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VIRTUAL REALITY. NOW.

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Abstract

The purpose of this article is to introduce and rank information related to virtual reality as a new media phenomenon. In principle, in the Polish nomenclature, the term is so new that it is often confused, incomprehensible. This, in turn, translates into misunderstanding and the lack of the use of this communication channel.

The article is a review of literature. In the first part concepts such as augmented reality, augmented virtuality, mixed reality, virtual reality, and immersion will be explained. A short historical outline of the virtual reality will also be shown. Then - in the next part of the article - the author compares this communication channel with well-known, such as the Internet, television, radio. Next the author will determine what are the fields of application of this communication channel and its condition.

Keywords: Virtual Reality, new media, definition, VR.

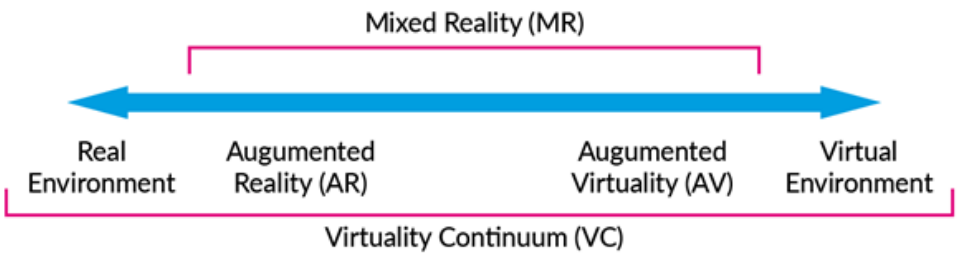
Introduction

In recent years, virtual reality has gained a new meaning. Due to its widespread use, the computing capabilities of computers and devices supporting vr have become a significant medium in the context of education, marketing, medicine or industry. It is worth determining what is the virtual reality, which has an advantage over typical media, as well as determine the rate of its growth.

Definitions

In the fields related to new media, some new types of reality have been mentioned for several years. Starting from the simplest one should indicate the augmented reality. Reviewing literature, it is worth noting that already in 1994 Milgram presented an interesting concept of combining real reality with virtual reality [Milgram, Kishino, 1994]. This concept is shown in Figure 1.

Fig. 1. Milgram'sVirtuality Continuum



Source: Milgram P., KishinoF., (1994), A Taxonomy of Mixed Reality Visual Displays

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As can be seen in the scheme developed by Milgram, reality is a certain continuum - and starting from the surrounding reality, through augmented reality, augmented virtuality and mixed reality, we are able to achieve virtual reality. This is a natural state of affairs. However, it is worth noting that in order to come to virtual reality (including having a full sense of it) one should face the challenges of augmented reality and then of augmented virtuality. It is also worth noting that these concepts were very precisely defined in the literature in the nineties of the last century.

Augmented reality according to researchers is<<Augmented Reality (AR) as a real-time director in direct view of a physical real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it. AR is both interactive and registered in 3D as well as combines real and virtual objects.>> [Carmigniani, Furht, 2011] or<<Augmented Reality (AR) is a new technology that involves the overlay of computer graphics on the real world. One of the best overviews of the technology is, that defined the field, described any problems, and summarized the developments up to that point. >> [Silva, Oliviera, Giraldi, 2003].

These two definitions show that through augmented reality one should understand the phenomenon that is generated at the moment when what surrounds us interacts in an interactive way with what is generated by any device (usually a smart phone or tablet). Augmented reality allows interaction between the real world and digital via interfaces / sensors such as a camera, gyroscope, motion sensor, light sensor, touch, temperature sensor or GPS module. The first in the history of the Augmented Reality phenomenon was Sensorama - the prototype of Morton Heilig's vision from 1955 showing Cinema of the future [Heilig, 1955]. In 1968, Ivan Sutherland developed the concept of the Head Mounted Three Dimensional Display, which firstly represented the AR, and on the other hand set the current direction of development of devices type HMD (appropriate for MR and VR technology) [Sutherland, 1968]. The development of this technology in those times was impossible - as it can be seen in Sutherland projects, the computing power of digital machines allowed only to draw a simple mesh of the object, without its physical features such as color, reflection, etc., without which we can not imagine photorealistic projection. However, since then, AR has been used by many companies for visualization, training, and similar purposes. The concept of Augmented Reality itself was introduced by Tom Caudell (working for Boeing) in 1990. Nowadays AR is very common – it is enough to refer to the popularity of a game such as PokemonGo. [Lee, 2012]

Augmented virtuality, in turn, allows us to transfer real objects to virtual reality and enables interaction with them. As we read in one of the articles<<Augmented Virtuality (AV) captures real objects and superimposes them into a virtual scene. A video of a real person, showed in a virtual environment, is an example for AV>> [Ladwig, Geiger, 2018].

Searching for the original for Virtual Reality, one should resort to a Polish fantasy artist - Stanisław Lem, who in one of his novels from 1964 (Summa technologiae) [Lem, 1964]introduces the concept of phantomics - translated as a technique of creating in the human mind the illusion of the existence of artificial reality - Lem beyond understanding it as perfectly understood world at the visual level understood it also at the level of other senses, and also assumed that the "new" reality would be ready to experience it (and not just to observe it). Stanisław Lem also analyzed threats of phantomics. It indicates above all the possibility of losing oneself in the new reality, which could lead to serious social disturbances - the blurring of the border between fiction and truth, a phenomenon we can see in films such as the Matrix or Inception. Due to the fact that in Lem's assumption, the phantomics would have to touch the senses of the user, it could lead to difficulties in distinguishing the world created from the real one. Another forerunner of virtual reality Myron Krueger in his study[Krueger, 1983] introduces the concept of responsive environment, which somehow defines the issue of virtual reality from the hardware and system side. According to Krueger, a responsive environment is one in which the computer receives user's actions and responds to them in a thoughtful way through

a complex system of visual and acoustic means, and adapts to the new environmental conditions created in this way. The very concept of virtual reality was introduced by the American computer scientist Jamie Lanier. According to Jamie Lanier (undisputed VR promoter, even considered the father of VR): <<... virtual reality is a way to use computer technology in creating the effect of an interactive, three-dimensional world in which objects give the impression of a spatial (physical?) presence.>> The following phenomena affect the general perception of virtual reality: Interaction, Immersion and Imagination. Therefore, VR is sometimes defined by these three concepts - and referred to as I3.

In turn, the concept of Mixed Reality is something that connects AR, AV and VR with reality (illustrated by Milgram's study).

<<In MR systems, users perceive both the physical environment around them and digital elements presented through, for example, the use of semitransparent displays. Imagine a system that indicates the name and provenance of it around you by displaying virtual labels overlaying the objects, or a system that guides your way by showing virtual arrows, or a system that displays people's names and affiliations on virtual badges. The information could be displayed in the native language of each user or could be customized to be most relevant to their individual profile; for example, when browsing food products, specific information could be provided according to the user's allergies.>> [Constanza, Kunz, Fjeld, 2009]

Completing the discussion on concepts one should define immersion, because it depends on it how much the user will be susceptible to a specific project (both VR, as well as AR or MR). Reviewing the literature, D. Maestre points out that<<Immersion is achieved by removing as many real world sensations as possible, and substituting these with the sensations corresponding to the VE. Immersion is by essence related to the multi-modal nature of the perceptual senses, and also to the interactive aspects of a VR experience.>> [Maestre]. And Micheal Heim in Metaphysics of Virtual Reality defines immersion as <<an important component of virtual reality systems. The virtual environment immerses the user in the sound and image space. Immersion creates a sense of being present in the virtual world, a feeling that we can exceed our physical limitations. The way in which the sense of presence and immersion simultaneously permeates – remains an open question of research on virtual reality>>. [Heim, 1995]. Therefore, thanks to immersion we can feel our presence in the virtual world, because to fully receive VR is not only presence, but also the feeling of this world and the possibility of interacting with it. It is also worth noting here that in order to ensure immersion, the user should be provided not only the picture (in full 360 degrees), but also spatial - binaural - sound. The other senses are often overlooked – this is due to the possible complexity of the VR system, and in the situation when the technology is to be disseminated, one should not hinder access to it. The interesting thing is that often the immersion itself can be achieved without too advanced image or sound quality, it is important that it is coincident with the real (physically correct).

Is VR a super medium?

In order to start a hearing about whether VR is a super medium, the term media should be defined at all. Behind Tomasz Goban Klas, we find out that the media<<is a term meaning the press, radio and television as so-called mass media, that is, institutions producing information and entertainment messages disseminated en masse and reaching simultaneously to large dispersed collectives of recipients>>[Goban Klas]. This definition is appropriate for traditional media. Due to some changes that have occurred over the last half century, the computer has become not only a tool, but also a "provider" of media content, it also allows them to store, collect, register and distribute. From that moment, we can talk about the phenomenon of new media. Reaching for the definition, we will see that<<under this concept we understand all these methods and social practices related to communication, representation and expression that have developed

thanks to a digital, multimedia, networked computer, as well as any innovations that have been introduced to other media through the computer>>[Lorek, Sadza, Sawicka, 2009]. Undoubtedly, VR is one of the manifestations of new media. It is a completely new approach to presenting information and even interfering with it, interacting with it. VR initially (in the 90s) was used mainly to present visions, which until now were only in the minds of designers, this technology allowed to communicate complex solutions whose prototypes were hard to wait for, or it was difficult to observe on such a level as VR enabled it. Currently, it begins to take the form of entertainment, training materials, or tools in the hands of marketers. It is important to verify the potential of this phenomenon.

Comparing VR to well-known media (radio, television, internet), we notice that it is the most widely received medium. The radio allows you to receive only sound (apart from video casts published on websites from individual programs), TV focuses on sound and image (and actually closes on these sensations - even in the context of Smart TV – skipping experimental productions such as Beyond by Beloff), while the internet is based on sound and image, but allows free (often) interaction with content. VR - as the only one mentioned, allows you to receive the image, biangular (surrounding) sound, fragrance, and what is also important – allows you to immerse in the received content by cutting off the real world. On the other hand, when analyzing the transmission method, we notice that radio and television broadcast, the Internet often cast to a small group of recipients, while VR is an individual cast - one to one, while specifying each user can view the same message on your own way. Reflecting on the popularity of each media, one can point out that radio is present in 75% of households [EFA Global Monitoring Report, 2012], television is available in 96% of households [The Nielsen Total Audience Report, 2017], and the internet is available in 46% of the population [Internet Live Stats, 2017]. When it comes to the popularity of VR, it is very difficult to estimate it – mainly due to the large portfolio of devices that can be used as a VR content player (from smart phones to simple HMD systems to complex simulators). The problem in spreading VR can also be a relatively small amount of content intended for this medium and the still functioning myth that it is an expensive technology. An important aspect in the context of media comparison is also the role of the user in the process of creating and receiving the message. In the case of radio, we can only receive content, similarly in the case of television (except for the mentioned experiments with the film Beyond by Zoe Beloff [Beloff, 1997]). In the case of the Internet, the user can definitely decide about the content being received, and also – with low effort – become its supplier. In the case of VR - if the content is difficult for the user to generate (due to the professional software, hardware and finally competences) – it is so easy to interact with the presented content, having a real impact on the artificial reality that surrounds us. The transmission time is worth considering - in the case of radio (broadcast traditionally) the user has no influence on the time of the program, must adapt to it, in the case of television - currently – has some impact (e.g. VOD), but in the mainstream also has to match. In the case of the Internet, the transmission time in most cases depends on the user (and the transmission takes place when it is expected, of course, except for live broadcasts). In the case of VR, the transmission time is fully dependent on the user. Another important aspect is the involvement in the received content - in the case of radio, many people declare that they do not engage in the content they hear (radio is the background of phonic), in the case of television, if the user devotes attention, he is unable to get involved in the message, in the case of the internet, the involvement can be large, including the possibility of interaction. The same applies to VR - the involvement will depend on the level of immersion, but it can still be determined that it will be relatively high, due to the phenomenon of cut-off from the real world.

VR condition today

VR as mentioned above is a medium that has not yet been widely disseminated. This is due to the fact that it is still too expensive (which is a myth). An important reason

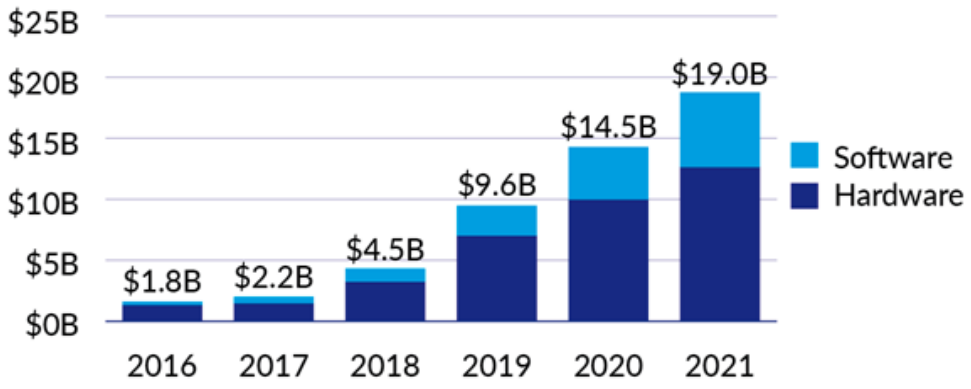
here is also the small amount of content that can be viewed using this medium.

It is worth noting that despite the low popularity of this medium, it is used in:

1. Education - VR is becoming more and more popular as a medium to provide knowledge supported by experience. The use of VR during the didactic process allows, for example, to move to another location (via 360 image) or display content that is not available in real (for example, human organs or car engine components).
2. Architecture - VR gives the possibility of spatial, free viewing of planned spaces, buildings, etc. As a result, the user has the opportunity to walk around the building, to see it before the actual execution.
3. Marketing - especially the marketing of places where the user can first go virtually for sightseeing - in order to buy a trip in the next step, or go on vacation. In addition, the virtual world gives us completely different possibilities and experiences compared to traditional marketing communication.
4. Medicine - allows you to verify the correctness of the exercises performed, or to view materials (such as MRI scans) during surgical procedures in three-dimensional space. VR can also be used therapeutically (e.g. in the treatment of post-traumatic disorders). An important aspect is the use of VR to educate medical staff.
5. Military purposes - thanks to this soldiers can educate their technical skills, fitness skills without a real battlefield, being on a virtual training ground. VR also used NASA to educate cosmonauts, and this way pilots or fighters are trained.
6. Entertainment - VR games are becoming more and more common, which in turn translates into the increasingly frequent publishing of VR titles. Currently, there are also applications that are like VR movies - thanks to which you can watch your favorite movie virtually on the cinema screen, or watch a 360-degree movie.

As it can be seen in the graph presented, the current VR rate is a total of 4.5 trillion dollars. Within the next year, it will be doubled, and by the end of 2021, a four-fold increase in this market is forecasted. It is worth noting that today the share of the hardware part predominates (practically 75% of the value), however, over the years the market share of the software part is also expected to increase (as it can be seen in the forecast, in 2021 it will be 1/3 of the market). The VR application and equipment market is very dynamic and constantly growing.

Fig. 2, Consumer VR Revenue



Source: State of the XR market, Feb. 2018, Super Data Research Holdings

Conclusion

Summarizing the above considerations, it is easy to notice that VR has features that put it much higher than other media. VR allows for the individuality of the message, its control, allows the user to influence the content that reaches it, is insensitive to time - allows for broadcasting when the user wants it, and allows the user to be heavily involved in the transmitted content. The whole is about the fact that the author allows himself to define Virtual Reality as a super media. In addition, it is worth noting that the VR market is a very dynamic and growing market - which in turn testifies to the development of this medium.

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