



# Basic Aspects of Digital Interior Design Used in Virtual Reality and Its Adaptation to the Metaverse. Biomimetic CASE

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## 1 Introduction

Using 3dsmax and Unreal software, the VR application for the Oculus Quest 2 (Meta) virtual reality glasses has been designed. A space has been designed where the properties of Biomimetic products are shown in different lecterns and scenarios, from their molecular composition to the different pharmacological and/or aesthetic applications (Anti-aging, anti-stain, anti-wrinkle, etc...).

This immersive experience will provide the user, pharmacy owner, with a perfect knowledge of the properties and applications of Biomimetic cosmetics.

From this VR application, the same optimized content in web3 (Metaverse) format has been designed for the portal Spatial.io [4].

It is important to note that the platform does Spatial.io add the social factor, an issue that VR glasses do not provide [5].

This is how, even presenting a less immersive experience, Spatial.io allows you to contact other people from a web environment, more accessible and easier to use than with VR glasses.

The main objective is to improve the creation of spaces where customers can interact: either in training contexts of the company itself or simply to consume and acquire products, in addition to sharing experiences [6] (Figs. 1 and 2).



**Fig. 1.** Detail of the interior of the Virtual Biomimetic showroom room.

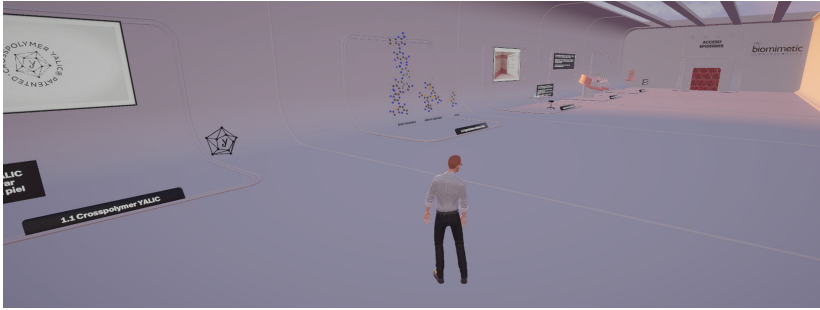


Fig. 2. Detail of the lecterns of the Virtual Biomimetic showroom room.

## 2 Approximations: From Virtual Reality to Metaverse

The metaverse represents “the ever-evolving virtual world.” The term is used to describe a changing virtual world, which feeds back and learns. That exists online and is accessible to users through virtual or augmented reality technologies.

Although in its early stages of development, the metaverse is rapidly evolving in popularity and a significant impact on how society interacts online is anticipated.

The term “metaverse” was coined by Neal Stephenson in his science fiction novel “Snow Crash” in 1992 [1], but has recently been adopted by tech companies such as Facebook and Microsoft [3] to describe their own initiatives in the virtual world. In essence, the metaverse unfolds in a virtual online space where users can interact in real time through avatars and experience a wide range of activities and/or create their own experiences.

One of the attractions of the metaverse is that it is an open and constantly evolving world. Unlike previous virtual worlds -more conditioned- where the experience is regulated and limited depending on the developer, the metaverse is designed to be completely interactive and customizable by users. This means that you can create and modify your own virtual context, its objects and avatars, and then share it with other users.

The metaverse also has significant implications for the online economy. With the ability to create and supply virtual goods, users can generate revenue and build businesses online. This has led to the creation of virtual economies within the metaverse itself, where users can exchange virtual goods with virtual currency. This virtual currency can often be converted into real currency, meaning that users can make real economic gains through their activities in the context of the metaverse.

In addition, its application in general education and specific online training represents a revolution in terms of modes of communication, allowing users to interact from different locations in a more “realistic” way. For example, students can explore virtual simulations of historical events or test skills and practice skills in a safe environment.

Content creation for the metaverse is one of the most interesting, fruitful, and ever-evolving areas of the tech industry. As the metaverse becomes more popular and accessible, there is a growing demand for original and creative content to enrich the user experience.

To create content for the metaverse it is necessary to resort to 3D design, animation, programming and visual narrative. This is because the metaverse is based on the creation of three-dimensional environments and objects, which requires skills in 3D design and animation. Also, the programming of these applications is essential for the creation of interactive experiences and for the integration of elements such as artificial intelligence, sounds, voice and chatbots.

One of the most common ways to create content for the metaverse is through the creation of virtual avatars, objects, and environments: (1) avatars are virtual representations of users that can be customized to reflect their online identity; (2) virtual objects, on the other hand, are three-dimensional elements that can be used within the metaverse such as: clothing, furniture or tools; (3) Virtual environments are interactive three-dimensional worlds that users can explore and that often have specific objectives such as: the exploration of an imaginary world, the resolution of a puzzle, etc.

This makes creating virtual environments one of the most exciting ways to create content for the metaverse. This requires a complete understanding of the platforms and technologies used for its creation and distribution. Some of the most used platforms include Second Life, High Fidelity, OpenSim, Sansar, and Spatial. Each and every one of them has its own tools and requirements for content creation.

Also, it is important to note that unlike other media, where content is passively consumed, content for the metaverse must have an interactive character that allows users to explore, experiment and collaborate with other users.

Currently, most of the contents for metaverse are conceived and built by programmers and computer scientists, without taking into account important aspects of design at different levels such as: the creation of environments, design of spatial architectures; other aspects of visual language such as the use of color or the volume of lights and shadows, the composition of the constructive elements; and other more narrative ones such as user experience planning, etc...

The objective of this paper is to analyze the errors that are often made in the construction of these immersive spaces and propose a basic-polyvalent manual, as a manual of good practices, that guide in some way the design of the visual content of these three-dimensional spaces, taking as a guide basic rules of contemporary design.

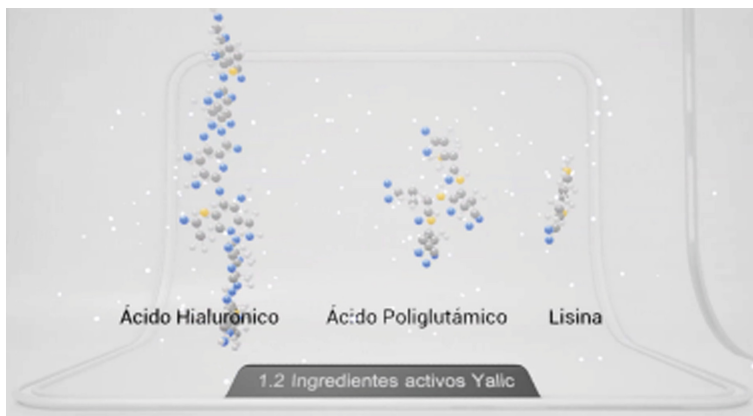
We will start from the work done for Biomimetic, a cosmetics company located in Alcoy, Alicante. This company requested to make a Virtual Reality application for the Oculus Quest 2 glasses in times of pandemic. The company Biomimetic had to solve the problem that prevented salespeople from visiting pharmacies to promote their products. By creating a Virtual Reality application, it was intended to leave an Oculus glasses device in deposit to the owner of each pharmacy, so that he could access the products through an immersive experience. With this, it would be possible to use VR as a marketing tool, where the user would learn the properties of the brand or products Yalic, Biomimetic's star product and the problem generated by the pandemic would be solved.

Based on the existing material on the web portal and on Biomimetic's social networks, both videos and images, it was planned to design a virtual exhibition space where the user, through different rooms, could know the properties and benefits of Biomimetic

cosmetics, from their molecular components to their different applications: anti-aging, anti-wrinkle, etc... (Figs. 3, 4, 5, 6, 7 and 8).



**Fig. 3.** Detail of one of the lecterns of the virtual showroom of Biomimetic.



**Fig. 4.** Descriptive lectern of Yalic active ingredients.

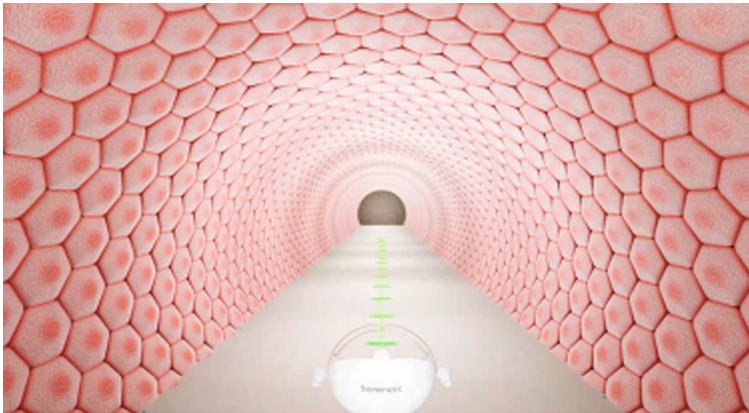
## 2.1 From Virtual Reality to the Metaverse. Case Study in Biomimetic

The development of this research deals with adapting the content created for Virtual Reality to an immersive scenario for Metaverse [1], with all the functionalities of avatarization and socialization for the user that this entails.

In addition, it is intended to obtain a series of good practices to define the elements of the stage, combination of colors, harmony of sounds, etc... Based on modern theories of Design and Interior Design.



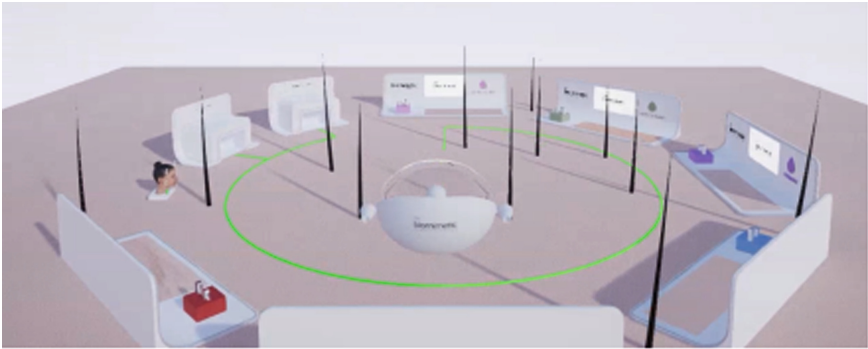
**Fig. 5.** 3D montage explaining Yalic's penetration into the skin.



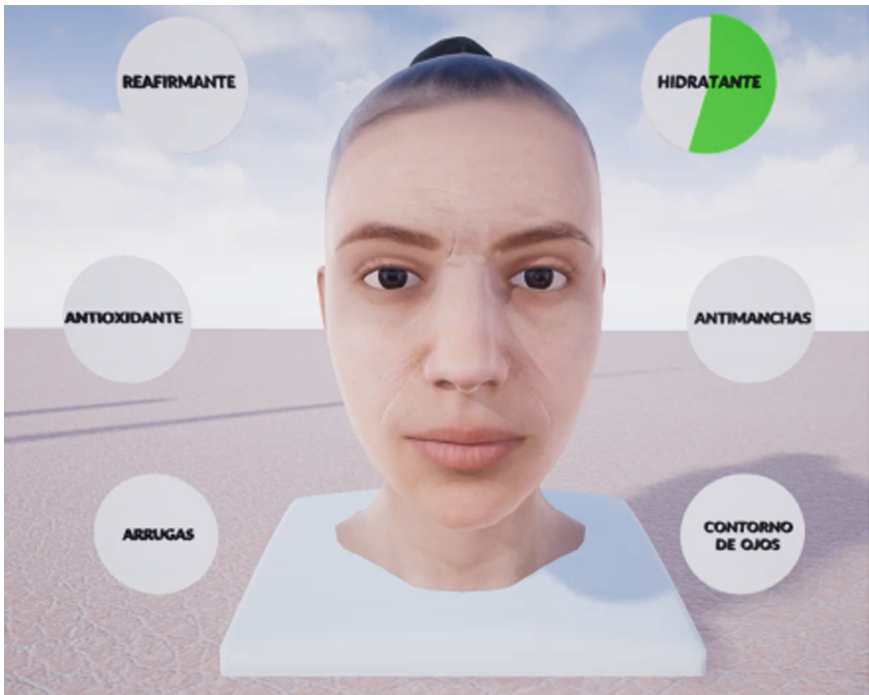
**Fig. 6.** 3D recreation of the inside of the epidermis.

Modern design theories refer to a set of principles and concepts that have been developed in the Bauhaus since the twenties of the last century, and that have been used to guide the practice of design to this day. These theories have been enriched influenced by various cultural movements, both architectural, artistic and technological. Some of the most important modern design theories are:

1. Proportion and symmetry: Proportion and symmetry are fundamental principles in modern design theory. A correct use of proportion and symmetry influences the beauty of the whole, therefore, its basic principles must be considered when designing any element, from buildings to objects of use.
2. Order and hierarchy: This theory also emphasizes the importance of order and hierarchy in design. A design with a specific ordering and hierarchy of its elements is more understandable, and therefore can be appreciated much better.



**Fig. 7.** Outside of the skin. Design of the lecterns that define each of the treatments.



**Fig. 8.** Summary of treatments, applied on a human face.

3. **Functionality:** It is another fundamental principle. A good design must be functional and practical according to the objectives of the designer, as well as being aesthetically attractive.
4. **Clarity and simplicity:** The importance of clarity and simplicity in design is emphasized. A design should be as simple as possible in terms of shapes, simplicity is preferable to unnecessary complexity.

5. Balance: Finally, the importance of balance in design is a fundamental issue. It is believed that a good design must have a balance between the different elements that compose it: color, shape and texture.

In our case, we will also take into account the contemporary assumptions of design that have emerged in response to cultural, social and technological changes.

Some of them, due to their importance in the development of this work, are encompassed in this way.

**User-centered design:** This theory focuses on the user as a central element in the design process. The goal is to design products and services that meet the needs and desires of users, and that generate new needs and desires, expanding the arc of action beyond creating something that is visually intelligible.

**Sustainable design:** Sustainable design focuses on creating products and services that are green and sustainable in most respects. This involves consideration of factors such as carbon footprint, use of recyclable materials, waste disposal and product life cycles.

**Emotional design:** Emotional design focuses on creating products and services that evoke positive emotions in users. This can be achieved through the visual language used and the narrative of the immersive experience, the use of color, the design of shapes, the use of materials and textures and other design elements that affect mood and impact human emotions.

**Experience design:** Experience design focuses on the ideation and preparation of attractive experiences for users. This may involve the creation of physical or digital environments that stimulate the senses, with high indicative value that arouses curiosity.

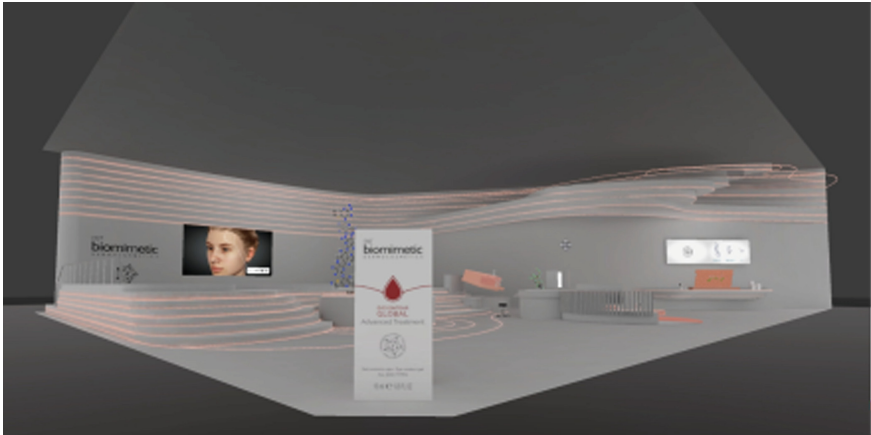
**Inclusive design:** Inclusive design focuses on creating products and services that are accessible and usable to everyone, regardless of skill level, or personal training. This requires incorporating factors that guarantee ease of understanding, that condition the design of accessibility and usability in general and specific terms.

Under these premises, a new virtual scenario has been created for Biomimetic Cosmetics not only more accessible and functional for the user, but at the same time better designed in terms of composition of elements, selection of textures and chromatic range. This scenario has been specified in a stand that simulates that of a traditional Exhibition Fair, all the existing content in the Virtual Reality version. However, as the new scenario is designed for the Metaverse, for the avatarization and socialization with visitors to the stage, different areas or relationship spaces have been created where you can attend conferences, training activities and/or networking talks. There they will be able to interact both Biomimetic professionals and experts from beauty centers and end users.

The final design of the metaverse scenario prepared for the Spatial platform can be seen in Fig. 9.

As you can see, an interconnected space has been designed, where it becomes more fluid to access each of the lecterns.

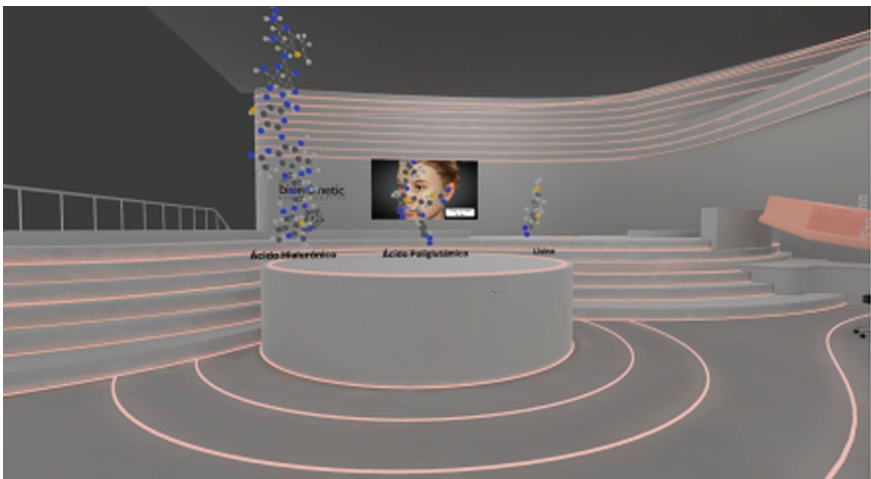
As for the aesthetic aspects of the set of scenarios, the previous diaphanous space, in white, has been modified to combine a gray tone filleted with pale pink LEDs, which simulate the color of the skin and add definition to the changes of plane, height and volume. This also allows you to provide depth to the whole scenario.



**Fig. 9.** Overview of Biomimetic's metaverse stand.

Both the object design elements and the lecterns have been simplified with the intention of eliminating visual noise that detracts from the prominence of the product exhibited inside (Fig. 10). Also, different transparent counters have been designed that serve as both display and seat (Fig. 11).

On the other hand, a meeting and training area has been signposted, where attendees can receive the training established by the company, in addition to being aware of Biomimetic news. And built a circular space that encourages group conversation.

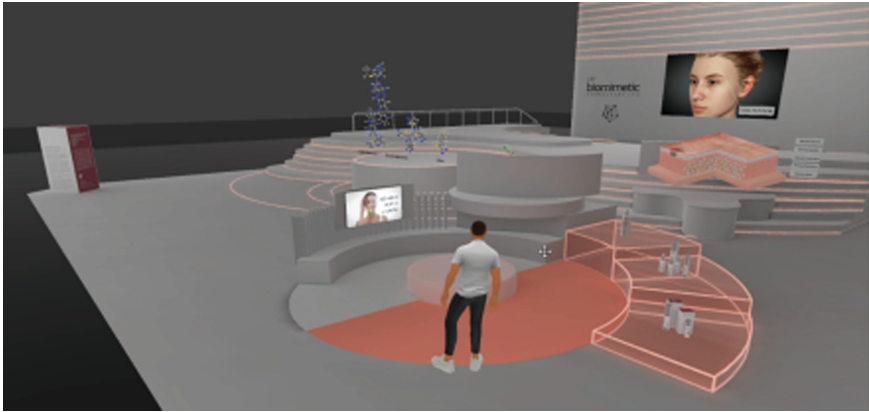


**Fig. 10.** Detail of the simplification of the lecterns.

It is important to indicate that the materialization of this project is proposed. To this end, injection moulds suitable for the manufacture of lecterns and counters will be designed. The future intention is to use this stand design, the modeling of accessories



and furniture to apply it in the showroom of the company, to be exhibited in physical fairs or manufactured for the franchises of urban aesthetic centers or located in shopping centers.



**Fig. 11.** View of the meeting and training space.

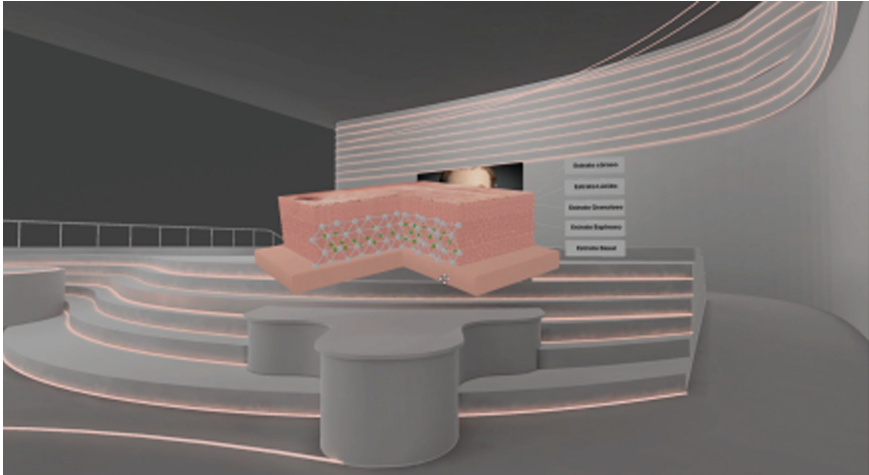
At the back of the stand, a space has been arranged to visualize an animated 3D model that shows how Yalic and its compounds penetrate to the basal stratum of the skin.

This stand will also serve as a product exhibitor and on it a screen has been placed where the video of the virtual reality lectern-5 will be played. You can appreciate the result of the schematization and how in this way it provides a feeling of lightness and simplicity (Fig. 12).



**Fig. 12.** Detail of the schematization of lectern 5 of virtual reality.

The lectern-4 has been reduced in volume and has been adjusted to the main steps of the staircase that leads to the auditorium, this allows the spatial set to be more integrated (Fig. 13).



**Fig. 13.** Final result to the redesign of lectern 4.

The lectern-3 has been incorporated along with the meeting/training area. It has been replaced by a work table that supports a microscope and a video screen.

As in previous examples, there is a tendency to outline the elements, creating simpler areas and harmonized with the rest.

Behind the lecterns described, the auditorium has been arranged, which is a meeting space for virtual assistants. In its stands, individual seats have been placed where the avatar can sit and receive the projected information. It is here the space to reproduce audiovisuals, give or receive conferences, training, and why not, also a space for debate.

### 3 Conclusions

Modern design theories are still significant when it comes to designing objects and spaces, so creating immersive spaces for the metaverse [4] should not be exempt from these guidelines.

As technology advances, there is an opportunity to explore new ways to create immersive experiences for users, for example, user-focused design constraints can help designers better structure needs and meet their expectations, and all this is applicable, necessarily, in the metaverse.

User experience (UX) design parameters can also be useful for creating immersive spaces in the metaverse. UX design focuses on how users interact with an interface or system, and aims to create fluid and enjoyable experiences for users.

Designers can apply these theories to designing immersive spaces for the metaverse, with the goal of creating experiences that are intuitive and easy to navigate.

Finally, the typologies and rules applied to game design can also be useful in the creation of immersive spaces for the metaverse [5], since they can provide playful strategies that can be implemented or transformed into fun and interactive experiences for users.

In summary, the aesthetic and compositional parameters of modernity are a valuable resource, applicable in the creative processes and ideation of immersive spaces for the metaverse, since they continue to delve into the visual language that intervenes directly and conditions each immersive experience, enhancing the attractiveness and satisfaction of the virtual tool, if it is our intention.

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