Virtual and Augmented Reality in Marketing

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This thesis serves as an introduction to Virtual and Augmented Reality and explains how these two different technologies can be used in marketing. I work in marketing and have been following the evolvement of both VR and AR for a few years now. I was personally very curious to learn about how these have been implemented in marketing in the past, and what they will look like in the future, and if there are any reoccurring themes, for both VR and AR, that work best with a specific product or service.

I spent a year reading the latest news and articles about various VR/AR marketing campaigns, and about the updates on these technologies that kept coming almost monthly. I also participated in different VR/AR-themed events in Helsinki to try out headsets and new AR apps, and to listen to the experts view on the potential of VR and AR.

I wanted to create clear guidelines on which technology to use and how, depending on the product or service being marketed, but realized during my research that this was not possible. VR and AR are still in development, but evolving at a very fast pace, and right now it's important to just bravely test them out without worrying about failing. I give plenty of examples in this thesis that will hopefully encourage marketers to start experimenting now, because we will see some really advanced VR and AR/MR in a few years, and those with the most experience will have great advantage in the marketing field.

Virtual Reality, Augmented Reality, Digital Marketing, Mixed Reality, Extended Reality

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Vocabulary & Abbreviation

API   **Application Programming Interface**

A set of tools for building application software using clearly defined methods of communication between various software components.

AR   **Augmented Reality**

An enhanced version of the reality where the real world is *augmented* with computer-generated images.

HDM   **Head-Mounted Display**

A display device worn on the head, used especially in VR.

MR   **Mixed Reality**

The merging of the real and virtual worlds, where the physical and digital objects co-exist and interact in real time with each other.

SDK   **Software Development Kit**

A programming package to develop applications for a specific platform. Usually includes one or more APIs and programming tools.

VR   **Virtual Reality**

A computer-generated digital world that is accessed through a HDM. It's an immersive environment often simulating the real world.

XR   **Extended Reality**

As the name suggest, everything that adds to the "real" reality belongs in the Extended Reality category; VR, AR and MR for example.

1 Introduction

Virtual and augmented realities (VR and AR) are still very new and hot topics in any industry. As a geek and a marketing enthusiast, I wanted to research these two technologies and learn how they have been used so far in digital marketing, what has worked the best and what are some must-have things to keep in mind when starting a VR or an AR marketing campaign.

Because it can be slightly confusing to some people, I will start by explaining the differences of the two, and also explaining and adding Mixed Reality (MR) to the "mix" as well, because it's basically a more advanced version of AR. Then I will give some history and background on VR and AR and explaining both in a little more detail, as well as introducing the more common headsets, and introduce the leading VR and AR companies in Finland.

I will also write about how VR and AR have been used in the past and give some interesting examples. I will then give more case examples per industry, and finish with a selection of useful tips to those who are planning on starting a VR/AR marketing campaign for the first time. These will be based on everything I've learned, seen and heard during my 9 months of research and time writing this thesis, as well as watching plenty of VR and AR ads and campaigns.

The thesis will then end with a conclusion and a self-evaluation chapter, which are basically a summary of the key points of my thesis, and some reflecting on what I've learned during the time I've been writing and researching this topic.

1.1 Objective and Limitations

The objective of this thesis is to give basic knowledge on what VR and AR are and how they differ from each other, as well as to give examples on how they are used in digital marketing. At the very beginning of my writing and research process, I wanted to create a sort of "decision tree" to help suggest the right strategy to the right product or service, based on which VR/AR marketing strategies were more popular in certain industries. I later realized this was not yet possible, as VR and AR marketing are still very much in an experimental stage, where there are no clear guidelines as in what works best with what. So instead, I decided to give helpful tips and suggestions to those who have never done VR or AR marketing yet. I feel like after all the time I have spent reading and watching numerous AR and VR campaigns, as well as seeing how this technology evolved and keeps evolving in just 9 months, I am qualified enough to share what I've learned on what to keep in mind, when planning VR or AR marketing.

It was a challenge to research technologies that are something so new and rapidly changing and improving, but I also believe VR and AR (and MR) are something that will significantly affect everyone very soon. Especially in the marketing industry, it is very important to always be aware of and prepared for the newest possibilities and trends. The amount of research material was sort of limited at the beginning, but new and more exciting material kept coming almost daily during the months of writing, so it was impossible to share every single interesting VR/AR marketing case that I stumbled upon, and it was difficult to decide when to stop gathering information and start focusing on writing about what I learned so far.

1.2   Research Methods and Key Resources

Most of my information had to come from online sources, as most books that are published about the topics of AR and VR are already outdated. Online resources on the other hand are endless, and new interesting and notable articles, reviews and videos come out all the time. When it came to doing research for my thesis, it didn't make much sense to first gather an X amount of information and then start writing. I wanted to continue my research throughout the writing progress, as to not miss anything important and to include the newest updates and the top VR and AR marketing success stories in my thesis.

I was lucky enough to join a few VR/AR related events through my work place as well, so it was interesting to hear and learn about what the experts here in Finland had to say about the topic and try out their products myself. What surprised me a little was that Finland seems to actually have some of the leading AR/VR professionals in the world. Tekes (Finnish Funding Agency for Innovation) held a "VR and AR in Marketing" event in November 8th. They had Arilyn, ZOAN and Deeptale demoing their products and answering questions. PING Studio, a digital influencers community in Helsinki, held a "Storytelling in AR and VR" event in January 11th, where Arilyn, Zoan and Stockmann were talking about AR and VR cases and held an interesting panel discussion on these two technologies. Also, as an employee at a B2B media company, I've had a chance to join a few events and seminars of our own where AR and/or VR has been mentioned.

2 The Difference Between VR and AR

Virtual reality (VR) and augmented reality (AR) have both been getting a lot of media attention recently and are aiming to hit the mainstream in the very near future. Nonetheless, there is still some confusion about the difference between the two. They both count as Extended Reality (XR), which means they are real-and-virtual environments generated by computer graphics. Both VR and AR use some of the same types of technology and exist to present the user with an enhanced or enriched experience. However, they differ very much in purpose and delivery method, and the main difference is really in the immersion spectrum.
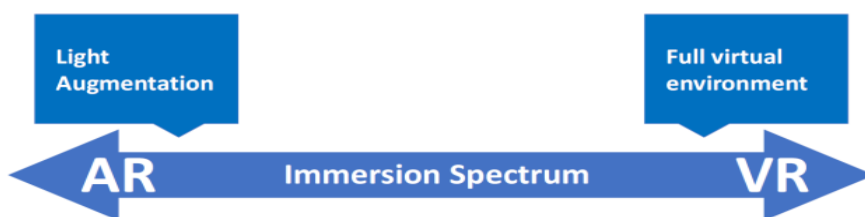
Picture 1 Different ends of the same spectrum (EmergingEdTech 2018)

Where augmented reality adds virtual components such as digital images and graphics as a new layer of interaction with the real world, virtual reality creates its own completely computer generated and driven reality. (Augment 2016a.)

Picture 2 Virtual Reality (StartUX 2017)

To enter virtual reality, the user wears an HMD (head-mounted display) to be able to move and look around the artificial world. The user can interact with this world with simple head movements or by using a game controller type of device, depending of course on the application and HMD being used. VR

applications and games can currently be used on mobile devices, PC's and certain video game consoles. Standalone VR headsets are already being made and should be coming out in 2018.

Picture 3 Augmented Reality (StartUX 2017)

Augmented reality is mostly used on mobile devices, using the devices' camera to see the world in AR. While seeing the live real-world environment, the viewer can also see computer-generated graphics layered on top of it. Different AR applications can use GPS, image registration and computer vision to have these AR graphics fit in and act more naturally with the real world.

Picture 4 Mixed Reality (StartUX 2017)

Mixed Reality is a sort of subcategory of augmented reality and not as well-known as AR and VR. It is still very much under development, but I've included it because it is a mix of the two, and it is good to know what it does and mean.

In short, the virtual reality requires a headset to use and completely replaces the real world with a virtual one, where no headsets are needed for augmented reality, which only enhances the real world with virtual

content through a mobile device. In this chapter, I will first present some history and background on both realities before going deeper into explaining about where VR and AR stand today.

2.1　History

Let us begin with **Virtual Reality**. Even though our first thought when we think about VR is a very modern and sci-fi-like VR headset, its concept dates all the way back to the 1930s. Stanley G. Weinbaum, a science fiction writer, in his book Pygmalion's Spectacles explains a game in which the player wears goggles to watch a holographic recording of virtual stories which also include touch and smell. (Filmora 2017.) I find it quite interesting to know that 85+ years ago creating simulation experiences using technology was already on peoples' minds.

1960s is when VR headsets actually started development. An American computer scientist and internet pioneer Ivann Sutherland created the very first VR headset to be used with military applications that used specialized military software and a motion control platform for military training exercises. These VR training tools are now a standard in the military and widely used for flight exercises to combat situations and more. (Filmora 2017.)

In 1990s VR headsets can be found in few arcade games for simulation, and the first home system becomes available. Virtual Boy from Nintendo was released in 1995 and had stereo sound, LCD screens and head tracking. Unfortunately, the games were all made in red and black and very few pieces of software were available with the device. Also, using the console was very uncomfortable, and because of the lack of games and colour, it was not really as big of a hit as the other Nintendo consoles. (Filmora 2017.) Despite the technological limitations however, it did sell 770k after its release (GoldmanSachs 2016).

Picture 5 Virtual Boy headset (Wikipedia 2017e)

2014 is when the latest revolution in VR technology happens. When Facebook acquired the Oculus VR system, it meant that virtual reality was becoming a concern for many world's top developers. In 2015, Oculus build partnerships with Samsung and began acquiring companies like Surreal Vision, and is definitely one of the leading companies in VR development today. Oculus has VR systems for consumers to use at home with a wide range of applications. Previous VR headsets were quite technical and inaccessible for an average computer user, so with plug-and-play compatibility and a large number of supported applications, Oculus gives an average consumer the possibility to enjoy VR. (Filmora 2017.)

Picture 6 Oculus Rift in 2013 and 2016 (Business Insider 2016a)

Now after Oculus Rift, new devices keep coming out from companies all over the world, and huge developments are made with apps, 360° cameras, cheaper headsets and more. VR is becoming the future focus for many developers, as 3D graphics are continuously improving and processing powers become faster. Because many smart phones have the advanced soundcards, the accelerometer data and graphic sets for 3D rendering, users have started to watch 360 videos and trying VR apps with their smartphone and free home devices like Google Cardboard. (Filmora 2017.) The new headsets will be wireless in the 2018, and there'll be wireless adapters for some of the older models (Digital Trends 2018).

The story of **Augmented Reality** starts in 1974 when Myron Krueger, an American computer artist, built a laboratory called the Videoplace. It combined projectors with video cameras that emitted onscreen silhouettes, making this an interactive environment for the user. (Augment 2016b.)
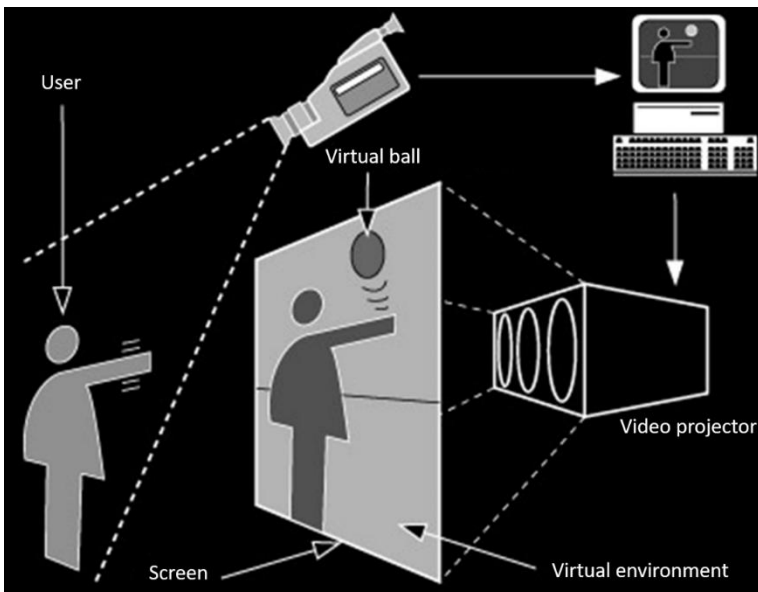
Picture 7 The Videoplace (The digital age 2009)

An American inventor, Lous Rosenberg, developed Virtual Fixtures for the Air Force in the 1992. This was an overlay of augmented sensory information on a workplace to improve human performance in direct and remotely manipulated tasks. Virtual Fixtures is said to be one of the pioneering platforms in VR and AR technologies. (Wikipedia 2017a.)

In 1999, Hirokazu Kato develops the ARToolKit, an open-source software library for creating AR applications that overlay virtual imagery on the real world. As it is an open-source project, it is still being widely used and hosted on GitHub. (Wikipedia 2017b.)

In 2009 print media gives AR a try for the first time. Readers of Esquire Magazine were prompt to scan the cover to make Robert Downey Jr. come alive on the page to introduce the reader to the issue. (Augment 2016b.) By tilting the magazine in different directions, the user would control the weather and make the models in the magazine adjust their clothing appropriately. Also, checking the AR magazine after midnight gave some different content than what was found during the daytime. (Mashable 2009.)

Car manufacturers begin to use AR as modern vehicle service manuals in 2013. The Volkswagen MARTA application gives the user step-by-step repair assistance, allowing service technicians to see how a repair process looks like on the vehicle in front of them. (Augment 2016a.)

Picture 8 Volkswagen MARTA application (Augment 2016a)

Pokémon GO was the first game application to bring AR widely to the mainstream in 2016. Users of all ages had (and are still having) fun with this free-to-play location-based AR game. The players' mobile devices' GPS is used by the game to locate, capture and battle virtual monsters, called Pokémon. They appear on the screen seeming to be at the same real-world location as the player. (Wikipedia 2017d.) In June 8th 2017, Pokémon Go celebrated its' first anniversary and 750 million global downloads (Pokémon Go Live 2017).

Picture 9 Pokémon GO (Polygon 2016)

In 2014 Google announces Google Glass devices for consumers, starting a trend of wearable AR. A few years later, Microsoft HoloLens Developer Kit and the Meta 2 Developer Kit are also being shipped out to the public. (Augment 2016b.)

Mark Zuckerberg, CEO of Facebook, announced a new platform for AR in Facebook's annual developer conference in April 2017. FB users will be able to add digital effects to still images, videos and live videos. Later users will also be able to leave digital messages to specific locations in the real world for others to find. (Wired 2017.) This will make interacting and enhancing the real world with digital effects even more fun and interesting.

The next big step for AR is turning it into MR. This means having computer graphics merge with their physical environment and behave accordingly. They will also become more interactive, responding to the users' voice, gestures and touch. (ABC 2018.)

In 2014 Magic Leap announces an AR investment of 50M$ which makes it the largest investment to date. A year later AR and VR investment reach 700M$, and in 2016 the investment reaches a nice amount of 1,1B$. Augmented and virtual reality have evolved at a rapid pace over the past decade and the growth is surely to continue. (Augment 2016b.) In 2017 the AR/VR investment records were broken as start-ups raised over 3B$ (Digi-Capital 2018).

2.2 Virtual Reality

"Virtual reality (VR) is an artificial, computer-generated simulation or recreation of a real-life environment or situation. It immerses the user by making them feel like they are experiencing the simulated reality first-hand, primarily by stimulating their vision and hearing." (Augment 2015).

Picture 10 Man playing one of Valves' VR games (Business Insider 2016b)

To experience virtual reality, you need a headset to start. Virtual reality can be used in various ways, from gaming and entertainment to simulators and education. The most popular use is still in the gaming field, but VR is sure to be more widely used in other fields as well, as it is an excellent tool for practising medicine, surgery, flying, driving and just about anything one can come up with. Inside the VR world, the user is in a 360-degree environment and can move around at his or her own pace, exploring whatever interests them.

Like all new things, VR also has some challenges to overcome. One of them is clearly the fact that VR needs to be a lot cheaper. It has to be affordable for an average buyer to become part of mass adoption. A proper VR headset for PC can cost anything from 400 to 1000 euros or more. In addition to the headsets, it's required to have a powerful computer, or a powerful smartphone for the smartphone headsets. Samsung's 99$ Gear VR sold out in 48 hours on Amazon.com, thus proving the strong demand at lower price point. Hopefully VR/AR HMD's (head-mounted display) will experience the same cost reduction curve as PC's and smartphone, with 5-10% annual falling with prices. (GoldmanSachs 2016).

Currently VR is still on the look for its killer app. It needs some must-have content that will push more consumers to get into VR. But obviously, before any of these, people need to be educated on VR and encouraged to try it at expos and conferences, or having experiences in public places.

Another issue that needs to be fixed is making VR mobile and getting all the cords out of the way. They're not much of a problem in more static experiences, but if multiple users want to share a design space for example, they'll want to walk around, and it'll be annoying and quite risky with a bunch of cords laying around. Fortunately, Oculus and HTC have promised to make their next generation headsets cordless, so this problem won't be around for long. (DesignNews 2017.) Also, the current headsets are quite bulky and need to be smaller and the design more aesthetically pleasing.

Even though there are still a lot of room for improvement, VR is slowly but surely getting to the top, and from the marketing perspective, first movers will most likely benefit from experiencing and practicing with VR marketing from the very beginning.

2.2.1 VR Headsets

Currently the top 5 most used, known and/or reviewed VR headsets are HTC Vive, Oculus Rift, Samsung VR Gear, PlayStation VR and Google Cardboard. HTC Vive and Oculus Rift require very powerful PC's to use and offer very high-quality VR experiences and are of the more expensive kind. The PlayStation VR is slightly cheaper, high quality headset for mostly gaming on PlayStation. The Samsung Gear VR is a more economically friendly headset, but it works only with specific Samsung mobile devices. The device is

inserted in the headset thus making it a mobile and cordless VR experience. The headset itself has a few buttons and pads that are used to navigate and complete actions in the VR world. The Google Cardboard is an extremely simplified version of the Samsung Gear VR, meaning it's just a headset made of cardboard with no additional buttons. It's the cheapest way to turn an Android or iPhone into a VR headset and get a feel of what the virtual reality is all about. From marketing point of view, the Google Cardboard would be the quickest and inexpensive way to make VR marketing experiences available for a larger audience. The quality of the VR experience would not be as high as with the HTC Vive, Oculus Rift and PlayStation VR, but works in cases where quantity has higher priority over quality. I'll introduce all five of them, as they are the ones everyone should be at least slightly familiar with.

HTC Vive is developed by HTC and Valve Corporation and allows the user to move in 3D space and interact with the environment using two handheld motion-tracked controllers. (Wikipedia, 2017g). It was released in April 2015 and currently goes for around 760 euros.

Picture 11 HTC Vive (Amazon 2017)

The **Oculus Rift** is developed and manufactured by Oculus VR, which is a division of Facebook Inc. The consumer version was released in March 2016. The Oculus Rift features a per-eye display running at 90Hz with high resolution, 360-degree positional tracking and integrated audio. It also has two handheld motion-tracked controllers for easier interaction with the virtual environment. This headset also has heavy

focus on consumer ergonomics and aesthetics. (Wikipedia 2017h). Oculus Rift VR sells for around 480 euros together with the controllers, Oculus Touch.

Picture 12 Oculus Rift (Oculus Rift 2017)

PlayStation VR is developed by Sony Interactive. Entertainment and was released in October of 2016. It works with the PlayStation 4 game console and its DualsShock 4 and PlayStation Move controllers. While the PlayStation VR is being used, you can mirror the picture displayed on the headset with the television, so that others can also see what is happening in the VR world. (Wikipedia 2017i). This of course is possible with all the VR headsets, but it's easier done with the PlayStation VR as it doesn't require a PC and downloading and learning to use specific software to display a separate image on the PC screen. The PlayStation VR costs 320 euros. The PlayStation 4 game console (1TB) with a controller cost about 310 euros.

Picture 13 PlayStation VR (PlayStation 2017)

I got to try this PS VR headset at Helsinki's Exhibition Centre during DigiExpo in 2016. It was my first time playing a VR horror game, and it did feel like I was inside the game. This level of immersion is just

completely different from just watching a screen from afar. If everyone got to experience this kind of higher-quality VR, I'm sure it'd be easier for people to understand what all the hype is about.

Samsung Gear VR is developed by Samsung Electronics and Oculus, and was released in November 2015. It is only compatible with Galaxy Note 5, Galaxy S6 to S8 and their Edge + versions. The Samsung Galaxy device acts as the display and processor of the headset, while the Samsung Gear VR acts as the controller with a touchpad and a back button on the side. (Wikipedia 2017j). A separate controller has now come available as well, and together they cost around 60 euros.

Picture 14 Samsung Gear VR (Samsung 2017)

Finally, the **Google Cardboard**. This cardboard headset was developed by Google and released in June 2014. Over 10 million Google Cardboards have been shipped and over 160 million app downloads have been made through March 2017.


Picture 15 Google Cardboard (Google Store 2017)

This low-cost system was created to increase interest in VR applications. The user places their phone on the back of the viewer and looks through the lenses to see the VR content. The Google Cardboard can be ordered for around 6 euros. I got to try this in 2015 and remember being quite impressed on how well this DIY cardboard headset worked, and of the idea of being able to watch VR content with just inserting my smartphone into this simple tool.

2.2.2 VR companies in Finland

There are quite many VR start-ups today, especially in the gaming field. Not so many offering services specifically for marketing. But there is at least one interesting company doing just that. ZOAN was introducing their VR services at a VR&AR event in Helsinki, in January 2018. I found them to be quite advanced in what they do, with a lot of potential to be the leading VR company in Finland, if they're not already.

ZOAN was founded in 2010 and is one of the largest VR companies in Finland. They offer solutions for VR marketing by creating 3D environments and experiences. They also do Virtual Training, where they create the learning environment in 3D and the user gets to practise, whatever it is, safely in a virtual world. And lastly, the also offer Digital Building services, which visualizes buildings for architects, real-estate agents and builders. One of their bigger projects is called Helsinki2020, where they created a virtual world of Helsinki.
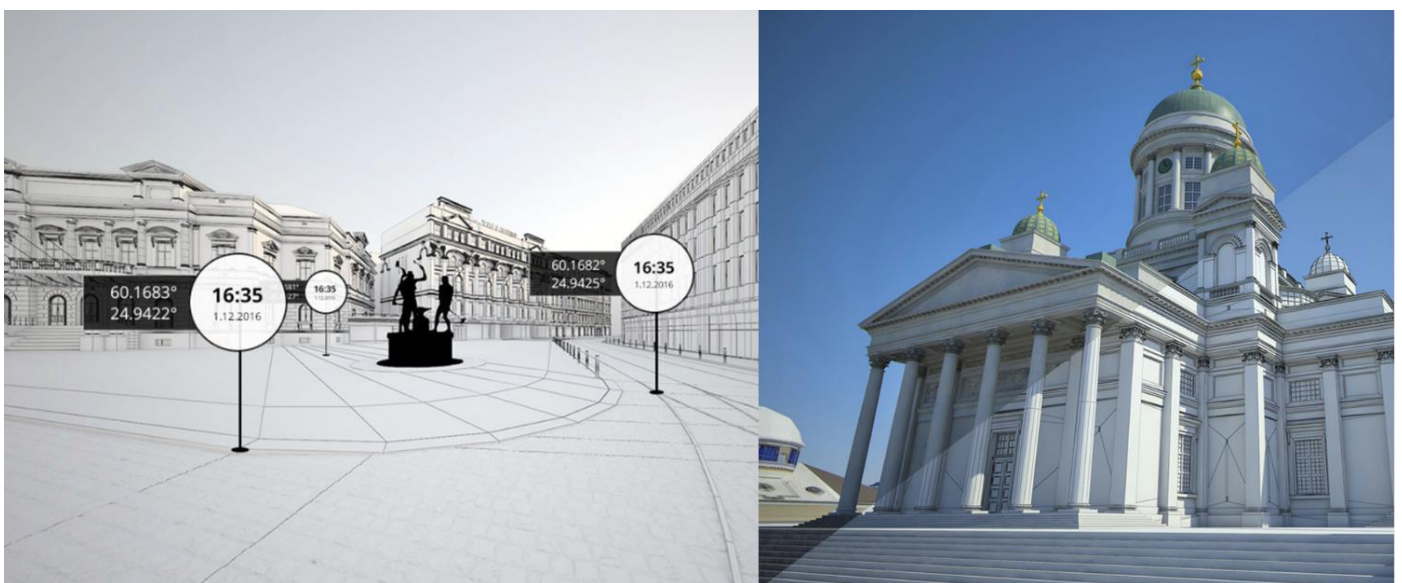
Picture 16 Helsinki2020 Model (Helsinki2020 2018)

2.3   Augmented Reality

"Augmented reality is a technology that allows for virtual objects to be placed in the real world in real-time, enhancing our information about the world around us" (Augment 2016b). AR is mostly used on mobile device apps to enrich the real world by blending digital components into it, but still having them easily be told apart.

It looks like AR will be the main driver of the global AR and VR market, as it is one of the hottest technology developments in the mobile industry and most people already have it. The latest smartphones are coming out with more advanced technical abilities to be even more compatible with AR applications, and big companies like Facebook, Microsoft and Apple have heavily invested in their AR development. With the help of AR, users will also have greater awareness and control of Internet of Things (IoT) devices in smart homes and offices for example.

People are already using their cell phones as a handy tool for everything. AR will make it even better and faster. Imagine instantly translating unknown language to your native language by just showing the text to your phone. Or when you're out shopping, you could get extra info about products by showing the product tag to your phone for example. Also, you could be trying out clothes and accessories with AR in your own home, instead of going to the store.

Right now, there are still a few technical issues getting in the way of mass market adoption. One of them would be the current battery technology. AR requires a serious amount of battery power to render digital elements in real time and power the camera. Secondly, publishers and marketers are yet to come up with a way to monetize AR apps without annoying the users and ruining their experience with ads, as they are probably less tolerated in an immersive mixed reality world. (Venturebeat 2018).

The hardware needed for AR are a processor, display, sensors and input devices, which can all be found on modern smartphones and tablets. They also tend to have a camera, an accelerometer, GPS and solid state compass, which makes these mobile computing devices very suitable AR platforms. (Wikipedia 2017a).

Picture 17 Seamless Augmented Reality Product Visualization (Augment 2017)

2.3.1 AR companies in Finland

The best known AR company in Finland right now would be a start-up called **Robust North**, which developed the AR app called **Arilyn**, and it's mainly targeted at marketing, media and entertainment industries. They've been introducing their work in various AR/VR events and have taken part in many of the newest and more successful AR marketing campaigns in Finland.

One of their latest AR campaigns was made for a Nordic dairy company in which a kitten jumps out of a milk carton when a picture on the back of the carton is scanned with the Arilyn app. This kitten is like a cute little AR pet and can be interacted with through the users' smart phone, and the kitten will develop into a cat (or a cow) over time. This campaign was aimed at kids and families as a fun little experience, and it also served as an example on how to use new technology to entertain and extend the storytelling. (Business Insider 2017).

Picture 18 Aamu Cat (Business Insider 2017)

Arilyn made a similar campaign for the movie *The Unknown Soldier*. By scanning a picture on the back of a milk carton, a trailer of the movie appears. I think the idea of using a milk carton as a place for advertising, is a very smart one. While kids are having their breakfast in the morning, they can entertain themselves with Arilyn, be it by playing with a virtual kitten, or by watching movie trailers from a milk carton.

2.4   Mixed Reality

Mixed Reality (MR), sometimes called Hybrid Reality (HR), is a more advanced feature of AR technology. The user wears semi-transparent goggles or glasses to, unlike in VR, still be able to see the real world around them. It combines the best aspects of both VR and AR. When these two realities are merged together, new visualizations and environments are made where physical and digital objects coexist and interact in real time. (Reality Technologies 2016).

Some of the MR applications created include 3D modelling, a large number of games varying from adventure and platform games to first-person shooters, interactive digital human anatomy curriculum and Skype, where the user of regular PC or mobile device can call the user wearing smart glasses, ie. HoloLens, and see the view of the HoloLens user, while the HoloLens user will see the normal camera view of the caller. (Wikipedia 2017c.)

Picture 19 Mixed Reality (Techno FAQ 2017)

There are so many headsets and smart glasses available, and new ones are being developed all the time. The HoloLens from Microsoft look like modern sunglasses and are capable of facial-recognition of the people you meet, fitness tracking and mixed reality just to name a few. MR headsets are believed to have potential to go mainstream in the next five years. (Wareable 2017.) MR is still very expensive and still strongly under development, but here are at least the three MR glasses you should know about.

The **Microsoft HoloLens** is a pair of mixed reality smart glasses, which were released in March 2016 and currently costs around 2700€. The consumer version is still under development and rumoured to be released in 2019. (Wikipedia 2017c.)

Picture 20 Microsoft HoloLens (Microsoft 2018)

Picture 21 HoloLens 3D Architecture (Greater Toronto Builders 2018)

For a long time Magic Leap was the very secretive start-up which, by the end of 2017, ended up with almost 2 billion invested on it. Their long-awaited headset, **Magic Leap One**, has been in development for five years now, and will finally be out in 2018. The price is said to be equal to a high-end smartphone, which in Finland will probably end up being around 1500€ to start. (Next Reality 2017.) The glasses look very awkward, but they are supposed to be very comfortable to wear, which has been a constant issue with other smartglasses and headsets.

Picture 22 Magic Leap Headset (Magic Leap 2018)
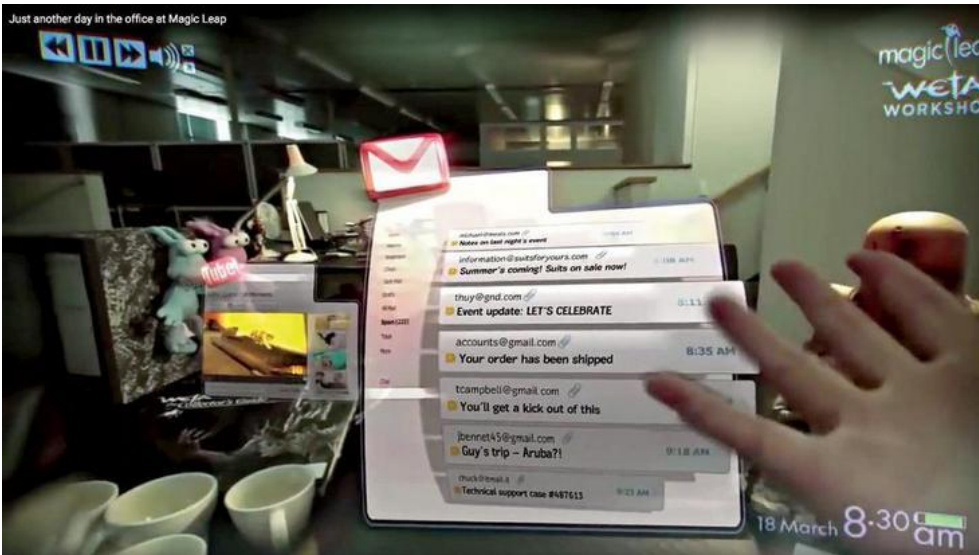
Picture 23 Magic Leap Demo (Startlr 2016)

Google Glass 2.0 (Enterprise Edition) was released in July 2017 and is aimed at workers in industries like healthcare logistics and manufacturing. These smartglasses help workers to easily gain information while their hands are busy doing manual work. (IntellectDigest 2017.) The price for these smartglasses go from 1500€ to 2500€ and in Europe they can only be purchased from two different distributors, one of them being a Google Glass partner called Streye (Xataka 2017). There is a chance of Google Glass making a consumer edition of their Google Glass, but not further information has come out yet.

Picture 24 Google Glass 2.0 (Glass 2017)

3   Creating AR & VR

The idea of creating AR and VR content yourself might seem quite intimidating at first, if you have no previous experience with coding and 3D modelling. If you're creating extremely simple AR apps, there doesn't necessarily even have to be any coding required, if you know which software to use. If you want to make something more advanced, then it would be good to know some coding, or at least understand it. There are websites where you can purchase ready-made 3D assets, but this is also something you should consider learning to create yourself. YouTube offers countless of tutorials for everything, so if you have the time and patience, I strongly recommend learning at least the very basics of coding and 3D modelling.

3.1   SDK's and Game engines

To begin your AR development, you will need an AR Software Development Kit (SDK). Vuforia is currently one of the most popular ones and is normally used together with Unity, as it has a very powerful Unity plugin. Its' supported platforms include iOS, Android, UWP and Unity Editor.

Some of the functionalities that Vuforia implements are:
- recognition of various visual objects (a box, cylinder, plane), text and environments
- VuMark (a mix of picture and QR-code)
- scanning and creating object targets with Vuforia Object Scanner (ThinkMobile 2018a).

ARToolKit is an open source tracking library for AR. It has way more functionalities than Vuforia, which makes this a good option for when Vuforia is not enough and you want to add some more advanced features to your app. It'll take a long time to learn all the options and settings of ARToolKit due to the variety of functions, so for those making an AR app for the first time I would suggest starting with Vuforia.

When it comes to VR Software Development Kits, things are different. Each VR headset/platform has its own specific SDK and some platforms may have several kits. I'll list the most popular ones below:

1. **HTC Vive → OpenVR SDK**
   OpenVR SDK is free Application Programming Interface (API) by Valve and it supports multiple VR hardware, and applications don't have to be vendor specific (ThinkMobile 2018b).

2. **PlayStation VR → PSVR dev kit**

Right now, the only way to develop apps and games for Sony PlayStation VR is to have access to PSVR dev kit. And to gain access to it, you need to pay 2500$ to become a registered developer (ThinkMobile 2018b).

3. **Oculus Rift → Oculus SDK**

Oculus SDK offers many features and handles a number of issues of VR content, like rendering techniques and the optical distortion to mention a few. This SDK includes various engine-specific kits (for Unity, Unreal etc.), audio packages, samples and assets to start build VR apps (ThinkMobile 2018b).

4. **Samsung Gear VR → Oculus Mobile SDK**

Because Samsungs' VR headset was initially build in collaboration with Oculus, their kit suits perfectly to build apps for Gear VR. The SDK includes tools and libraries for C/C++ development for both Oculus and Samsung Gear VR (ThinkMobile 2018b).

5. **Google Cardboard → Google VR SDK**

Googles VR SDKs offers native APIs for VR features like user input, rendering and controller support to build VR experiences (Google VR 2018).

A game engine is a software development platform that is used to make games and mobile applications. Some of its core functions include rendering 2D and 3D graphics and providing a physics engine, sound, animation, localization, memory management and video support. (Wikipedia 2018k). The most popular game engines for both AR and VR seem to be Unity and Unreal Engine.

Unity 3D is a cross-platform game engine that supports all of the VR platforms that I just mentioned above. It is the most popular choice among developers as it allows a free choice of programming language and offers an asset store with a wide range of choices (ThinkMobile 2018b).

Unreal Engine is a platform to build games, apps, animations for both VR headsets and mobile devices. It comes with a visual scripting mode, has an amazing compilation speed and grants full access to the source code (ThinkMobile 2018b).

3.2   3D modeling

3D modeling is the process of creating a three-dimensional representation of an object by using a 3D modeling software. 3D models can then be used in games and animations for example, and can even be physically created using 3D printing devices. (Wikipedia 2018).

You can make your own 3D assets and animations with software like Blender, 3ds Max and Maya. I myself use Blender and think it's a very good choice especially for new users, as it has various good tutorials on YouTube. It can look confusing and complicated at first, but it's really not as bad as it looks once you get the hang of it. **Blender** is an open-source software, so it's free and there are no usage restrictions on anything you make. (i.materialise 2017). After you've finished your model, you just export it in a format used by your 3D engine of choice and it'll be ready to use.

Creating high quality 3D models can be very time consuming and manual. If you don't have the time and patience to learn to create 3D assets yourself, there are a number of websites offering high quality 3D models for purchase. The leading digital art library is CGTrader, which has thousands of 3D assets perfect for VR, AR and gaming. Digimation and Adobe Stock are also good places to search for the right 3D models for your AR and VR apps. (DigitalArts 2017).

3.3   AR Project example

An AR book is one of the simpler AR apps you can make without having to use any coding nor game engines. ARAF Browser is an open source software perfect for creating this kind of AR applications for Android devices.

An AR book is a physical book with images, and once you scan the augmented images with your smart phone, it triggers an AR effect. To get started, you first pick the images you want to augment. And then, to keep it simple, you could just select audio files to associate with the images.

After that, you register to a site called Mymultimediaworld and go to the Create tab and select the Augmented Books option. There you click on "Add book" which takes you to a page in where you can browse and submit all the right images and sound files to use in your final AR app. After you're done, you click on Export.

Now to export the Augmented book to your smartphone, you go back to Mymultimediaworld homepage and go to the Binaries in Software section. There you download the ARAF browser by scanning the QR

code. Finally, you go back to your book edit page, and choose Save Augment Book and scan the QR code again to download your book. Run the file and open it with ARAF browser, and now if you focus your camera to the images that were uploaded in the AR book. If you hear the correct audio file start playing, it means your AR application is working and ready to be used. (Maker Pro 2017).

This was a very brief example of an AR app, but perfect for those doing AR for the first time, and to give some sort of idea on what kind of steps go into making AR. Later you can try adding other features like 3D objects and other media in addition to the audio, to further improve your AR book.
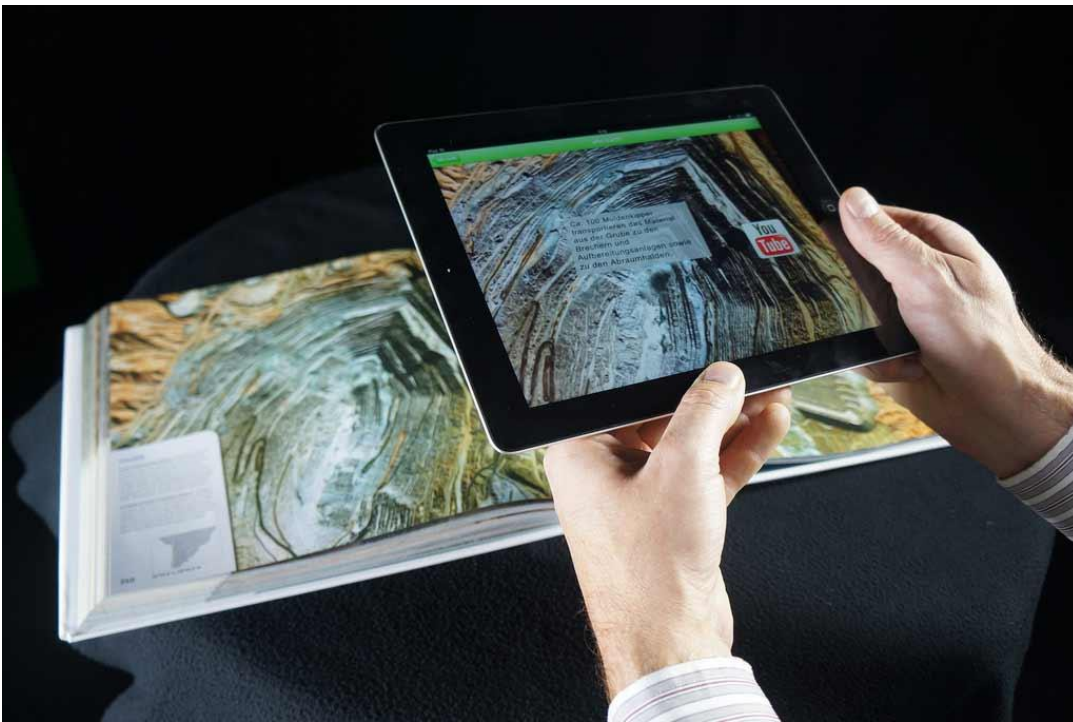
Picture 25 Augmented Reality Book (Maker Pro 2017)

4 Extended Reality in Marketing

When it comes to VR and marketing, there are four big reasons why VR marketing campaigns can be extremely successful. For one, wearing an HMD, the user is totally immersed in the content and giving all his or her attention to the message. Secondly, the intensity of a VR experience, at least now that it is still very new, is a lot greater than traditional media and creates strong emotions in its users. Thirdly, as our brains are built to remember events linked to locations, it means VR experiences will be a lot more memorable for the audience. Finally, early adapters can most likely benefit from the high media and public interest in VR and enjoy favourable media exposure. VR in marketing is immersive, impactful and memorable and solves one of the huge problems marketers have with awareness and engagement. (Mbryonic 2017.) According to Greenlight Insights 62% of consumers feel more engaged with the brand after getting a VR experience, and 71% feels the brand is forward-thinking if it is using virtual reality (Content Marketing Institute 2017).

AR adds value to the user experience as it has the unique ability to give users more information during a purchasing process, or while visiting an attraction or attending an event. Additional info will start popping out when aiming the smart phone's camera at a specific picture for example. When given crucial insight to the customer at the right time and the right place, it will greatly improve the user experience. (Copypress 2016.) Another key benefit of AR is that it is highly sharable. From interactive environments like Pokémon GO to fun filters in Snapchat, AR experiences get shared daily on various social media channels. So one way to drive brand identity could be in producing a custom geofilter in Snapchat or sponsoring a location in Pokémon Go. (Copypress 2016.)

The analysts at IDC, a market research firm based in Massachusetts, believe worldwide spending on VR and AR is going to double each year through 2021. Total spending is said to increase from $11.4 billion in 2017 to $215 billion in 2021, with an annual growth rate of 113.2%. (CNET 2017).

There hasn't been that many VR marketing stunts or campaigns done yet, but the ones that have been done are quite impressive. The whole concept of VR in marketing is still so new and unfamiliar to many, that it will understandably take time before it becomes something most would want to join in on. The best VR marketing stunt I found was done by a Korean agency called INNORED for The North Face store. Here, a customer is looking or trying out winter coats, when a clerk asks if the customer wants to test out their potential winter gear in action before leaving the store. If the customer says yes, he or she is sat down in a dog sled inside the store and given a pair of Oculus Rift goggles to put on. In the VR world, the customer is being pulled by a pack of huskies in a very beautiful and snowy scenery. The customers seem to be very amazed by this, as for many it is their first ever VR experience. But the second

they remove their VR goggles, something unexpected happens, and the dog sled takes off, being pulled by real huskies. The customer is taken on a sudden and very fast dog sled ride around the mall, and near the end of the ride, the winter jacket that they were looking at is hanging from the ceiling, and there is a sign telling them to "Catch their prize". So the customer has to raise his or her hands and snatch the jacket when the dogs run under it.

Picture 26 The North Face VR stunt (Alcone 2016)

Mixing VR and real life and adding surprise elements in an already unexpected and random situation makes this a very successful marketing stunt. I'm sure it was a very intense and memorable experience for the customers, as well as the other mall people who happened to be around when a pack of huskies were running inside the mall pulling a North Face sled. The stunts were also filmed and turned into a montage, and then uploaded on The North Face Koreas' YouTube channel, which has almost 5,5 million views today.

Another cool VR experience was done in the United States by an advertising agency called McCann. They turned a school bus into a group virtual reality vehicle experience by installing electric glass screens on the windows, turning it into a virtual reality "headset". A group of students would enter the bus, but once inside, it would look like the bus was driving on Mars. When the bus moved or turned, the surface moved and turned as well. (Framestore VR Studio 2016.)

Picture 27 Field trip to Mars (IR.net 2016)

Being able to give a virtual reality experience to a larger group of people at the same time makes this a very effective way of VR marketing. In addition to the bus, this could be done with any moving or non-moving space, with whatever virtual reality world you can think of. The possibilities are quite endless, and it makes a very immersive and memorable experience to the customer.

Unlike VR, AR has already been used in marketing for years now, and the quality and ways of applying AR has increased a lot every year. It makes a popular marketing tool, as it mostly just requires a smartphone. AR experiences can be easily shared online through video and pictures, and best AR stunts tend to go viral very fast.

Pepsi and the TV show "The Walking Dead" both turned a bus stop window into an AR screen in 2014. The window installation has real-time feed of the streetscape, so for the people looking at it believe it to be just a regular glass window. The person looking at the screen, would see weird and scary things happen on the other side of the window. In the Pepsi version people inside the bus stop would see UFOs a floating in the sky, or a tiger walking down the street towards the bus stop, and other random happenings of the sort. In the Walking Dead version, they made it look like the zombie apocalypse itself was taking place near the bus stop. These occurrences would of course startle people, and usually get them to get up and look on the other side of the window, where they would then see this huge ad of Pepsi / The Walking Dead.

Picture 28 Pepsi Max Ubelievable Bus Shelter (Inspiration room 2014)

Pepsis' AR campaign went viral and was YouTube's most viewed advertising campaign that year, with over 6 million views (Convince&Convert 2014). These kinds of interesting virtual ads work perfectly in spots like these, where people are just waiting around trying to kill time. An ad works best when it's entertaining enough to gain peoples' attention. Hopefully we'll see more of these in the future.

Another cool AR marketing campaign was done in Beijing by Baidu (Chinas' "Google") and Yum! Brands. They worked together to create an AR game in which the customers would scan stickers in any KFC restaurant to get a chance to win meal discounts. The game got popular fast, and was played 400 000 times within its first three days, according to the company. (Huffington Post 2017.) Scanning stickers is such a simple gamification idea that can work with almost anything. For example, Gym X could have their own app in which members would scan a sticker every time they visit the gym. This would earn them points, which can then be used in upgrading their gym card level or and/appearance and then be shared on their social media. Or you could get discounts on sportswear or personal trainer sessions or what not. Something similar could be done with pretty much any store or restaurant as well.

4.1   VR and AR Marketing Examples in Different Industries

Even though VR and AR are both still quite new in marketing, there are some re-occurring strategies that seem to be popular with certain products and services. I'll go through some of the more common ones, but at the same time it's good to remember that there are no one right way of doing things. With enough imagination and modification, all these strategies can be used to market just about anything.

4.1.1   Sports

Starting from the sports industry, I noticed many fitness centres are offering 360-degree tours on YouTube to show off their venue to potential customers. This makes it possible to get to know the gym from home and see if it has the space and everything the customer would need and want from their gym.

What we'll also see more is people exercising in VR through simulators and gamification. A company called VirZOOM is selling exercise bikes with handlebar buttons for game controls, so you can play VR cycling games while you exercise. In games like car racing and tank battling for example, the only way to move your "car" or "tank" is by cycling. (TechCrunch, 2017.) This kind of modern VR exercising is great news for marketers, if they're able to do some digital product placement in the VR apps, where the user will not be able to miss it.

Picture 29 NCAA March Madness Live VR (NewscastStudio 2018)

Live stream sports events will also come available for everyone through VR, and it will come with the various views to see the game. You could be watching the game from the best seats, or from the "eyes" of the goal keeper for example. VR can also be used to give the viewer a sneak peek to what a game day experience would be like in the premium club, or to give special behind-the-scenes access that would not otherwise be possible.

4.1.2 Food

Some of the biggest challenges for the food industry are spreading knowledge of their products and ingredients, and for restaurants it would be to attract more regular customers. Food manufacturers and grocery stores focus a lot on visual content, so I'm sure VR and AR will come in very handy, especially once the graphics reach their maximum potential. To make regular customers, you need to offer something that makes it beneficial and/or interesting for the customer to keep coming back. This is usually done with offering discounts, or by organizing events of some sort.

Food and beverage manufacturers have started using VR to share their brand message through immersive storytelling. A French cheese manufacturer Boursin takes the viewer into a VR fridge tour to show which foods work well with the cheese. And a premium tequila brand Patrón shows the viewer the entire manufacturing process in VR through the eyes of a bee, starting from the very beginning with the pollination of the blue agave plant, from which tequila is made of. (Food Navigator 2017.) Marketing through VR storytelling seem to be very popular right now, as it's more immersive than AR. After VR headsets hit the mainstream in a more mobile and compact way, we might see more of this kind of marketing.

Another clever marketing trick was done during the Pokémon GO boom in the summer of 2016, but which can still work if you manage to keep up with the game's newest updates. What the smart restaurant and cafeteria owners and the like would do, assuming they have a PokéStop near their venue, is create a PoGo account, and use that account to buy "lures", and then use those lures on their closest PokéStop, to attract hungry/thirsty PoGo players. One lure lasts for 30 minutes, and random pokémons will spawn near that PokéStop during that time. If the player knows that the lure will be on for longer than 30 minutes, they might as well take a break at the coffee shop/restaurant and eat or drink something while playing the game at the same time. Now, since the biggest boom is over, it would make more sense to wait until there are certain events taking place in the game, before taking advantage of PoGo marketing. For example, many of the not-so-active players become more active again during double-exp, or double-candy events, when you get double experience points and loot from the pokémons you catch during the event. These events last for a week or so, and this is when you should be using your lures to attract customers. Also,

during some of the events, the lures will last for an hour instead of 30 minutes, so it makes even more sense to use them to your advantage. Another perfect time for lures is when new pokémons are added to the game. That is also when players get very active again, and will hang out near lures. I've played Pokémon GO since it came out, and have personally seen how many people simple events can attract to certain locations. It is also interesting, how international players visiting Finland, occasionally join Finnish PokémonGo Facebook groups just to ask which are the best locations to play.
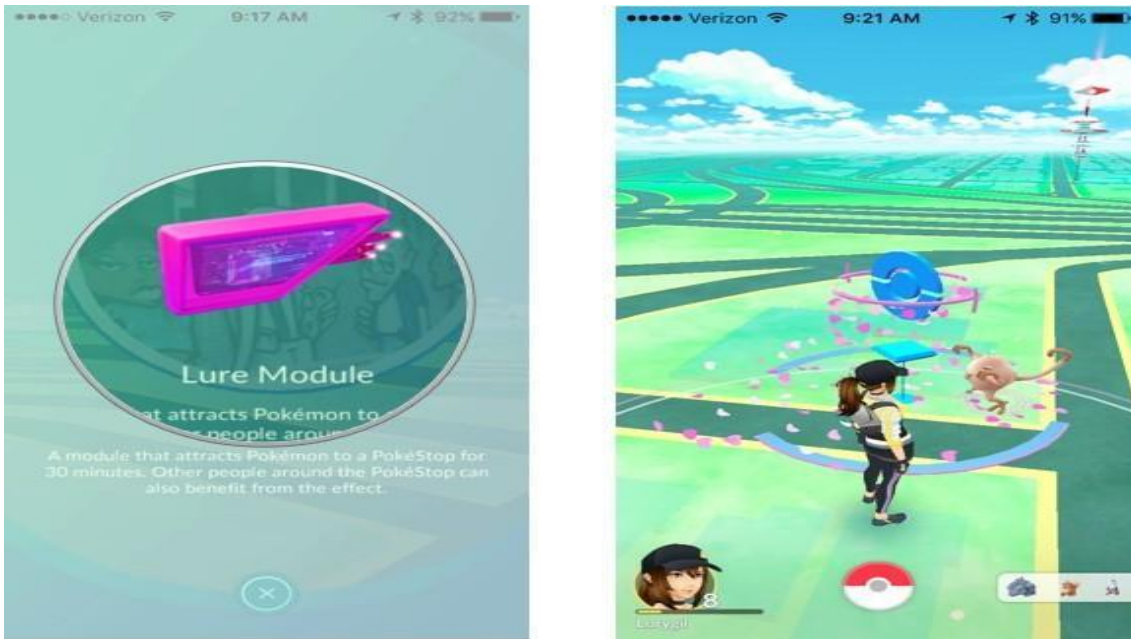
Picture 30 Pokémon GO Lure (iMore 2016)

New AR games like Pokémon GO will come out soon, so even for the non-gamers, it's good to be aware of this type of marketing, as it's very cheap, easy and effective if the timing is done right.

The Dutch Lady is a dairy beverage brand in Vietnam, who created their own AR app for their young consumers. The app is a game for children, where you interact with the characters from the "Dutch Lady farm", and by scanning Dutch Lady milk packs, you can unlock new characters in the game. The app was a huge success and achieved over 40 000 downloads and a 19% increase in sales. (Catchoom 2014). This kind of gamification can work for pretty much anything, and it's not much different from the Baidu's and Yum! Brands example earlier. The reward for using the AR app must be worth it. For Dutch Lady, it was entertaining children and improving their game experience, and with Yum! Brands it was meal discounts. The reward should be whatever the main users of the specific app want most.

4.1.3   Tourism

It's so common and easy today to compare different options online before deciding on which restaurants and other locations to visit. People will want to choose the best possible accommodations and will try to plan a successful trip by doing research online beforehand. This is why it's crucial to stand out, be easily found through search engine optimization, and to offer as much information as possible of your venues and services, especially through video and images.

Since 2015, when YouTube and Facebook made it possible to upload 360-degree videos, hotel and travel industry have been increasingly using them for marketing their services. The videos work best when using a VR headset, to feel more immersed in the experience. These videos serve as inspiration and trip-planning for travellers and are very popular at travel conferences and exhibitions. Instead of buying few expensive VR headsets and helping people put them on, you can now buy get hundreds of Google cardboard headsets to give out at a conference with a simple instruction on where to download a 360-video. (Skift 2017.) What these videos show, vary from hotel (room) tours to interesting landscapes and activities.

Picture 31 AR navigation (Imagineality 2017)

AR has also been used in GPS navigator apps aimed specifically for tourists, which recommend the user the best touristic route to famous landmarks or restaurants or whatever it is the user is in the mood for. With AR/MR glasses, the user can focus fully on sightseeing instead of glancing at his or her smartphone for directions or other information. This also works perfectly for those who prefer exploring new places by riding a bike.

4.1.4 Automotive industry

Buying a car can be a very big investment, so customers will want to be very convinced of their choice before purchasing. Sellers job is to make this easy for them, by offering tools and ways to compare their options. This is why the automotive industry has been all over AR lately. Volvo promoted its S60 model by creating an AR experience on YouTube, where the users could drive a virtual car by tilting their smartphone left and right. Volvo said there was an outstanding traffic increase of 293% to volvocars.com. (CommsCo 2016.)

AR has also been used in letting potential consumers personalize and build their own cars. Jeep dealership visitors are given tablets with an app that lets them explore the Compass car via 360-degree camera options. They can change the cars' external colors and go through different wheel options, and also open car doors to check out detailed interiors. (Marketing Week, 2017.)

Other cool and useful AR creations in the automotive industry are AR manuals, which help the user with car maintenance and by introducing different car parts to the user through an AR app. Hyundai made an app called the Virtual Guide, which does just that. By using the app to get an AR view of the interior of the car or the engine compartment, floating little dots will appear on the screen showing all points of interest in that view. Tapping one of the dots will give the user an illustrated, step-by-step walkthrough on how that exact maintenance item works. Inside the car, it would give tutorials on how certain functions, like pairing a cell phone with Bluetooth is done. (The Verge 2016.)

Picture 32 Hyundai Virtual Guide (Slash Gear 2015)

This simple but clever use of AR technology makes it so much easier for car owners to do basics tasks without having to go through a thick paper manual to find the information they need. I wouldn't be surprised if AR manuals started to replace paper manuals for most products and vehicles.

4.1.5   Entertainment

The VR/AR consumer market in entertainment was the first to develop and is believed to grow to 216 million users by 2025 (Goldman Sachs 2016). For the entertainment industry, both VR and AR can help with creating memorable experiences for their audience. I believe VR and AR has worked best in the entertainment industry, because these technologies alone are a type of entertainment, so it's quite easy to come up with ways to implement them in the game, movie and music industry for example.

VR and AR have worked perfectly in the game industry and especially VR has taken gaming into a completely different level. The gaming experience intensifies as the player becomes more immersed in the game. Instead of sitting in front of a screen, players are now able to play games while moving around. This is also being improved as developers and engineers try to create a dreadmill-type of equipment for players, where they can safely run and walk around while wearing their headset, without the fear of running into a wall or knocking things over.

In April 2017, Gorillaz, a British virtual band, made a VR music video for YouTube and it got over 3 million views in the first 48 hours. The famous singer Björk also made a cool VR music video setting the viewer in a magical underwater world. With this kind of immersion, viewers get a chance to really become a part of the story. The entertainment industry knows that people are craving for adventure, and it has started to use VR and AR to give people what they want. (ViarBox 2017.)

A number of movie theatres have experimented AR marketing with apps that work by scanning movie posters in the theatre lobby or movie ads on magazines. The AR app then brings up information like a trailer and premiere date, and also serves as a jumping point to buy tickets or visit the movies' website. (AppReal 2017.) Adding AR elements especially into posters lobbies and bus stops is a brilliant idea, as people tend to already have their smartphones in hand when they're bored and waiting for something or someone.

Musicians today are mainly earning their living from concerts and merchandise (ViarBox 2017). Soon VR will be used to stream live 360-degree events, like concerts and theatrical performances, as it solves the issue of limited seating and makes events available to anyone anywhere. Watching an event in VR will make the user feel like they're physically there with the best seat available. (GoldmanSachs 2016).

4.1.6   Beauty & Fashion

In the beauty and fashion industry, the use of AR is becoming quite popular when it comes to trying out clothes and makeup virtually. I find this to be an excellent use of AR, as shopping for clothes and trying to find the right cosmetics can be extremely frustrating and time-consuming.

Sephora created its own app called Virtual Artist, where the user can try out different lip shades and eye makeup by either uploading their picture into the app, or by using the camera function, where the app recognises a face and is able to serve as a sort of mirror while the user tries on different products through the app.

Picture 33 Sephora Virtual Artist app (Beauty Packaging 2017)

Converse has its "The Sampler" AR app for users to try on shoes, and GAP has a dressing room AR app, where to users outline their body dimensions to create a virtual mannequin of themselves to see what the clothes look like on their body type (Intellectsoft 2017). There are a number of retail stores offering these types of services and we'll probably start seeing more of them in the future.

Hector&Karger created an interactive look book named RE_ALITY in 2015. Readers of the Viva! Moda magazine could scan the magazine cover to view photoshoots and see models from all angles, and even purchase the ones they liked. (Catchoom 2017).

Picture 34 Hector&Karger RE_ALITY 3D lookbook (Glamour 2015)

VR catwalk shows have also been a hit in the fashion industry. Catwalk shows used to happen behind closed doors and for the privileged few, but now VR is allowing anyone to experience that world. Also, with VR, the location of the show can be anywhere and anything. If the models are filmed against a green screen, the background which shows in the VR setup can be anything from a space station to an underwater scene. (Wired 2016).

4.1.7   Architecture & Interior design

AR and VR are making life so much easier for architects, home buyers and interior designers as well as furniture stores. For example, Ikea has an AR application called Ikea Place with over 2000 products that the customer can place in his or her own home to see if the proportions of the products and furniture are correct, and if they match with the existing furniture and décor of that room. To see if an armchair fits in your living room, you just hold up your phone and use the camera to place the digital chair to wherever you want to put it in the room. These 3D furniture show up at scale with 98% accuracy. (Wired 2017). This saves the customer the time of measuring rooms and spaces, as well as helps them choose the right products and colours for a visually pleasing interior.

Home buyers can visit houses virtually from anywhere at any time. This will mean less travel expenses and time spent on going out to look at houses. Sellers and agents can sell homes faster when they can focus on marketing houses to only people who are really interested, instead of also to those who do not find the house worthy of consideration. (Forbes 2017). It's quite likely this will be a very requested feature if not a requirement for the real estate agencies in the future.

Promising software tools have been developed for architects who'd prefer to visualize, create and edit their 3D models and plans in virtual reality. The advantage of moving from 2D design drawing and floor plants to a 3D environment makes communication between designers, clients and end users easier and more meaningful. This will allow clients and end users to recognize challenges and opportunities as they can better visualize the final product. Another interesting feature you can use with VR models is simulations. For example, if the client would like to know how well the designed hospital can be evacuated in case of a hurricane, it's possible to run evacuation simulations on the VR model to see what kind of destruction the wind and rain can cause. (ArchDaily 2018).

Picture 35 Stambol AR Architecture (Stambol 2017)

4.1.8 Education

I believe VR and AR are already having, and will continue to have, huge benefits when using them for educational purposes. When turning a lesson into an immersive interactive visual experience through virtual reality, it will make learning more interesting and entertaining as well as turn it into a more effective and efficient learning experience.

Using VR for taking students on virtual field trips, to the surface of Mars or the international space station for example, has been one of the more popular uses in education. There are some schools that are using VR to teach in virtual classrooms, to solve the problem of not having enough room for everyone interested in joining the class. AR on the other hand makes a great tool for checking small details, or when serving as a quick dictionary or translator, or as a personal guide when touring museums for example.
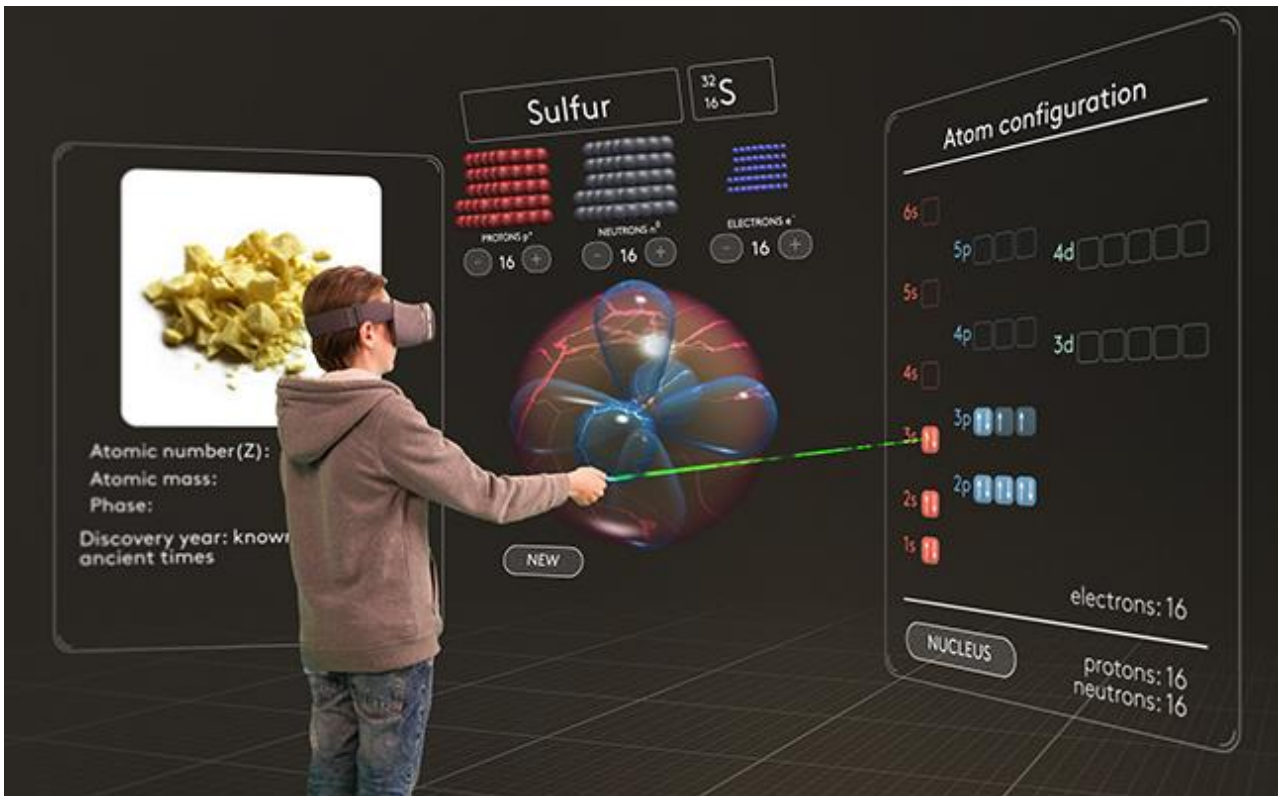
Picture 36 MEL Science, VR chemistry lessons (The Journal 2017)

VR is excellent when it comes to simulation training for nursing students, or for making science labs more interesting when you can make experiments in a safe virtual environment. Alchemy VR is a company that has created some great VR journeys into the heart of the Amazon, the Great Barrier Reef and Galapagos Islands to name a few. These are great examples of the possibilities of VR in creating unique and breath-taking experiences through a combination of storytelling and technical innovation (Alchemy VR 2018).

4.2 What to Keep in Mind when Planning VR/AR Marketing

As we've already established, AR and VR as channels are quite different from each other, so we will keep them separated. To decide which channel to use, it comes down to what kind of message you want to send and how, and also who the target group is. If the message can be told through immersive storytelling, VR would be the best way to go. If your goal is quantity over quality, and you want to create a tool or a game that people would come back to later, then go with AR.

Let's start with VR. Customers today are looking for engaging, interactive and more personal experiences. VR offers just that, as it enables the user to feel immersed in a different place or time. It's important to create a strong narrative for the VR video journey and preferably include interactivity and visual and audio cues to make the experience even more impactful.

If you've opened a new arts and crafts store for example, you could make an interactive VR tour of the store for the potential customers. In the VR store, the user could pick up products and maybe try them out in a separate room where the walls of the room could serve as a canvas for the user to try out various art supplies like watercolours or sharpies and the like. To make it even more interesting, you could let the user know there is a hidden message somewhere in the VR store, and if they can find it they can get an X% discount from their purchases when they come visit the real store. If you can add a fun narrative to the tour, that's even better.

One of the very important things to remember when planning a VR solution for your marketing is to focus on providing value to the customer. You should consider their perspective and craft the story and virtual environment based on the customers' needs. In VR it all comes down to storytelling and imagination. Adding features for users with access to handheld controllers should not be a must, but the option should be there, to add something extra for those who have them.

Measuring ROI and KPI works with VR campaigns where you can treat VR as a video campaign; views, unique users, view-through rate, watch time can all be tracked from the VR medium. There are also some companies that are already specialized in VR analytics, like InstaVR, Ghostline and Retinad VR.

AR offers a different kind of channel to make content more interactive and engaging by gamifying real life. There are free tools and tutorials for learning to create AR elements yourself. So if you can't afford outsourcing VR and/or AR, learning to make your own AR content is not a bad option.

Same rules go with AR marketing. Create something entertaining, helpful and useful and from the perspective of the customer. If, for example, you are marketing a cruise line, your ship could have it's on AR smartphone application. When using the app on the ship, it could be made to offer a real-time navigation map with arrows and other helpful direction and information. It could show you timetables and other details of live shows on bars and restaurants. And it could show you the latest products and discounts on different stores. And to gamify it a little, you could add some Pokémon GO elements to it by having surprise elements appear on the navigation map that the user can collect during the cruise. These collectibles could vary depending on the place and time, and could then be turned in for a prize or a discount. You could also add Snapchat features to it and have a certain number of collectibles unlock AR filters for the user. AR can be very shareable on social media if you offer that possibility to the user through something fun like adding AR elements to the users' pictures.

These were just examples on what you *could* do. There are so many possibilities and things that haven't even been tried or invented yet. Now it's the perfect time to experiment without it having to be perfect because everyone is still pretty much still learning and trying out ideas. The technology is constantly becoming more adaptive and mainstream, and soon we'll have new platforms for smoother and more advanced forms of VR and AR.

5 Conclusion

It can be quite an intimidating thing for digital marketers to add yet another channel to their already long list of various digital marketing channels to create content to. But the most important thing is to at least start thinking about VR and AR and then to start experimenting with both as soon as possible. Big companies have been making huge investments around AR and VR, so I am quite confident they'll be a big part of our lives in a few years if not sooner.

After reading hundreds of articles about VR and AR, and visiting a few VR & AR events, it became quite clear, that AR will be the more widely adopted of the two technologies. AR is so easily accessed by anyone with a smartphone, so marketers will most likely prefer AR to reach a wider audience. VR will be more popular in the entertainment field and architecture, as well as used in education and events to give a more profound user experience.

For digital marketers, there are many VR and AR companies selling their services, like ZOAN and Arilyn that I've already mentioned before. And then there are other tools, like ARKit and ARCore, for marketers to take advantage of and create AR content themselves. And for VR it's good to remember that there are already companies capable of VR analytics, and something similar is sure to come to AR marketing at some point as well.

Because VR and AR are still in the developmental stages, it's okay to start with experimental content and by testing things out and learning your way in. For the bigger companies who can afford it, it would be best to start investing in AR skills within their own department. In the long run it'll make more sense investing in their own employees instead of outsourcing the job.

My goal for this thesis was to create a clear guideline on which technology to use and how for different products and services, but I soon realized that because we are still in very early stages of VR and AR, this was not possible. Instead I gave out some examples and ideas based on what I've learned from my research, to hopefully help marketers in getting started.

In my own personal opinion, I find educational and entertaining marketing to be the most effective and hope to see them used more in the future AR and VR marketing. I'm sure gamification will be huge in marketing, as more and more people are getting into gaming, and the many 90's kids (like myself) who grew up with videogames are all grown up and would probably be excited about adding gaming elements into their job, be it marketing or whatever else. And the best way to teach and sell is by making it entertaining.

We have started to see more AR content being made for our smart phones, but what we haven't seen just yet, is VR, AR and MR in their full potential. It will be a game-changer once the graphics get more realistic, and AR/MR truly becomes an extension to our reality. And when VR gets so real distinguishing virtual objects from real world objects becomes nearly impossible.

6 Self-Evaluation

Like I already mentioned in the last chapter, my goal of the perfect VR/AR guide for marketers was not successful. Also, VR and AR, even though they share some of the same technology, they are still quite different. They are two distinct channels for marketers to use. VR is like an interactive movie in which the user is immersed on, and thus creates a very strong and memorable experience to the user. AR can mean anything from AR applications on a smartphone or a tablet, to a big AR screen on a bus stop. And then we have MR, which will be used with smart glasses, and in the far future through smart contact lenses.

Writing this thesis was hard but fascinating, and it was very exciting to see how fast these technologies are improving and how developers keep coming up with new ideas on how to use them. My biggest challenge was deciding when to stop reading about the latest news on AR and VR and focusing on writing based on what I had learned so far. And because this thesis took nearly a year to finish, I had to constantly go back and update parts of it to not have some parts of my text contradicting with each other.

I started working at a B2B marketing company during this thesis, and it was extremely fun and interesting to hear our creative team coming up with ideas on how to implement AR to some of their clients' marketing campaigns. This has definitely boosted my motivation to improve my 3D modelling skills and is really tempting me to try out the current AR tools to create something myself.

The possibilities seem endless, and right now it's important to just bravely try and fail until you've got it. I hope to see more of AR in our everyday lives and can't wait to see VR and AR reaching their peak performance in the future.

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