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ESCAPE ROOMS IN VIRTUAL REALITY, THE CONCEPT AND APPLICATION IN ELECTRONIC BUSINESS DOING

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ABSTRACT

The world has changed with the help of the Internet; simultaneously, the manner of our business doing has also changed. It has opened a door to new possibilities, business models, and innovative ideas. This electronic revolution has really facilitated communication and trade. The duty on the part of users and followers of technology is to keep advancing and use these means to their own benefit. This paper is aimed at presenting the advantages of using modern technologies, such as virtual reality, in the very business doing of traditional escape rooms.

Keywords: electronic business doing, electronic trade, escape room, virtual reality

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1. INTRODUCTION

In the era of the Internet and information technologies it is almost impossible to remain competitive on the market unless we use them. Information technologies have become an inseparable part of many branches and have for sure changed the way how people do business and make transaction during their business doing. Exchange of information has never been faster, employers opt for being present on the Internet so as to achieve as big a profit as possible, using globalism offered by the Internet.

Consumers also use this network so as to exchange information between and among themselves, and also to inform themselves in several different places and thus draw the right conclusion and the right decision. Working hours and the location are no longer the crucial factor(s) when purchasing; instead of them, the crucial factor is the digital (online) presence of the enterprise.

With the help of electronic trade, every buyer may make a transaction at any place and at any time, provided that he/she has access to the Internet. With the appearance of the Internet and the development of electronic business doing the world has totally changed the dynamics of people's lives.

Because of the environment like this, dealing with electronic business doing is of crucial significance. The manners in which it can be applied in the already existent business doing are different and, in fact, quite numerous.

The broader subject matter of the research study is a presentation of electronic business doing and the development of electronic trade, virtual reality and its benefits and application, as well as escape rooms.

The main goal of the paper is to more deeply study the nature of electronic business doing and its application in combination with advanced technology, such as virtual reality, as it is possible to improve the business doing of the enterprises engaged in escape-room business with the help of them.

2. ESCAPE ROOMS

2.1. The Notion of 'Escape Room'

Escape Room is a new way of people's spending their leisure time. An escape room is so designed to make the players in and of itself jointly overcome all obstacles. All escape rooms are based on the same idea: the players are placed in a room with a series of puzzles or

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challenges (hereinafter referred to as “puzzles”) they have to solve so as to be allowed to leave the room, or win the game. If they complete all tasks, i.e. puzzles, in or before the previously defined time, they leave the room as the winners.

Certainly, to win does not mean that the player must physically leave the room – it all depends on the very construction of the room played. The main aspect of this kind of games implies that the participants play it as a team, in groups of two or, more frequently, several people.

Escape rooms are also often called by other names, such as “escapegames, exitgames, puzzlerooms, adventurerooms” etc. Officially, there is no rule that would clearly define the name of this type of games; in the Serbian language, there is no adequate translation, so the most frequently used name “escape room” has been absolutely accepted (CLARE, 2015).

2.2. The Room

Once the player(s) enter(s) the room, things start happening slowly. The players start observing the room and its theme, take notes, and so forth. The room is the central and main part of the overall experience – puzzles are hidden in it and with the help of it the players live the story which lies behind the room. The team will search the whole room and try to discover all that originally was hidden from them. As the tasks inside the room are solved, the story itself uncovers more and more to the players. This means that, apart from making progress in task solving, the players will be entering deeper and deeper into the world of that escape room with every new solution.

The positioning of the puzzles is the key thing in designing every room. They should be hidden, but at the same time inweaved in and blended with the theme of the room. They should be distributed around the room about equally. In the very beginning, the players should not be assigned the puzzles that may drastically change the course of the action; namely, in the beginning, they should be assigned the tasks that are easy to do, whereas those more difficult should be left for the later phases of solving the room.

It is important that these two kinds of puzzles should be mixed with each other since, if we overexaggerate with any of the two of them, the players will either gain the impression that the room is too easy to solve or they will not feel they are making any progress in solving the same, which again will not be interesting to them. The best place to put these initial puzzles in is the central part of the room, in a visible place, and the goal is to enable the players to discover

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the message in as simple and as obvious a way as possible so that the players can gain self-confidence and the enthusiasm they need to start the game well.

The difficulty of the tasks should slowly be increased in a gradual way in order not to endanger the course of the game. In order to better understand the ideal course of the game, please see Figure 1.

Figure 1: A graphical presentation of the ideal course of the game.
Source: Clare (2015)

2.3. The Duration of a Single Escape Room

The ideal time of every escape room is estimated at 45 to 60 minutes, with the exception of the case when it is a room specially designed for an event, i.e. when the room is a form of promotion. A total of 30 minutes of the game is generally too short a time, and the players may feel that the price-quality ratio is not sufficiently good. On the other hand, any time in excess of one hour may create a feeling of fatigue and boredom in the team of players themselves.

We must not forget that, beside the one hour reserved for the game, going to an escape room also implies at least additional 45 minutes to one hour the players spend in time prior to and after the game (an introduction to the theme of the escape room and the summing-up of the impressions after the end of the game).

From the point of view of someone possessing their own escape room, you must bear in mind the fact that after the players are gone, you must restore the escape room to the original condition, the condition in which the room had been before the players came. By doing so, the room will always be ready for new teams.

2.4. Running an Escape Room

2.4.1. Escape Room Revisited

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In the clogged places such as Toronto, it is more difficult for people to have their turn to play the same escape room again, while besides, they have a wish to also try playing the other escape rooms which are quite numerous there. They simply have no need for playing the same room again. Certainly, on the markets considered to be smaller than Toronto, even 50% of the people decide to play the same escape room again.

Yet another way which makes it possible to "urge" old customers to return and try escaping from the room again is a discount, the discount granted in case the play did not have time to leave the room within the defined time, i.e. in case the player lost. Also, yet another way is to introduce a competition between two teams. In this way, the teams' main motivator are competition and the emulative spirit, not a concrete person, not concrete tasks; in that case, it is acceptable that the room should be one of those the players already played.

2.4.2. Prices and Costs

Starting up an escape room is frequently underestimated; abroad, the prices for starting up one such business range from 7000 dollars to as much as 25000 dollars per room. The price mostly depends on the very complexity of the room and its location. It is mainly after starting up the first room that the owners become aware of the fact that they are unable to do everything by themselves, so that employing a designer goes almost without saying.

The other types of the costs are the costs of the work of the escape room, overheads and so on. In order to make the room appear as originally envisaged, employing an interior designer is also one of the more important steps one should not skip (CLARE, 2015).

All objects, no matter how they may be resistant to the application of force, are prone to cracking, breaking and other kinds of damages. No single person is individually a problem; but, the result of the constant use by a large number of people is exactly the damages and broken objects. This may be treated as a collateral damage incurred through the frequent use of rooms. For that reason, it is always good have a duplicate of the object(s) in reserve. Apart from the fact that objects break and disappear, players may very easily forget that, after using it, they put the key in their pocket. For the foregoing reasons, it is better to avoid the objects of a unique nature and exhibit easily replaceable objects instead.

The thing that must not happen at all is that a team start solving the room in which some key objects are considerably damaged or even broken and nonfunctional. If so, the course of

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the game is threatened, the players have a feeling of a bad exchange of their money and time, which is bad for the reputation of the enterprise engaged in this kind of business.

Escape rooms earn money through the collection of money for participating in the game. abroad, such collection is made per player and is around 30 dollars/euros, whereas here, in Serbia, the whole room is most frequently rented irrespective of the number of the people, i.e. team members playing it; the price remains the same and varies from 2000 all the way to as much as 6000 dinars.

2.4.3. Puzzles

Depending on the resources, the money and the time, as well as external pressures, one of the following methods will be chosen in designing a room.

The first method implies buying already finished puzzles. In the beginning, when the enterprise is still young, this method may considerably accelerate its work and save time.

The majority of enterprises design their rooms on their own, but the components, i.e. puzzles themselves repeat, so more experienced players can notice this kind of standardization if the same or a similar puzzle repeats in several different locations.

Yet another type of rooms that appears during designing are escape rooms completely constructed by some other company. This type of rooms is mainly quite simple since they are constructed following the building pattern, for which reason any complexity whatsoever would have no purpose.

The last way in which puzzles can be designed is buying the already finished pattern and its later modification on the example of some other room, simultaneously certainly adapting it to the desired theme.

3. Virtual Reality

3.1. Introduction to Virtual Reality

We are testifying to an increase in the use of virtual reality for commercial purposes. The technology behind the notion of virtual reality is promising with respect to many changes regarding the way we observe and interact with information, friends, and the rest of the world.

Generally observing, virtual reality is a computer-generated simulation of a 3D environment, which only seemingly looks like a reality for the person who finds itself in it. Virtual reality has the aim to convince the user that it is about equally real as reality itself.

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Today's VR equipment (most frequently the glasses, headphones and joysticks) enables a wide range of people to enjoy this technology. Looking around is done by moving the head in a desired direction, and walking is possible with the help of controlling joysticks or motion sensors. In this way, virtual reality is trying to occupy all human senses so that the experience of the same could be as close to reality as possible – as if the user is in a totally other place and time, i.e. in a virtual world.

Virtual reality is certainly not a novelty. It has been existent for decades, but it has not been in a broader, consumer user, but has rather been used in laboratories for various academic research studies, for industrial and military purposes.

The first glasses for virtual reality were made as early as in 1965 and were so big that they had to be connected to the ceiling of the room in which they were placed [3]. A photograph of the first VR glasses is shown in Figure 10.

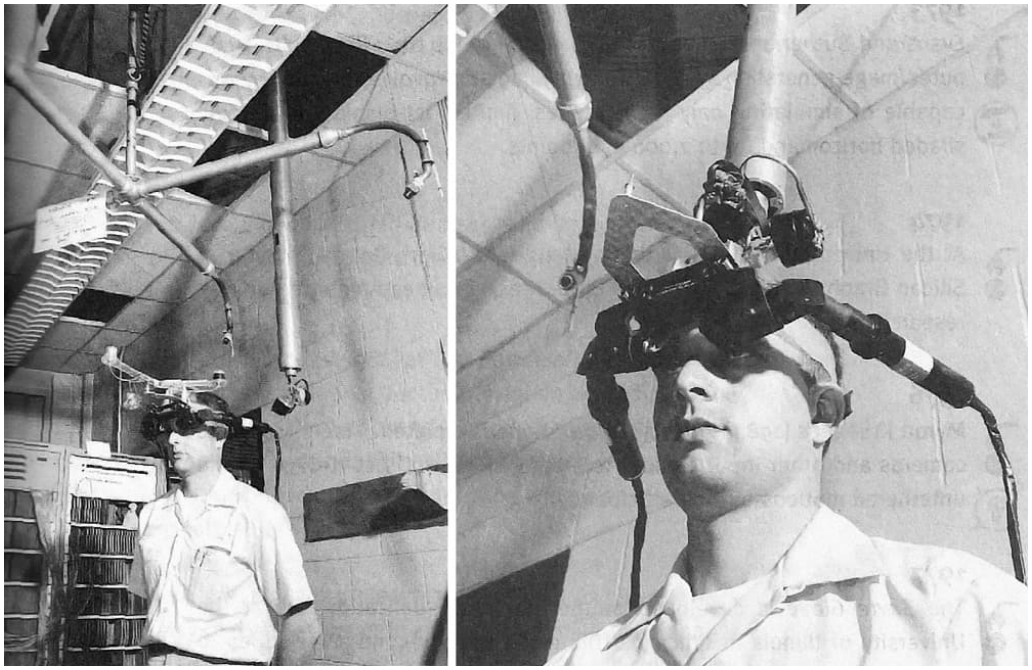

Figure 2: The first glasses
Source: Immotion (2019)

Over years, there had been a few attempts to create the glasses for virtual reality that would be available to a broader public, but not one single attempt had become a reality until the appearance of the OculusRiftDevelopment Kit (DK1), which was presented as an idea for the first time in 2012. Once the company Oculus VR LLC presented this idea on the Kickstarter crowdfunding website it attracted investors' great attention, and the attention of the founder of Facebook himself, Mark Zuckerberg, who bought this company at a price of 2 billion dollars in March 2014 (IMMOTION, 2019).

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On the other hand, competitors were making their virtual reality glasses that were launched onto the market not long after OculusRift. Ones of the most popular are Steam's *HTC VIVE*, Sony's *PlayStation VR*, Samsung's *Gear VR* and other. Innovations and new devices operating in the field of virtual reality are reported every day.

All basic research studies have already been done, so this technology is now available to a much greater number of people than it was the case in the past. There is a huge community of programmers experienced in creating 3D games and mobile applications.

Although VR finds the largest number of its users among the people who play games, it also has a huge potential in the applications of the 'non-game-playing' type. The fact is that every enterprise/firm dealing with or using 3D models and computer graphics will have incomparably greater and better results by using VR technology. The level of the attention and presence enabled by VR can improve all online interactions and experiences of the user, which implies engineering, socializing, purchasing, marketing, entertainment, as well as business development. In a near future, visiting 3D websites via VR may be a normal thing to do, just as visiting 2D websites by using the screen is a normal thing to do today.

3.2. Desktop VR

With desktop VR (and console VR, e.g. PlayStation), your glasses are a peripheral device of a powerful computer capable of working with demanding graphics. The computer itself can work on the Windows, Mac or Linux operational system, but the Windows OS has proven to be the most prominent of these three.

In the majority of cases, the glasses are connected to the computer itself by means of cables. The game itself or the application itself is started on the computer, but it is displayed on the peripheral device, i.e. on the VR glasses. Apart from the display screen, the glasses also have in themselves the motion sensors that provide the computer with needed data.

One of the examples of suchlike glasses certainly is the previously mentioned OculusRift, which has in itself an integrated screen and sensors. The game is started on a physically independent computer. Apart from these glasses, the other models of this type are also HTC VIVE, SonyPlayStation VR and others.

Desktop VR glasses rely on the computer, when we speak about the central processing unit (CPU) and the graphic processing unit (GPU), where the law: the greater the power, the better is also applicable.

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3.3. Mobile VR

VR glasses for mobile phones were created by the emergence of the GoogleCardboard, a simple carton box that has in itself two lenses and a space for a mobile device. This device can be seen in Figure 11. The screen of a mobile phone is used for a double stereoscopic display of an image, i.e. a video. This kind of VR glasses is characterized by a possibility of monitoring the rotations of the head, however not monitoring its position. Also, the Cardboard has a possibility of selection in the game itself; this option is activated by a click or patting the sides of the glasses. The complexity of the graphics it can show is limited by the fact that it uses the processing power of the mobile phone itself for rendering the image.

Google's *Daydream* and Samsung's *GearVR* have considerably improved their platforms for mobile virtual reality by introducing higher criteria when we speak about the minimum specifications and performances that mobile phones have. By doing so, they considerably reduced the list of the mobile devices that can be used in combination with their boxes. GearVR boxes are delivered with the inbuilt motion sensors that additionally support mobile phones. Controllers, which serve as laser pointers within the framework of virtual reality were presented with these devices for the first time, too.

The next generation of mobile VR devices also differs from the original in that, differently from the predecessor, they have no space reserved for a mobile phone since they do not need it. They already have in themselves inbuilt screens and processing units, due to which there is no need for mobile devices any longer. An example of a device like this is Oculus Go. It is anticipated that newer models will have in themselves inbuilt depth sensors and space mapping processors so as to monitor the user's position and location in a 3D space.

3.3.1. The Difference Between Virtual Reality (VR) and Augmented Reality (AR)

The technology extremely close to virtual reality is augmented reality (AR), which combines computer-generated images (CGI) with the scenes from the real world. AR has recently become popular on smart telephones, and a great contribution to that has come from Apple's ARKit and Google's ARCore. The manner in which this technology works on mobile devices is quite simple – a layer with a computer-generated image is placed over the video that we receive directly from the sensor of the camera.

The latest innovations in AR are the glasses for augmented reality; the examples of these devices are Microsoft's HoloLens and MagicLeap. These devices display computer

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graphics directly in your visual field, but the graphics do not mix with the video, as is the case with the mobile version of AR.

If compared with the glasses for virtual reality, which are of a closed type, then the augmented reality glasses work like the transparent sun glasses that combine ambient light and a computer-generated image. To ensure a stable image, i.e. to solve the problem of lagging and moving between a computer-generated image and the real world, is a challenge for AR technology.

Just like VR, AR also has a good perspective and application in future applications, but in some items it differs from virtual reality. In comparison with virtual reality, which has the aim to totally isolate the user and lead the user to a totally different place or the user goes to a completely other world, augmented reality engages the user to interact with his/her surroundings. There are also devices that combine the features of VR and AR technologies and enable shifting from one technology to another.

3.3.2. The Application of Virtual Reality in Electronic Business Doing, Applications and Games

Virtual reality at the consumer level was first accepted by the people who played games, hereinafter referred to as gamers. Gamers liked the idea of virtual reality, where they completely transport themselves into some other surroundings that is like a game. As their appetites for as good performances as possible were growing, so were growing the prices of VR devices as well. Those users are simultaneously considered to be early followers of such an advanced graphic technology. After a while, there was mass production of gaming consoles and individual components for computers.

The competitiveness amongst suppliers of goods grew after that, resulting in a fall in prices and a simultaneous growth of the performances of components and consoles themselves. Gamers are a very demanding group of buyers who constantly raise the ladder with their requests; so, in order to satisfy their needs, the market must carefully and attentively listen to them. Due to that fact, the first market targeted by the majority of the companies dealing with the manufacturing of virtual reality hardwares is exactly the game markets (IMMOTION, 2019).

Certainly, apart from the world of games, virtual reality is also applicable in other fields of business doing. Although games will remain a very much so important segment of this industry, the other applications that cannot be classified into games will cast a shadow on them.

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These applications will differ from games in several ways. The first and biggest difference will be paying less attention to the mechanical components inside an application and giving a far bigger focus on the experience itself of the application or some other aim that application wants to achieve.

Of course, this does not mean that the notion of mechanical components inside games, i.e. inside applications, will disappear, but rather that it will only lose the focus that it has had in the world of games so far. For example, an application may be specially created for the user to learn some particular skill, so the mechanical components will depend on the very nature of the skill it is being designed for.

Generally observing, the moment at which some wins or loses is not that important in applications, as is the case when games are concerned; what is important is rather the very experience of the whole of the application.

The types of the applications used in various types of enterprises and those which are currently being developed within the framework of virtual reality are as follows:

Travel and tourism: this type of applications enables the user to visit the places on the other side of the planet and museums located in cities kilometers away from them, be present at festivals and so forth from their homes with the help of the glasses for virtual reality within only a few minutes.

Machine engineering and industrial design: design software, such as AutoCAD and SOLIDWORKS, help in the modelling, simulation and visualization of creative solutions. Virtual reality enables engineers and designers to experience the end product before the same is manufactured. This also offers them a certain dose of freedom and experimenting since, in that stage of the creation of a solution, costs are still small.

Take, for example, the creation of a new automobile – what it will look like from the outside, how the parts will be fitted, how the interior of that automobile will look. Virtual reality enables them to do all of the mentioned in a much better and much more interesting way.

Construction and architecture: architects and engineers always constructed the scale models of their designer solutions only to be able to present an idea to clients, investors, or even more importantly to be able to validate the assumptions related to their design. Nowadays, modeling and rendering are performed via pieces of software in order to build virtual models of architectural plans.

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With the help of virtual reality, negotiations with actors of interest may be held with far greater certainty and self-confidence in the model itself. Apart from all of the foregoing, having a model like this in one's possession would enable the owner of it to make other people, such as interior designers, electrical engineers and so on, join the team far earlier.

Real estate: real estate agencies are amongst the first to have accepted the Internet and different visualization technologies to attract as large a number of buyers as possible and make as great a number of sales as possible. To have an online panoramic video of the whole real estate being sold has become a standard for those agencies. With the help of virtual reality, the buyer is allowed to fully experience the real estate that is perhaps thousands of kilometers far away from him.

Medicine: when speaking about the application of virtual reality in medicine, examples reach as far as the ultimate, extreme boundaries, within which this technology can be of vital importance. Every day, MRI and other scanners are used in hospitals so as to create the models of bones and organs that will later be used for the purpose of diagnostics or potential presurgical plans. By using virtual reality to achieve more advanced visualization and measuring, the analysis itself is improved, too. Apart from the application like this, VR is also used in training the students who want to engage themselves in surgery (LINOWES, 2018).

Mental health: the use of virtual reality has proven to have a positive and therapeutic effect on the patients in whom post-traumatic stress disorder (PTSD) has been diagnosed. Similarly to the above-mentioned example, VR is known to be helpful in the elimination of arachnophobia (a fear of spiders), as well as a fear of flying.

Education: the educative potential of virtual reality is obvious to everyone almost at first sight. Apart from a better approach to learning, virtual reality can also be much more cost-effective and much more economical in the long run.

Training: on the example of virtual reality Toyota created a simulation intended to drivers, which is aimed at educating teenagers on the dangers and consequences that appear once their attention has been diverted while they are driving. On another project, students had a chance to see how good they were as operators of a crane and the other machines used for construction. A similar kind of training can be applied for policemen and fire-fighters, which would make their performance in cases of emergency better. Apart from these examples, the American National Football League (NFL), as well as many colleges, are in search for the VR training courses that will help their athletes.

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Entertainment: virtual presence at rock (and any other) concerts, sports events. A better experience of pieces of news, (on the spot) as if you had been in the field together with the reporter. Video contents in 360 degrees, and much more. Virtual reality will change the manner in which we receive and process pieces of information.

Yet another example of the use of virtual reality in electronic business doing is the world known website eBay, which made the first department store in virtual reality in cooperation with the Australian firm Myer in 2016. With the help of a mobile device and a VR box, consumers are enabled to browse the products exhibited in that department store. Users had an option to move, rotate, and zoom the products themselves, receive information about the availability of the same in real time, as well as the one considered as the most important of all – the option of buying products (DIECK; JUNG, 2019). Figure 3 illustrates the appearance of the virtual department store.

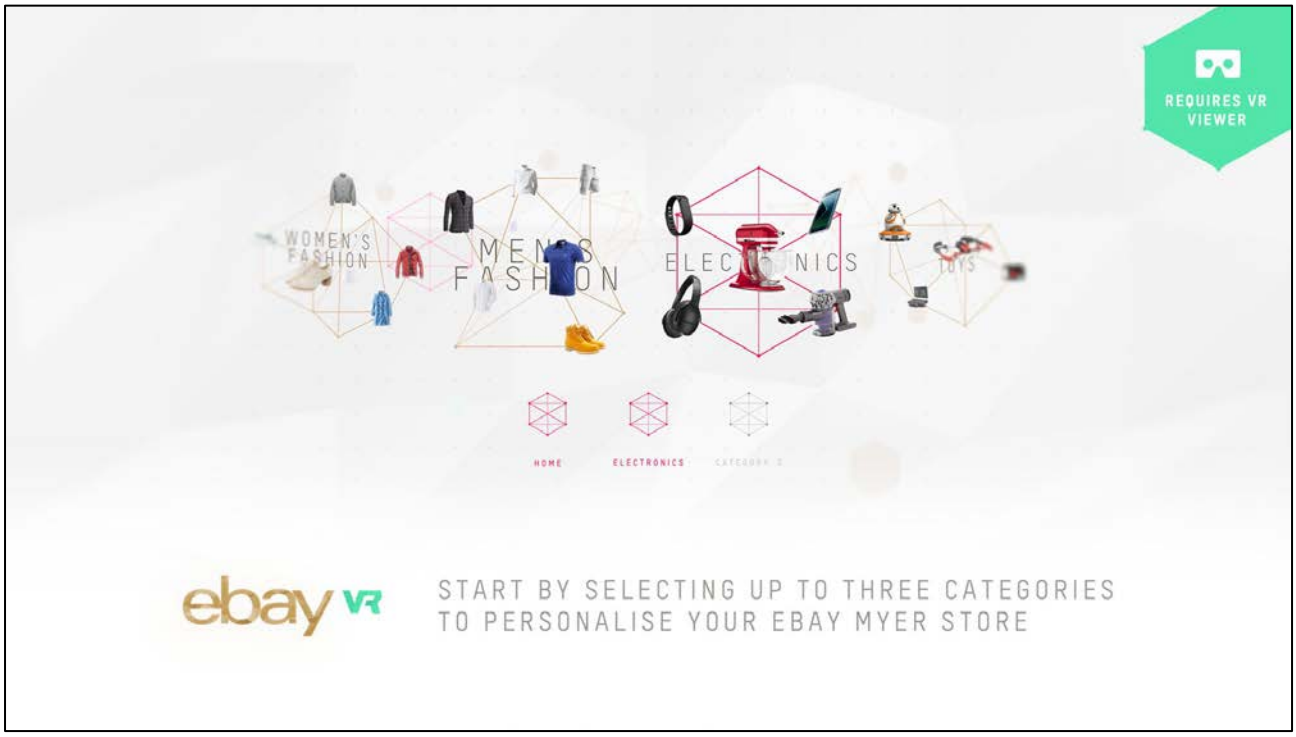

Figure 3: The appearance of the first virtual department store
Source: Apkpure (2019)

This is but the beginning; in forthcoming years and decades, no one knows what is ahead of us – yet, we need live in the present and use the technologies currently available to us. A mistake made by many enterprises and brands is that they are afraid of potential bad moves, by which they deprive themselves of a wide range of possibilities that could only potentially improve their business operations.

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We should believe in new achievements and experiment because no one knows the exact value a product or a technology has until they have done an experiment or research by using the product or the technology, through which its real possibilities are revealed.

Virtual reality is exactly a true example of one such technology. Although it has been existent for a large number of years, this technology has never been available to a broader public. Never until now. Its potential is only now being barely discernible and its possibilities will also increase with the advancement of hardware. The market is now only recognizing all the possibilities of the applicability of virtual reality.

Currently, gamers are the largest group of the users of this technology. They identified themselves in and with that virtual world quite a long time ago, when they started playing games actively for the first time. The very thought of a possibility that they can now even physically be a part of that world is astonishing to them. This group of people will certainly dictate the development of this technology in the future, too, but by no means must we cloud the potential lying in virtual reality applications.

If the fact that only the biggest world industries like tourism and medicine, not to mention the army, have already recognized the serious potential of the application of this technology in their performing certain activities is taken into consideration, we can only imagine what will be revealed over time.

So, this technology has also become applicable in the field of leisure time, such as escape rooms. Throughout the paper, the characteristics of virtual reality, escape rooms and electronic business doing have been discussed a lot. The reason lying behind such an amount of theory is the very complexity of one such idea.

To design a room full of puzzles in a form of virtual reality and find an appropriate business model that will provide the grounds for that idea to be profitable is not an easy task to do, not at all. All those problems that this synergy solves need be recognized, as well as the reason why exactly that one, not something else or something similar to it.

That is the art and beauty of information technologies – first, everything emerges as one contemplation and one idea, only to then transform into a burning desire to decompose itself into smaller wholes so as to see if that idea has any sense. After that stage, a shift is made to the stage of execution, learning and interaction with people.

4. CONCLUSION

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Historically, the development of technology was changing the course of further actions. People always adapted themselves to it and tried to benefit from it as much as possible. The development of electronic business doing and the Internet initiated a new era. The manner in which merchants and purchasers do business and communicate has significantly changed thanks to electronic business doing.

Every day, people around the world use the services created as a product of the application of electronic business doing. Every day, there are more and more people present on the Internet, which automatically implies that the only thing the market can do is to keep growing. What is the most probable and the reason why the application of electronic business doing is spread to such an extent is the very fact that buying and selling, i.e. trade, has transformed into a completely new dimension, where the actions that used to require a whole set of processes to carry out are now simplified and displayed on the Internet so as to be available to all.

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