yet been tested to deal with virtual assaults, as opposed to real physical assaults, this may be an area of relevance for VR/AR companies. With the development of technology such as body haptic suits, this will be an increasingly relevant topic where users may be exposed to physical sensation, such as feeling a punch by another user through the vibrations from the suit.

The experiences within a VR environment can feel real and intense, especially where a player strongly identifies with their own avatar, compared to a more traditional game console for instance and certain developers of VR games have taken the decision not to allow extreme violence or death in their multiplayer VR games.

End-user licence terms or terms of use should be used to help manage the risk of criminal activities by users, by imposing rules of conduct and guidelines on all users, and monitoring user activity where there are any complaints.

In the gaming world, platform staff have been used to monitor use and virtual dispute resolution and arbitration can also be used to determine outcomes and whether a user can continue to participate. Applications can also implement functionality to report harassment and any other complaints to moderators who can take action against the perpetrators.

If there is a significant concern regarding criminal activities and being able to identify such users in the real world is a priority, decide whether to obtain and store personal information of users when they sign up (such as full name and address) or store their IP addresses with sufficient information to be able to link an IP address to a particular individual (such as through cookies or other technology) to be able to identify users in the event of a criminal activity. However, there are a number of legal considerations before adopting such an approach, most notably ensure compliance with data protection laws, that there are lawful grounds for collecting and processing such personal data (which includes IP addresses where possible, to link an IP address to a particular individual, for example, through the use of cookies or other technology).



LIABILITY OF VR/AR PLATFORM AND SERVICE PROVIDERS FOR ILLEGAL ACTIVITIES BY USERS

Relevant questions

- A VR platform allows users to upload music to accompany scenarios which they've created. Is there a mechanism to enable copyright owners to object? How will difficulties in complying with notice and takedown proceedings be dealt with? For example, where the destruction of infringing copies is requested, how will this be achieved where:
 - (a) the copy may be ephemeral in that it may be a downloadable/transmittable copy which has been disseminated among members of the virtual platform, and/or
 - (b) the platform provider has little/no control over use of the platform (or there are limits on the ability of the platform creator/content creator to achieve takedown).

QUESTION

Will VR service providers be held liable for copyright infringement or for illegal or offensive content that is circulated or introduced into a VR environment by its users?

A framework of current laws in the UK, EU and other major countries such as the US, generally provides some level of legal protection to existing internet service providers, social networking platforms, hosting companies and similar intermediaries in respect of legal liability for content introduced or circulated by users. This is known as 'intermediary liability'. Although not written specifically for VR/AR applications, or with them in mind, certain types of VR/AR service providers or platforms may also be protected by these provisions, provided that they comply with the relevant requirements such as removing or disabling access to content swiftly on becoming aware that it is illegal or unlawful.

Examples have for some time included the distribution of and access to pirated music or films, or illicit access to encrypted broadcasts, which could give rise to parallels in the VR/AR environment. More recently there has been increasing pressure to hold service providers liable for other forms of offensive or unlawful content. For example, it was reported in January 2018 that Facebook had reached an out-of-court settlement with a Northern Irish teenager over 'revenge porn' posted on a 'shame page' on the social media platform. No determination of actual or potential liability was made but it highlights issues regarding liability of platforms more broadly for failure to remove offensive content.

Legal cont.

The legal picture is quite complex, but key provisions in the UK include:

- Provisions in the e-commerce directive exempting 'information society service' providers from liability in respect of:
 - 'Hosting' – storage of information provided by a service recipient, provided that the service provider does not have actual knowledge of illegal activity, and acts 'expeditiously' on obtaining such knowledge.
 - 'Mere conduit' – where they merely transmit material through a communication network without modification.
 - 'Caching' – where material is stored temporarily and automatically for onward transmission.
- Provisions in copyright law exempting temporary copying as part of a technological process, and allowing for orders to be made against service providers requiring them to block or remove content if they have knowledge of infringement.
- Provisions relating to liability for defamation (untrue statements that harm an individual's reputation, which might be made by a participant in a virtual environment, possibly anonymously):
 - 'Innocent disseminator' defence if the operator can show that it is not the author, editor or publisher of the statement complained of, that it took reasonable care in relation to its publication and did not know, and had no reason to believe, that it had caused or contributed to the publication of the defamatory statement. To rely on this defence a VR operator would have to show that it took reasonable care in dealing with a complaint and appropriate action upon notification.
 - 'Operators of Websites' defence (under Defamation (Operators of Websites) Regulations 2013) provides a defence for website operators who follow set procedures

following receipt of a notice of complaint about statements posted on a website. In many cases a VR/AR service provider might not qualify as a 'website operator', so this defence may not apply, however other general defences may provide a similar effect.

The definition of 'information society service' is quite general meaning 'any service normally provided for remuneration at a distance by means of electronic equipment for the processing (including digital compression) and storage of data at the individual request of a recipient of the service'. This would potentially cover at least some form of VR/AR platforms and services which are remotely accessible by users.

If it is believed that a company could benefit from these provisions then it should ensure that it deals with illegal, unlawful and infringing content in its terms and conditions, and that effective processes are in place to enable contraventions to be notified and to disable or block content and/or users who contravene the terms. For example:

- How will notice and takedown proceedings be dealt with? Where the destruction of infringing copies is requested, how will this be achieved where (a) the copy may be ephemeral, in that it may be a downloadable/transmittable copy which has been disseminated among members of the virtual platform and/or (b) the platform provider has little/no control over use of the platform (or there are limits on the ability of the platform creator/content creator to achieve takedown).
- Consider whether to implement any monitoring mechanisms for illegal activity, and the processes by which these can be used in order to minimise risks while continuing to comply with the intermediary liability rules.



S Medium term **L**

Stricter regulation is expected for VR/AR service providers

These provisions currently align with similar laws across the EU under the e-Commerce Directive, and a parallel (but slightly different) regime in the US under the Digital Millennium Copyright Act (DMCA). However, there are differences in interpretation between countries, and there have been increasing suggestions for reform and amendment to give service providers greater responsibility for circulating various forms of illegal content, so the details of these regimes may evolve further.

This could make it difficult for VR/AR service providers to structure processes which comply in all the markets from which users may access and participate in the VR environment.

Further consideration and legal advice may be needed to confirm the extent to which these provisions could apply to a particular VR/AR service, and how best to structure mechanisms in order to comply.

JURISDICTION AND APPLICABLE LAWS IN A VR/AR ENVIRONMENT

Relevant questions

- Reporting offences involving VR/AR to the police is unlikely to result in apprehension of the offender if they are in another country or even state/county (even for crimes which the 'normal' criminal law can deal with, such as extortion). The most that is likely to be achieved is requesting the technology provider to block the individual. It may be possible for the offender to evade punishment by creating a new account (unless there are stringent registration requirements – biometrics, for example). Who will take prime responsibility for these matters: providers or law enforcement?
- Users of immersive technology platforms can log in from a different jurisdiction from that governing the licence. Notably, the law of the jurisdiction from which the user is logging in may override that of the licence jurisdiction, posing a conflict of laws issue. How will conflict of laws issues be managed especially where there are enforcement issues?
- How will collaborative international platforms be dealt with such as those created by multiple coders in various countries and stored on the cloud? Is there any applicable international jurisdiction?

QUESTION

A company delivers a VR/AR service from the UK but some of its hosting infrastructure is in the US, and its users could access it using equipment based anywhere else in the world. How will other countries' laws affect its service in this case?

Questions of governing law and court jurisdiction must be considered to determine which laws will govern interactions between users and service providers in different locations. Generally, a number of different countries' laws can potentially apply based on factors such as:

- Location of servers
- Location of users
- Movement of data in the cloud
- Contractual vs non-contractual obligations, and any provisions in applicable terms of use or licence agreements
- Law enforcement powers (e.g. rights of access to data and records by security services and police).

These types of issues have already arisen for many years regarding the delivery of services and interactions via the internet (and earlier), and a complex body of law already exists to address these questions. It is not the case that no laws apply, or that there is any single body of international laws which will govern activities in a VR environment. Instead the principles of 'conflict of laws' will be used by courts and judges to decide what laws apply. Some of these are based on international conventions, EU law or other regional arrangements, and some are based on national laws in each country.

Full details are beyond the scope of this handbook, but some basic guidance as a starting point is as follows:

- Where users are contracting as consumers, they are likely to be protected by consumer law in their country of residence, which a company generally cannot contract out of. Therefore, recognise and respect consumers' rights wherever the consumers are located, particularly in any country to which the service is actively directed (e.g. if email or other marketing is sent to consumers in a particular country, a website is set up in the local language, or local currencies are accepted for payment).
- Where special hardware (e.g. headsets, gloves or body trackers) is needed to use or access a service, it will need to comply with relevant product standards in the countries where it is sold in order for it to be available to users in that location.
- If the VR/AR service is a business application it is likely to have greater freedom to choose the law by contract which applies to the provision of the service to its business users. However, it may still be subject to mandatory local legal requirements which cannot be avoided by contract.
- Within the EU, currently a 'digital service provider' (which would include the provider of a VR/AR service) broadly only has to comply with the laws of the country in which it is established (in this case the UK) when delivering services to customers in other EU countries. However,
 - (i) there are a substantial number of exceptions to this, including for consumer protection purposes, and
 - (ii) it is currently unclear whether this principle will continue to apply following the UK's exit from the European Union in March 2019 (or any subsequent transition period).

- Attempt to manage these issues through clear terms of use, which specify the governing law of the contract, and the courts or other method by which any disputes between the company and a user, or between any users where they can interact in the VR environment, will be resolved. In the UK and EU, arbitration and other alternative dispute resolution methods are encouraged especially in contracts with consumers, so it is possible that over time industry bodies or schemes may develop to help resolve any disputes.

It is most likely that national police and other law enforcement authorities will have the right to intervene in the event that the provision of the service or user activities contravene local laws in a way which affects users in a particular country. Companies should try to be aware of any significant restrictions or legal issues affecting the provision of the service in countries where the company is seeking to provide the service.

For example, some countries might prohibit users from accessing certain types of VR service, or have strict requirements over use of encryption technology or export of personal data from their country. Consider how to address these issues if they are relevant to the VR/AR service, e.g. is it possible to block access from those countries?

PRIVACY AND DATA PROTECTION

Relevant questions

- A company is gathering data as part of their VR/AR experience – how does the General Data Protection Regulation (GDPR) affect their business?
- What are examples of VR/AR specific personal data?

The use of VR/AR technology could present issues in the form of personal information potentially being captured during experiences and how environments could be recorded. This is becoming even more important given the introduction of the General Data Protection Regulations (GDPR).

QUESTION

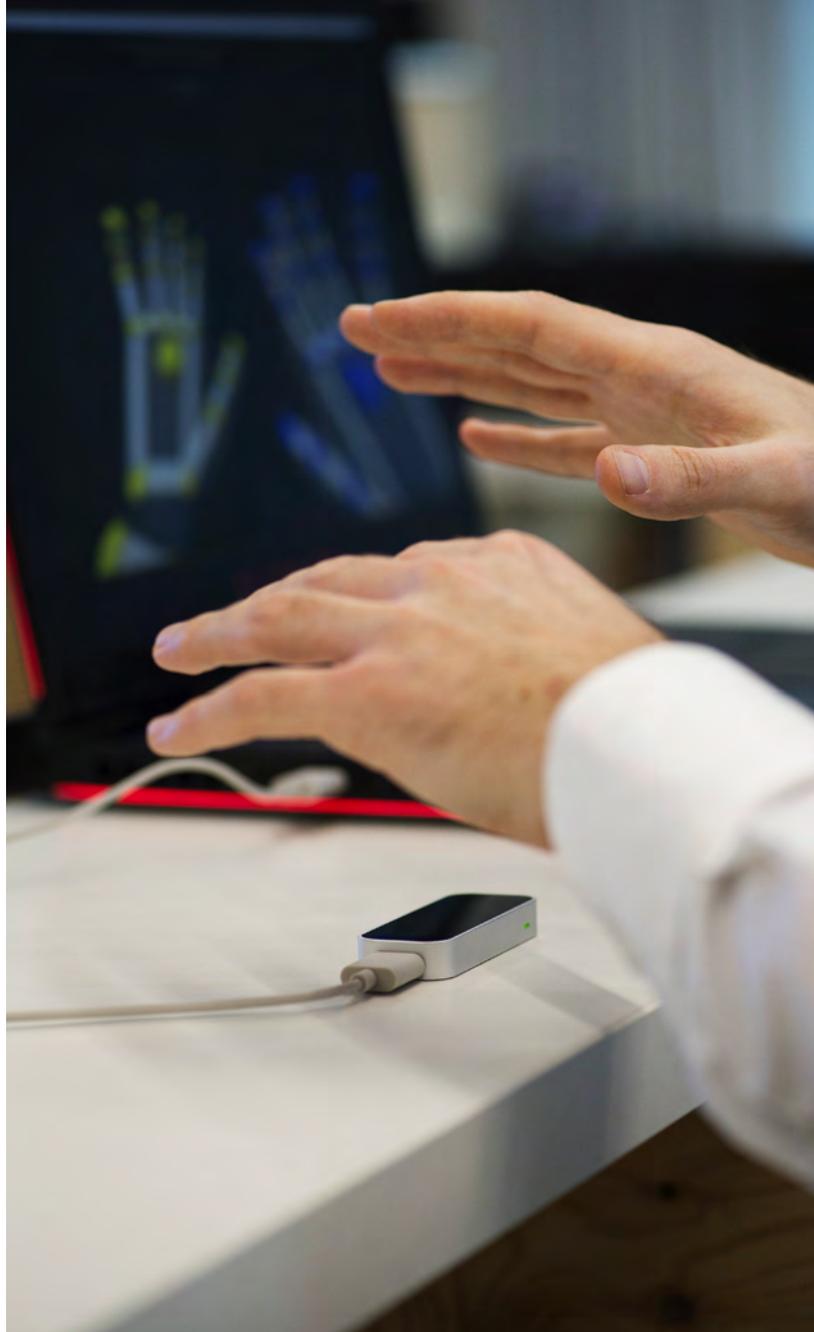
A company is unsure about what aspects it needs to be aware of from a privacy and data protection point of view – what should its key considerations be?

1. IS THE BUSINESS PREPARED FOR LEGISLATION SUCH AS GDPR?

The EU General Data Protection Regulation (GDPR) replaces the Data Protection Directive 95/46/EC and came into force on 25th May 2018.

GDPR introduces enhanced compliance obligations which adds to and complements the data protection principles.

Any identified data breach will trigger a requirement to notify the Information Commissioner's Office (ICO) within 72 hours if the breach involves personal data that is likely to cause harm to an individual.



The use of VR/AR technology could present issues in the form of personal information potentially being captured during experiences and how environments could be recorded

GDPR RIGHTS	DEFINITIONS	VR/AR EXAMPLE INCLUDING IMPLICATIONS
The right to be informed	Tell individuals what personal data is held relating to them, why, and how it's used.	Consider an enterprise AR tool that allows senior engineers to record and access the view of operations engineers on an oil rig. The operations engineers should be informed that their vision (and voice) was recorded for the purpose of allowing the senior engineers to diagnose problems on the oil rig in use.
The right of access	Know where all Personal Identifiable Information (PII) is held and be able to provide access to this data including historical, in all its forms.	If a VR user wanted to know the details of how their gaze was tracked across a virtual shopping environment, they should be able to access this information.
The right of rectification	Allow individuals to retrieve, review and correct any incorrect personal data.	If a user's real name in a social VR environment has been entered or recorded incorrectly, the user should be able to adjust this.
The right to erasure	Delete data if requested by the individual and provide evidence of having done so (unless the organisation has a legitimate reason to retain it).	If a lifelike avatar of a user is created for a communications AR platform, the user should be able to delete it.
The right to restrict processing	Be able to restrict use/processing of data, including by third parties/outsourcers.	If a VR advertising platform recorded eye tracking information for users across multiple applications, the users should be able to deny the platform use of the data for their own internal analyses or for external sale.
The right to data portability	Be able to retrieve and transfer requested PII data to an individual or to another third party, including to a competitor.	Consider the achievements of a user on a VR public speaking platform. If the user wishes to use a competing platform instead, they have the right to transfer this information to the competitor.
Rights in relation to automated decision making and profiling	Ensure that no decision making about an individual is done solely on the basis of automated processing of data.	Consider a job interview conducted in VR where the user's facial expressions and tone of voice are tracked, analysed and assessed such that an algorithm makes the job offer or rejection on the basis of the user's perceived personability. The user has the right to reject this process in favour of a manual assessment.

As with cyber security, privacy should be considered from day one



2. CONSIDER HOW AUGMENTED REALITY SHOULD RESPECT PRIVACY IN PUBLIC ENVIRONMENTS

The use of AR in public presents challenges for respecting other people's privacy and ensuring that the device does not record an environment illegally such as a movie theatre during screening. It is recommended that AR companies consider geolocation based warnings and/or restrictions on device functionality where venues can specify if such recordings are permissible.

3. IS PRIVACY AN AFTERTHOUGHT OR HAS IT BEEN THOUGHT ABOUT FROM DAY ONE?

As with cyber security, privacy should be considered from day one. VR/AR software should allow users to set their own privacy settings according to their personal preferences.

Even seemingly innocent data such as gait/movement style has the potential to identify an individual, and as such should be appropriately protected behind privacy restrictions.

Some examples of personal data that could be gathered during a VR/AR experience include:

- Eye tracking/gaze details including length of time spent looking at specific objects
- Thinking/neural patterns
- Height
- Gait/movement style
- Behavioural patterns*

* could include trigger activation speed, left/right hand preference, and even the angle of an individual's wrist when picking up objects.

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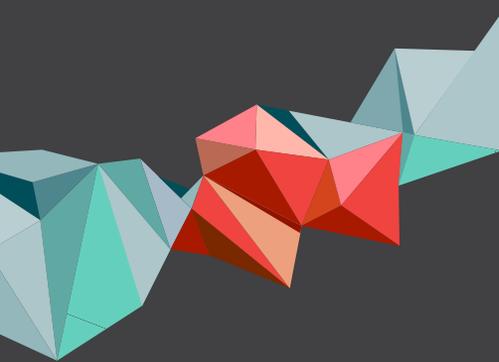
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