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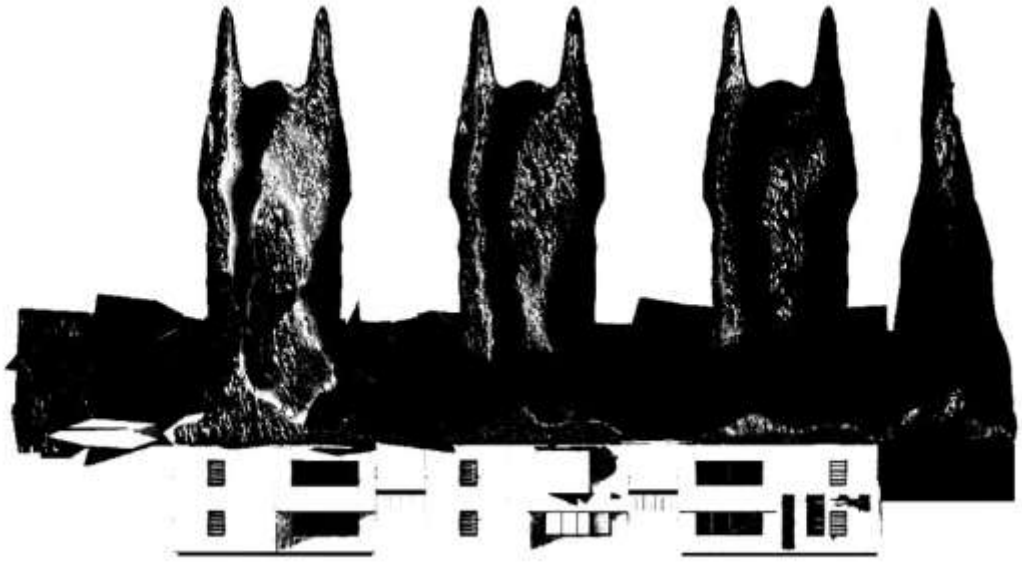
OLD AND NEW BABELS
The evolution of Architectural Fantasies

Xenokratis VARTZIKOS



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Abstract

This dissertation is a conclusion to my longstanding interest in architectural fantasies, focusing on their chronological transition, from framed and static pictorial representations to functional, life-hosting virtual environments. In the first part, an effort to define architectural fantasies is taking place, based on J. R. R. Tolkien's thoughts about fantasy, combined with the characteristics shaping them, their relationship with the real world, as well as the concepts that explain their purpose. The two following parts consist of examples of representations through the mediums of drawing, film and virtual reality, including three personal experimentations, realized during my current and my former architecture studies. Overall, this dissertation aims to prepare the field for an architectural design process essentially new, based on a scenario, new laws of physics and the technology of mixed reality.

Résumé

Cette dissertation est une conclusion de mon intérêt de longue date pour les conceptions architecturales imaginaires. Je me suis concentré sur les transitions chronologiques de celles-ci, allant des représentations picturales statiques aux environnements virtuels fonctionnels. Dans la première partie, un effort de définition de l'architecture imaginaire est effectué. Cette définition, basée sur les réflexions de J. R. R. Tolkien sur les univers de Fantasy, combine les caractéristiques qui façonnent les conceptions architecturales imaginaires, leurs relations avec le monde réel, ainsi que les concepts qui justifient leurs intentions. Les deux parties suivantes consistent en des exemples de représentation à travers le dessin, le cinéma et la réalité virtuelle, y compris trois expérimentations personnelles, réalisées dans le cadre de mes études. De manière générale, cette dissertation vise à préparer le terrain pour un processus de conception architecturale nouveau, basé sur un scénario, de nouvelles lois de la physique et/ou la technologie de la réalité mixte.

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Introduction

During the last century, we witnessed a series of architectural wonders being realized. Modern “towers of Babel” formed new cityscapes, as a result of the second industrial revolution and mainly the invention of the elevator which allowed high-rise living and working. Today, a third revolution is underway, the one of digital manufacturing, in which the question of how architecture is going to be affected arises. One of the technologies regarding this revolution, with a close connection to architecture, is virtual and augmented reality, which incorporates architectural thinking for the creation of virtual spaces. At the same time, in the field of arts, pictorial representations are inspiring and predicting the architecture of tomorrow, an architecture of mixed reality, the same way science fiction films did for many contemporary technologies.

This essay is a short conclusion to an almost 10-year interest around such representations, an interest that came along with my former architecture studies. Starting from drawing representations and concluding to the medium of virtual reality, I scope to investigate the change of nature of imaginary architectural spaces. This transition derives from the purposes served in each case and deals with the involvement of the public, which starts from a level of passive observation to the one of being actual users of space, similar to the way physical architecture works. The notion of “fantasy” is used to filter the cases of study used for this dissertation, that is being characterized by the feature of “physically impossible.”

Alongside with the way they are supposed to be used, architectural fantasies are being evaluated for their cultural meaning. In many cases, such as the ones of Utopias and Dystopias, they reflect social messages, disparate political philosophies or personal thoughts, through the use of visual language. Towards this direction, I also tried to move, in the case of my last experimentation analyzed in the third part of this dissertation.

Through the whole context, a personal preference to the theme and meanings of “Babylon” can be observed, binding all cases together. To avoid any confusion or misleadings, the double interpretation of the Babylon concept should be noted. There is the biblical meaning of Babylon, the one of the materialistic city of immorality and spectacle, representing its grasping glory with its symbol of tremendous scale, the tower of Babel. Although this Babel is an inspiration for countless fantasy representations, there is also a new meaning, given by the artist Constant Nieuwenhuys for his masterwork and later adopted by others. In this

Babylon, all the old, unpleasant features were revived as beneficial ones, symbolizing playful, technologically advanced spaces of freedom and artistic expression. Both old and new "Babylons," will be examined in the following chapters for the purpose of a constructive comparison.

"What is New Babylon actually? Is it a social utopia? An urban architectural design? An artistic vision? A cultural revolution? A technical conquest? A solution of the practical problems of the industrial age? […] Each of these questions touches an aspect of New Babylon." (Wigley & Constant, 1998, pp. 235)

1. Architectural Fantasies

1.1. Defining Architectural Fantasies

Fantasy environments were first examined by fiction authors, with some of the most important contributions coming from writer J.R.R. Tolkien. For Tolkien, fantasy is “the making or glimpsing of other worlds” (Tolkien, 1965, pp. 14), therefore strongly related to the ability of worldbuilding, essentially different from the one of imagination. Art is the link between Imagination and the Sub-creation and Fantasy is the notion that encloses the sub-creative art and the quality of expression together:

“For my present purpose, I require a word which shall embrace both the Sub-creative Art in itself and a quality of strangeness and wonder in the Expression, derived from the Image. […] I propose, therefore […] to use Fantasy for this purpose.” (Tolkien, 1965, pp. 15)

In the field of architecture, more than a few styles dealt with the idea of fantasies. Therefore, we often come across the notions of fictional, futuristic, and visionary architecture, as well as the architecture styles of avant-garde and radical movements. However, architectural fantasies are not an architectural style. Initially, their "immaterialist" nature allows them not to be affected by pragmatic factors, as in the case of conventional architecture. Restrictions such as construction coefficients, technological development, even laws of nature, affect design only to a level adjustable by the creator. But beyond their "supernatural" materiality, there is a deeper sense of interpretation from a cultural approach: architectural fantasies project in an artistic way social, political and technological views, concerns, and beliefs. Therefore, there are cases of representations of an unpleasant status quo that the creator wants to broach, as in the case of dystopias, while in other cases the creator seems to provide solutions to certain concerns, as in the case of utopias.

Thus, the purpose of architectural fantasies is being revealed, a purpose that falls into the general question of why we like fantasy worlds. Simply put, the answer lies in the juxtaposition of two worlds, that are the imaginary and the factual one. This confrontation may aim to criticize reality, inspire towards a new one, or merely achieve feelings of pleasure, simply because fantasies contain features, impossible in the physical world, that make it more exciting than the real.

Both in the case of critical socio-political commentary and also in a more general frame, architectural fantasies serve as a dynamic means of storytelling. They describe the social and cultural background of an imaginary world and transmit it to the audience through a visual language. But they do not always have to be "irrational." Apart from imaginary worlds, it can also be said that historical representations of cities and buildings are also architectural fantasies as they are speculations of worlds that we have not yet seen, so we can only imagine using limited sources. In this case, the purpose is the rebirth of an event of historical importance through which, we get to know our past. Also, in other cases of examples closely connected to the real world, they may have simulative purposes, providing proposals for interventions in physical space. These proposals can be possible or not, in the field of art and architecture, and for a wide range of applications like visionary exhibitions, installations and conceptual interventions in real sites of a certain interest.

Figure 1:Lucas, G. (1999). Star Wars: Episode I The Phantom Menace. Otoh Gunga City.

Figure 2: Vincenz\o, N. (1997). Cube.

An architectural fantasy can be enormous and complex, like a metropolis, or as small as an architectural structure. It should always refer to a built environment though so that it is clearly distinct from the natural environment. Therefore, while in the case of the film series *Star Wars* the fictional environment is an entire galaxy, whose detail reaches in some cases up to the description of cities, like the one of "Otoh Gunga" (Figure 1), a town located beneath the surface of a lake, in the film series *The Cube* (Figure 2), the entire environment is a sequence of cubic rooms, having the same form but different properties.

Apart from their size, there are various spectrums to rank architectural fantasies, related to the architectural style, the level of possibility in the real world and the process of design which will be further analyzed in the following chapters. However, the spectrum of interest of this dissertation and according to which the second part will be organized is the immersion of the user. The starting point of this spectrum are the earlier examples of drawing

and painting representations, where architectural fantasies served as an exhibit for religious or artistic reasons. Ending point is the contemporary applications of today, where the digital spaces are interactive and functionally similar to the way physical architecture is.

1.2 Concept, Backstory, Scenario

In physical architecture, there are some very specific factors that affect the design process, such as orientation, building factors, and aesthetics. On the contrary, in fantasy architecture design, it is more complicated than that. Except functionality, it is necessary for the designer to perceive a different reality. And this is done through the understanding of description, arising from the thoughts of the project creator or a story that inspired the theme of the project.

In multiple cases, there is not a written description, mainly in the case of non-narrative projects, as for example in purely architectural projects. There is a backstory though. As Benjamin J. Robertson notes in his article *Backstory (Robertson, 2017, pp. 37),* the backstory of an imaginary world reveals the way in which it stands distinct from the real world and participates in a set of assumptions about how that world operates. It is inconceivable for example, to even think that behind the futuristic projects of the avant-garde architectural group *Archigram*, there is not a back story, rich in terms of social vision and functionality, as an invisible but powerful scenario. In this case, the designer has to obtain a double role and prove himself as a successful story-maker, and even if his story will never be told, it should be feature-equivalent as in the case of narrative projects, where there is a certain and solid written description.

The story, as Tolkien notes in his essay *On Fairy Stories* is actually the sub-creation of a “Secondary World.” In other words, a consistent and fictional environment also known in the field of fantasy literature as “conworld” or “fiction universe.” This world has to be persuasive, capable of producing literal belief, a state of mind that has been called “willing suspension of disbelief.” In the case of fantasy architecture, the user should exit the *“Primary World,”* a term used by Tolkien to describe reality, enter this state of mind, and believe in the laws of the sub-creation. Therefore, the designer should successfully perceive and then project these laws to the setting he is going to create. One scenario is the beginning point of the environment design, and it should describe everything that governs an alternative social

reality. Geography, history, lore, social customs, politics, religion and technological context are among others some of the aspects that directly affect the morphology of a visionary world.

The scenario behind a fantastic environment may be about an entirely imaginary world or an alternative version of the real. So, there is graduation regarding the "secondariness" (Hynes, 2017, pp. 4) of an imaginary world, depending on how close they are to the primary one. For example, while in the case of "The Known World" of George R. R. Martin's *Game of Thrones* the setting is far away from the Primary World and completely independent from it, in many post-apocalyptic films, like John Hillcoat's *The Road*, the setting is contemporary and potentially familiar, but with of a more somber atmosphere.

In the case of the film *The Road* and unlike Martin's fantasy world, there is an undefined chronological connection of the secondary with the primary world, separated by a post-apocalyptic event in America. The time setting, in which a story is taking place, affects directly the design of the environment, therefore the architectural design too. As Marie-Laure Rayan notes, the time setting can be historical, future or mythical (Ryan, 2017, pp. 78).

In other cases, connection with the primary world is not achieved in a chronological manner but geographically. In later works, this connection serves the rules of logic, as the passage between the two worlds. In Rowling's Harry Potter books, for example, London King's Cross Railway Station features as the starting point of the Hogwarts Express. In earlier descriptions, the geographical connection brings the two worlds closer together for a comparative confrontation and their criticism, as in the case of Plato's mythical Atlantis, which is placed beyond the promontories that flank the entrance to the Strait of Gibraltar. In a level of smaller scale construction fantasies, a typical example is the Tower of Babel, which is placed in the general region of Mesopotamia.

Especially in the case of earlier descriptions, the authors' intention is to describe the creation and structure of a different culture. Atlantis, in particular, is undoubtedly parallelism that Plato constructed to explain his political views. Similarly, according to the description in Book of Genesis, the Tower of Babel, was a political center in Mesopotamia designed to increase the reputation and power of its builders. The form of architectural creations in a fantastic environment is, as everything created by the members of a society, the manifestation of cultural identity. This identity reflects both the civilization in which the sub-

creation is incorporated, and also the intentions of the creator, and can be from magnificent and pompous to minimalist and simple. Therefore, a scenario describing all these aspects can be a source of inspiration for the way the architectural environment is being realised, which should act as a memory collector of the members of the society in which it belongs. The designer should be acutely aware of this scenario and probably come up with specific sub-elements forming a constant creation, properly fitted into the wider cultural context of the description.

1.3 Blending Real with Unreal

Every fantasy environment contains real-world references, capable of incorporating it into certain patterns of world-building tendencies. These references derive from a combination of familiar settings, inspired by the physical or built environment, with imaginary elements. For example, Tolkien focuses on creating worlds whose architecture is reminiscent of the one of Northern Europe in the Early Middle Ages. In the case of the Game of Thrones, there is a variety of architectural references on the building forms, such as classical, gothic even futuristic. In both cases, architecture, although familiar, is influenced in a unique way by the particular laws of nature that govern the environment to which they belong, in terms of materiality, scale, and building statics.

There are two prisms under which we can examine this blending of real or familiar with unreal: The prism regarding the scenario and the one regarding the form. As already noted, while many of the architectural fantasies are taking place in completely imaginary worlds, others are an alternative version of real environments. In the film series *The Man in the High Castle,* for example, there is a mix of historical events, factional and fictional that end up with an alternative vision of the world in which, the winners of World War II were the Axis powers. In the series, one of Nazi Germany's symbols of magnificence in Berlin, is the "Volkshalle" (Peoples' Hall), a huge domed building, which was inspired by the actual plans of Hitler's architect *Albert Speer*. Located between Reichstag and today´s Federal Chancellery, this monumental building would have been 320m tall, with a dome of 250m in diameter, which would rise from a massive granite podium 315 by 315m and 74m high. The

Figure 3: Spotnitz, F. (2015). The Man in the High Castle. "Volkshalle".

juxtaposition of Volkshalle with the non-fictional building of Reichstag, indicates both the scale of the building and the ambition of the Nazi regime.

Figure 4: Vaughan, B. (2013). Under the Dome

Both in cinema and video game industry and in the genres of horror and science fiction, there are more examples of familiar architectural sceneries from a directing point of view that represents a hypothetical scenario. This level of secondariness, described in the previous chapter as the conceptual proximity to the primary world, brings up the tendency of fictional projects to have references to the "real" or "known" and in general, blending it with the imaginary. A typical example of this blending in film industry is the pattern in which the architectural fantasy is composed by an uncanny involvement to a part of the primary world, like in the series *Under the Dome*, based on the novel of the same name by Steven King. In this series the architecture is conventional, and the environment is common as we know it today, with the exception of outside intervention, a dome that isolates the city of Chester Mill, Maine, USA from the rest of the world. Once again, the blending of real -even if not popular, but familiar buildings- with unreal is of great importance, to understand the massive scale of the dome.

Likewise, in the field of arts, there are various examples of real-world environments in which certain artistic interventions are being proposed, that for either practical or legislative reasons, could not be presented physically. For example, the impossibility of such an intervention or the permission from the establishment, or in some cases even the community may be some of these reasons. Even if the proposal is not "possible," visionary exhibitions, installations, occupations and architectural interventions can be held in real places of a certain interest, among others historical and cultural. This can be achieved in such places by using augmented reality technology, or in a digitally reconstructed version of them, using virtual reality equipment. Unlike in the previous, narrative mostly cases, the blending does not serve the purpose of comparison, but mostly of a consistent blending of virtual elements with a real environment playing a dominant role. In the case of augmented reality, there are still some major challenges being faced and are related to the contemporary technologies of tracking, displaying and real-time rendering.

Some remarkable examples of augmented reality intervention projects are among others the *Sky Pavilions* (2011), created by architect John Cleater, as well as the works of the digital urban art team, named HEAVY PROJECTS. *Sky Pavilions* are virtual cloudbursts appearing in various places such as cultural landmarks and abandoned buildings. The "mothership" is floating over Piazza San Marco, Venice and it consists of 3000 polygon faces and 9 animated texture maps. Likewise, in another cultural landmark of Brussels, Belgium, and more precisely Grand-Place, an UNESCO World Heritage Site, a digital takeover takes place. The installation is a mixed reality project of Heavy + PAC and entails three functionalities: interactive augmented mapping, interactive data visualization, and a digital art installation.

Figure 5: John Cleater (2011). Sky Pavilions. Alien Mothership Sky Pavilion floats over Piazza San Marco. Augmented Reality and audio.

Figure 6: Heavy + PAC. (2014). Grand-Place Takeover. Mobile augmented Reality. Brussels, Belgium.

In other cases, the blending takes place in a fictional environment in which digitized versions of real-world objects are being integrated. Such objects can be digital photography, captured sounds, 2d or 3d scanned objects and camera footage. The innovative technologies of 3d scanning, such as photogrammetry[1], are becoming popular to independent artists, tending to allow anyone to digitize artworks at low cost just with the use of a smartphone. At the same time, more relatively expensive procedures, such as laser scanning, are being used by institutions, when detailed accuracy is of great importance for cultural heritage conservation purposes.

Digital museums have the opportunity to take advantage of these technologies and constitute an innovative concept. Their goal is the living experience of observing an artwork, as well as obtaining a kind of knowledge in a similar way as visiting a physical museum. The

[1] Photogrammetry makes use of the camera movement to estimate the coordinated for each pixel of the scanned object.

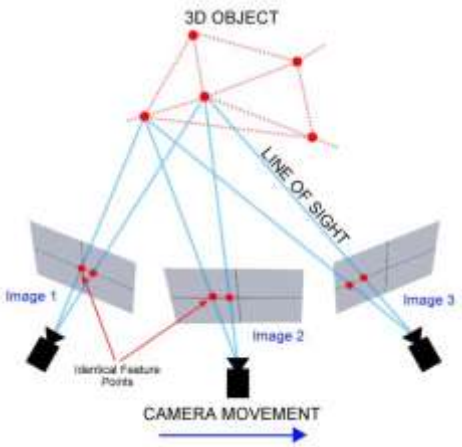

Figure 7: Photogrammetry and camera movement. Source: https://thehaskinssociety.wildapricot.org/photogrammetry

freedom of moving in a virtual world can make this experience even more immersive, providing advanced imaging techniques such as infrared reflectography[2] and X-ray imaging. A museum like this was designed and digitally constructed for the housing needs of the Kremer collection by architect Johan van Lierop and will be further examined in the "From an Exhibit to a functional narrative Environment" chapter of the second part of this dissertation.

[2] Infrared Reflectography (IRR) is an imagining technique that reveals the ground layers under the paint, using near infrared radiation. This layer can be scanned separately and be exposed in Virtual Museums for a greater user experience.

2. From Exhibits to Functional, Narrative Environments

2.1. Creative Process

Figure 8: Unknown artist. (c 1410–30) Bedford Hours. British Museum

In terms of architectural thinking, the nature of architectural fantasies orbits between the process of physical design and a descriptive statement. Both of them, aim to configure the two basic principles associated with architectural creations, which are the form and function. "*Form follows Function*," was the fundamental idea of the modernist movement which basically means that the end result of any designed space should derive from its function. In the wide spectrum of imaginary worlds though, this is not the case. Both the form and the function of architectural fantasies are defined by a level of completeness, which depends on the medium through which they are being represented. Also, even their correlation is not unquestioned. For instance, the comparison of functionality between imaginary buildings in paintings, or even some conceptual architectural projects and the ones of interactive projects is evident. In interactive environments, functionality is of major importance since it is the space one user of a specific size and possibilities will wander and act. Especially in cases of non-architectural, painting representations, the functionality can be totally ignored, as in the case of the *Bedford* representation of the Babel Tower, where the scale between architectural elements and peoples' heights is uneven.

In a similar way to painting representations, in video representations architectural fantasies are selectively created frequently treated as sets of facades, lacking actual interiors.

Figure 9: Nikolai Ladovsky. (1920). Communal House. Ground floor plan. Ink and pencil on paper.

Figure 10:Nikolai Ladovsky. (1920). Communal House. Cross-section. Ink and pencil on paper.

The director's intention though for characters' acting within these sets is evident, making the medium of video lie in-between paintings and actual physical spaces, or virtual environments. In architecture, designs are the outcome of a process regarding both the exterior form, but also the movement and sensation of the user from the inside. Architectural sketches express vividly this creative process of evolving and transforming ideas into completed projects.

Regarding the "descriptive statement" sub-nature of architectural fantasies, except a narrative backstory, it aims at providing the rules that define the architectural form of the fantasy. Using the contemporary design tools, these rules can be expressed as parameters in an algorithmic format, understood by a computer by the verbalization of a design process. The use of parametric design serves multiple purposes, which are related to the style, size, and management of the creation.

Parametric design does not end up with a certain architectural style though. After all, it has existed for ages, even before the invention of the digital computer, as in the case of the chain models of architect Antonio Gaudi, that used gravity as a parameter in his designs. Instead, parametric design provides a different method of work that can result to geometries, not efficiently

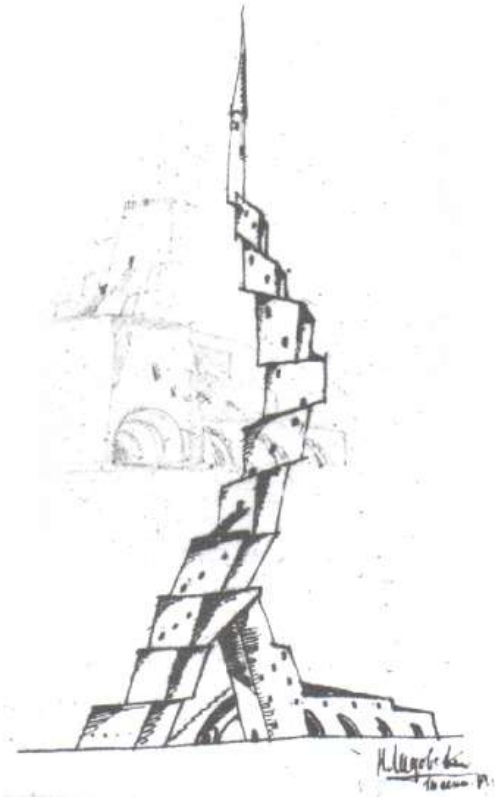

Figure 11: Nikolai Ladovsky. (1920). Communal House. Elevation. Ink and pencil on paper.

created by more conventional methods. The fundamentals of this method lie in an associative relationship between the various components of the design and its environment, a behaviour that describes the nature of what we call Swarm Intelligence Systems. There are two main approaches concerning the use of Swarm Intelligence (SI) in architectural design[3]. The first one, is for the purpose of creating adaptive structures, that respond in real-time to environmental influences approximating the behaviour of living organisms. The second one, is to provide defined, possibly dynamic designs, close to the designer's complex intentions that are not directly accessible.

Figure 12: Antonio Gaudi. (1889). Sagrada Familia. Hanging chain model.

Figure 13: Gaudi, A. (1882). Sagrada Familia.

An example showing the transition from a designer's intentions to technical representations is the *Guggenheim Museum* in Bilbao (1993-1997) of architect Frank O. Gehry. The original concept of the building was carried out with the use of models made from cardboard and wood. Since parametric modeling technology was fairly unusual in architectural design during this period, for the technical realization of his models, Gehry adapted the commonly used in Aerospace engineering industries CATIA software. The physical models were imported and completed into CATIA after being scanned as sets of nodes into a virtual three-dimensional coordinate system using the existing 3d scanning technologies. These sets were then used by Gehry and his team in place of the traditional two-dimensional plans, views, and sections. Another software called BOCAD, mainly used for road construction, was used for the transformation of the model from a wireframe to a three-dimensional model of structural steel. It allowed

[3] Wiesenhuetter, S. et al. (2016). Swarm Intelligence in Architectural Design. In *Advances in Swarm Intelligence: 7th International Conference, ICSI 2016, Bali, Indonesia, June 25-30, 2016, Proceedings*. (pp. 5). New York, *Proceedings*. Springer.

Figure 14: Gehry, F. (1997). Guggenheim Museum Bilbao. Final Cardboard Model.

Figure 15: Gehry, F. (1997). Guggenheim Museum Bilbao.

prefabricating each component of the building's surface, which was then barcoded and assembled on the construction site, leading to the successful manufacturing of complex geometry.

The construction of the Guggenheim Museum would not be feasible back then, without the adaptation of CATIA and BOCAD software. Today, a variety of widely used software has been developed for the architectural design of complex and dynamic shapes. Autodesk's 3ds Max and Maya both combine parametric modifiers to generate complex geometries, with the second one also providing the use of the scripting languages of Python and MEL (Maya Embedded Language). Programs like Grasshopper, provide a visual interface language representing functions and relations between the components for greater ease of use. Other types like Autodesk Revit, are building information modeling (BIM)

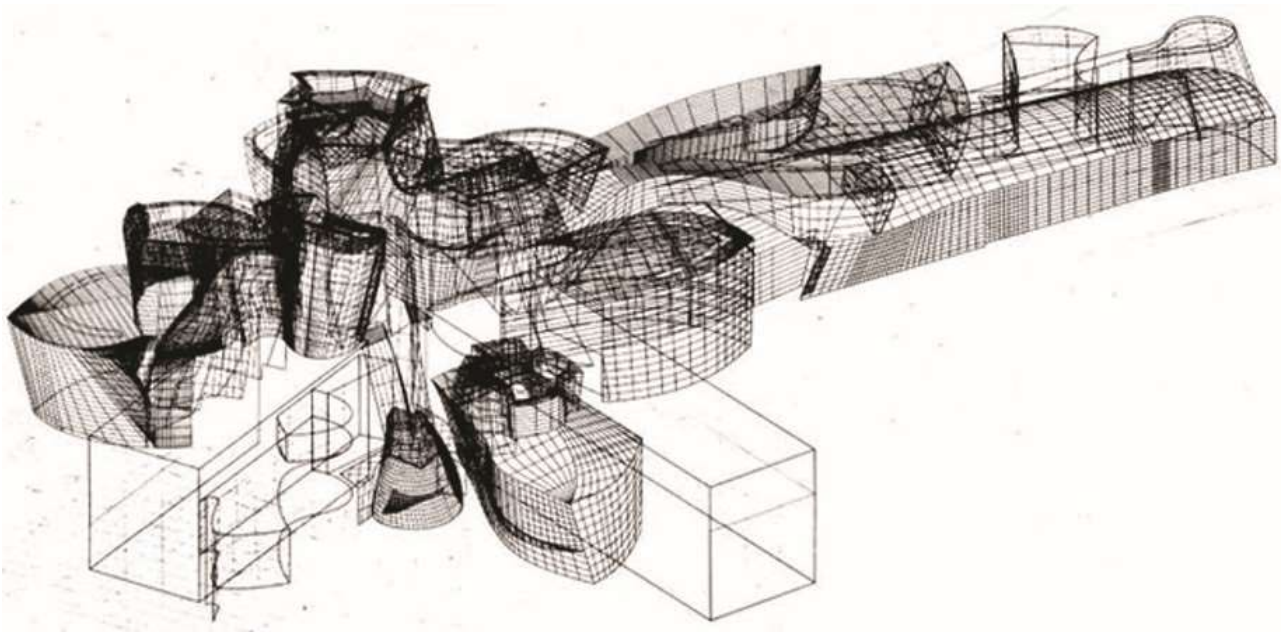

Figure 16: Gehry, F. (1997). Guggenheim Museum Bilbao. Computer Generated Model.

software that is specialized in both the generation and the management of parametric and non-parametric designs.

As being said, beyond the purposes of style and management, parametric design also serves the purpose of handling big amounts of data and generating large-scale models such as urban design. Parametric urbanism scopes on providing a set of solutions depending on the relation between closed shells, street systems, and open areas, as well as the special characteristics of its environment. Esri CityEngine, CityCad, and Autodesk Civil 3d are parametric software of this category, mainly used to support contemporary studies in urban planning and architecture. In general, though, parametric urbanism can be a method for creating virtual worlds of great scale, without the need of a direct spatial organization or excessive design of its elements.

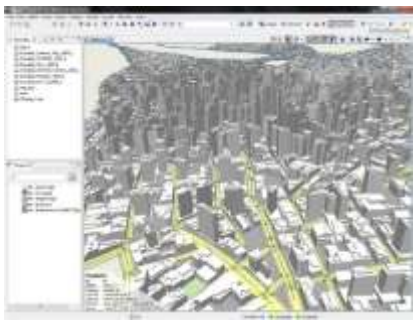

Figure 17: Screenshot of Esri CityEngine.

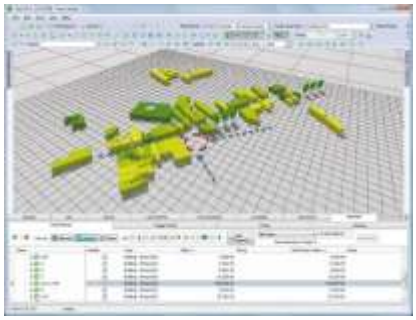

Figure 18: Screenshot of CityCad

It has to be noted though that parametric design, through the automation of generative processes and its distant view from small-scale, therefore from human interference too, often lead to dysfunctionality. In urban design, although parametricism would serve as an answer to the heterogeneous status of contemporary city structures, its repetitive patterns did not serve this purpose yet. As in the case of the relationship between virtual reality applications and user-experience, in the field of architecture, designing human-centric spaces is of major importance. Human physiology and behavior should be the design driver of spatial configuration and small-scale plans considered as the translation of kinetic perception and of gathering sensorial experiences.

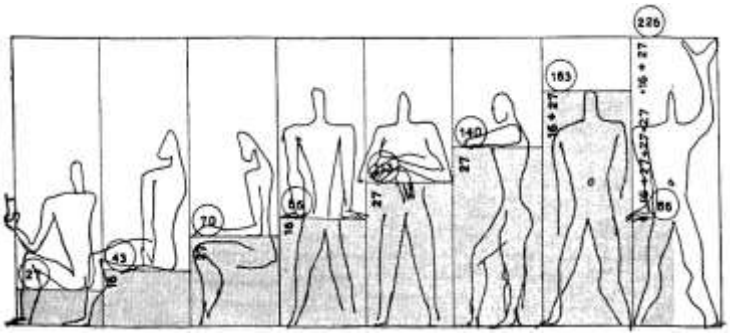

Figure 19: Le Corbusier. (1943). Le Modulor.

2.2. About the Medium

As we suspect the evolution of mediums displaying visual information, we observe four elementary means of representing architectural fantasies: Fiction and fantasy books, drawing and painting media, film, and virtual reality technology. Mostly through narrative, the book was the medium that used human imagination to form images in mind. Nevertheless, due to its lack of using an illustrational language, it will not be examined separately in this part which will insist on pictorial representations.

Drawings and paintings were the first means to hold a role in visual narrative. Especially in religion, but also in arts in general, there are numerous examples of representations containing architectural fantasies. Their static nature though does not provide the necessary freedom to move in time, to be used and become functional or truly narrative. Video, on the other hand, gave film-makers the opportunity to create realistic imaginary settings with a purely narrative function and a more functional role since the setting is used by the characters. But the most functional environment can be seen in the environments of virtual reality, where the architecture is truly functional, directly aiming to the user experience.

Each of these media was involved separately and at the same time affecting each other, in order to accomplish their own purposes. All of them though had the common purpose of producing literal belief, and for most of them, as a first step before jumping to the next one, by providing realistic representations.

But the essence of the evolution of the mediums from one to another, from written descriptions to illustration and then to video representations and virtual reality did not just serve the level of realism. After all, many of the artistic movements developed during the centuries, repudiated realism from their main features. Hence, this evolution served another purpose: functionality, a necessary feature in order to characterize a setting as truly narrative. For the reasons mentioned above, and in order to highlight this trend towards an environment that allows being used, the order in which visual media will be examined is the aforementioned, that is image-video-virtual reality, which also conforms with their chronological appearance.

2.3. Painting Representations

Architectural elements have always been used in paintings as a background of a synthesis or as the main theme. Even as a background, they have an active role as part of the common visual language paintings use, transmitting underlying messages and ideas. The common appearance of architecture in paintings can be traced throughout the history of European art and all over the world in modern times, also creating the genre known as *architectural paintings*. In many cases, paintings represent imaginary worlds, with impossible structures that go above and beyond the laws of physics. Religion has also influenced artists for the creation of architectural fantasies, as in the case of pictorial representations of the Tower of Babel and the fantastic realms described in the narrative poem *Divine Comedy* by Dante Alighieri.

One of the most famous representations of Dante's descriptions are the ones created by Sandro Botticelli around 1485. They consist of ninety-two drawings illustrating the entire work of Divine Comedy, and they are located at the Vatican Library of Rome and Kupferstichkabinett, the Museum of Prints and Drawings in Berlin. One of these drawings is *Mappa dell'Inferno* [Figure 21]. Botticelli, who tried to be as close to Dante's description as possible, demonstrates the map of hell as a funnel-shaped structure of nine levels. Each level is dedicated to a specific type of sinner and the lower it is located, the closer it is in hell, in accordance with the gravity of the sin. To create the Map of Hell, Botticelli used the medieval technique of Silverpoint[4].

Figure 20: Bruegel, P. (1563). The Tower of Babel. Kunsthistorisches Museum, Vienna.

Figure 21: Botticelli, S. (c. 1485). Mappa dell'Inferno. Museum Biblioteca Apostolica, Vatican City.

[4] The technique of drawing with a sharp piece of silver wire or a stylus on to a prepared surface

Figure 22: Bosch, H. (c. 1495–1505). The Garden of Earthly Delights. Museo del Prado. Madrid.

During the same period in the Netherlands, another painter was dealing with the idea of imaginary, in order to illustrate concepts of a moral or religious character. It was Hieronymus Bosch, one of the most remarkable painters of Early Netherlandish painting school. His most famous work is one of his triptychs, which was given the name "the Garden of Earthly Delight" (c. 1495–1505). In general, the painting represents three surreal worlds: Eden, the garden of earthly delights, and Hell. The general atmosphere is hallucinatory, full of symbols of death and temporality, making it doubtful to recognize if it is a religious or a pseudo-religious work. The architecture is odd, being half-natural and half-artificial, sometimes looking like it consists of human organs. The buildings' form, is of astounding imagination and as complex as the whole composition it is being fitted into, made of exotic materials and botanic elements.

Bosch and Botticelli were only two among numerous painters that dealt with architectural fantasies during Renaissance. Especially in Italy, architectural paintings have been popular all along the history of art. A later genre of the 17th and 18th century, the *capriccios*, was exclusively about architectural fantasies. Capriccios were focusing on imaginary topographical scenes, which combined architectural elements, archaeological ruins and actual sites for an excessive juxtaposition. Examples of such paintings include the work of Viviano Codazzi (1604-1670), Claude Lorrain (1600-1682) and Canaletto (1697-1768).

Back to Bosch, his surreal style has influenced the work of even later artists. Possibly to honor Bosch, Dutch artist M. C. Escher created a lithograph copy of the right-hand panel of *The Garden of Earthly Delights*, the one representing hell (Figure 21). Even though the general style of Escher is more mathematically-inspired, elements from Bosch's hell reappear in more of his works, such as *Belvedère,* his masterpiece from 1958. The subject of invented places, the woman in the bottom-right corner, the cell chamber and the stairs are direct references to Bosch's triptych.

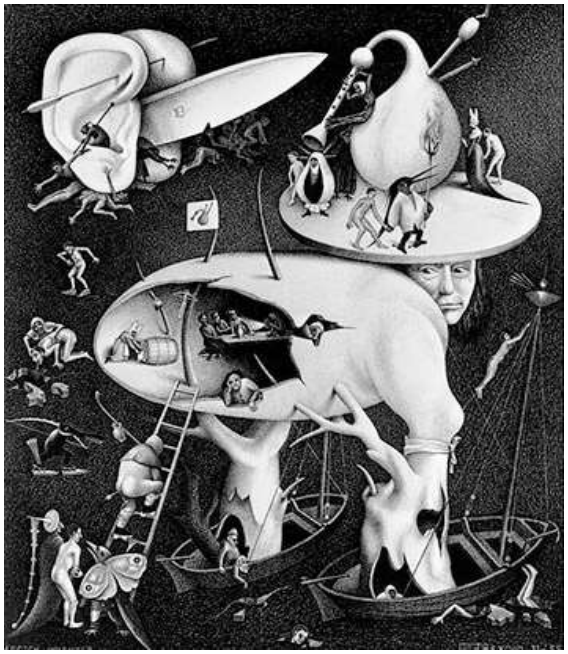

Figure 23: Escher, M. C. (1935). Hell

Figure 24: Escher, M. C. (1958). Belvedère

Figure 25: Escher, M. C. (1938). Day and night

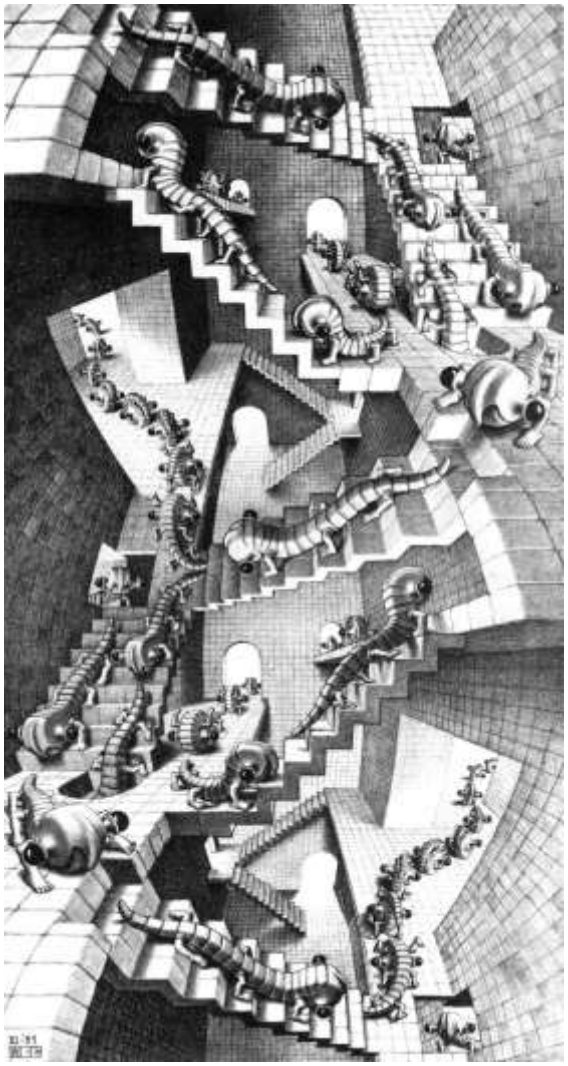

Figure 26:Escher, M. C. (1951). House of Stairs.

In general, Escher's work cannot be included in any particular movement. His semi-finished architectural studies seem to have influenced him for a common subject in his work, impossible architecture. Fed by his growing concern of dimensionality, he invented and made use of a set of creative techniques for perspective representations in his own special style. In his series of drawings *Regular Division of the Plane*, he combined repeating patterns and irregular shapes in a way that they form two- or three-dimensional illusions with recognized silhouettes. *Day and night* is the most popular print in this series. As in this case, but also in general, Esher's work goes above and beyond a study of geometrical representations and express, in his own words, an examination of "the language of matter, space, and the universe."

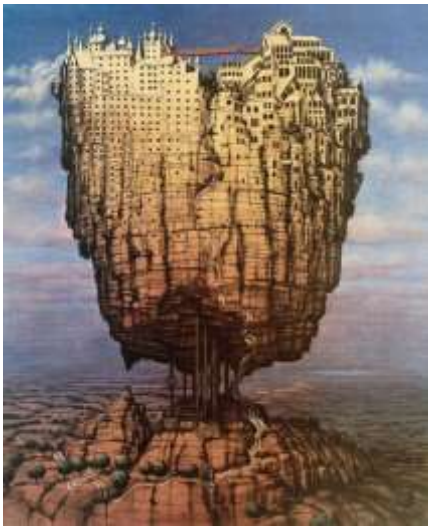

Figure 27: Yerka, J. (1952-). Europa

Figure 28: Nomata, M. (1955-). The Door of Perception

More recent artists have been dealing with the idea of architectural fantasies all over the world and are, among others, the Russian couple of Alexander Brodsky and Ilya Utkin, American industrial designer Syd Mead, Polish painter Jacek Yerka and Japanese illustrator Minoru Nomata,. All of them, envision space through their own unique way of thinking: Nomata's designs resemble hybrids of buildings and machines. Many of his works are also integrating the theme of stairs, perhaps as a reference to Esher's or Bosch's work, although in this case, they lack any human presence in them. This lack is also evident in the "paper architecture" of Brodsky and Utkin. The buildings' forms have the leading role in their city-structures, creating urban collages of every architectural style ever existed as a criticism of the aesthetically restricted Soviet-Union architecture. Syd Mead, on the other hand, envisions the cities of tomorrow and focuses on neo-futuristic concept art for science fiction movies like Blade Runner, Aliens and Tron.

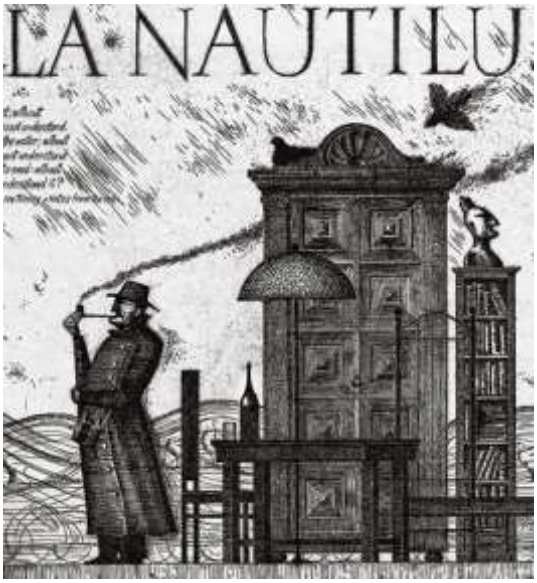

Figure 29: Brodsky, A. (1985). Villa Nautilus: Bulwark of Resistance. Elevation. Courtesy of Ronald Feldman Fine Arts Inc.

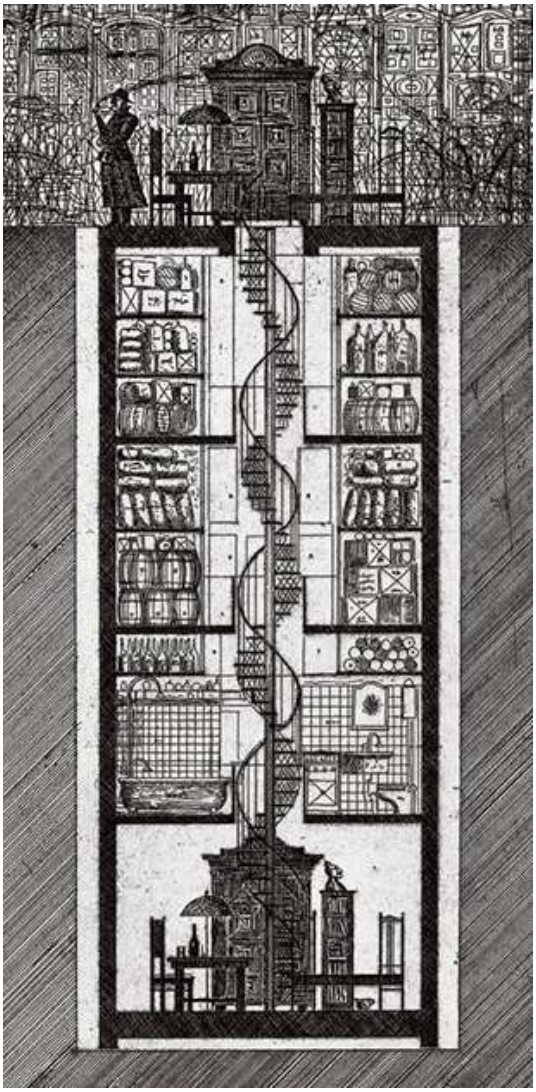

Figure 30: Brodsky, A. (1985). Villa Nautilus: Bulwark of Resistance. Section. Courtesy of Ronald Feldman Fine Arts Inc.

Similar to Syd Mead's work, numerous independent concept and matte painting artists continue to explore visionary cities and environments. Matte painters are mostly working for a two-dimensional outcome, combining digital resources such as photography, 3-D models and of course, their digitally matte painted textures. Some notable work has been done by Tomas Muller and Bastien Grivet. Other artists, focus more on highly detailed and photorealistic renders, later edited in a raster graphics editor environment. Fabio Barretta Zungrone, Ross Damien Jordan, Stefan Morrell and Alexandr Melentiev are among others some promising artists of this category showing special interest in architectural fantasies.

2.4. Film Representations

Architecture and cinema are two arts that interact with each other. It is impossible to think, the cinematic narration of a story without a directed, narrative environment. Narrative architecture, in turn, comes into this environment by the work of product designers and art directors and has a double role: The first is to give information about the plot, as a narrative, constructed element. The second and most important role is to enhance the overall aesthetics of fantasy, both in live action and in animation films.

The approach of animation movies, at least the earlier examples of it, was closer to the way the medium of painting worked. It can share the shame visual language the paintings offer, as well as a special atmosphere. And the pure essence of the animation aesthetics, that is by its nature further away from realistic representations is the reason that makes it purely a fantasy.

In live action films, on the other hand, it was the art of illusion. Effects played a key role in the process of developing fantasy aesthetics and fall into two categories. Special effects and visual effects. Special effects are the illusions achieved by using mechanical or optical devices, mainly during the production stage. As Rama Venkatasawmy notes in his book *The Digitization of Cinematic Visual Effects: Hollywood's Coming of Age*, mechanical effects are "physically created and recorded live, such as mechanized props or scale models shot on the studio stage" (Venkatasawmy, 2013, pp. 64), whereas optical effects are "obtained purely in-camera, such as with multiple exposure or slit-scan photography" (Venkatasawmy, 2013, pp. 64). Visual effects, on the other hand, refer to frame-by-frame digital manipulation of the film, using computer software. Some optical effects though, also take place during the post-production stage, such as manipulating the film through the optical printer.

VFX technology allows the integration of artificial elements in current film works. Photorealistic landscapes, physical phenomena, buildings even people seem to have won the battle against the concept of the uncanny valley[5] and are indistinguishable from reality. This development has been achieved thanks to specialized software used by film studios, like Pixar, DreamWorks, Animal Logic and Blue Sky, software that has also been commercialized and can be used by anyone. So except the huge variety of 3d-modeling software, a series of rendering

[5] The concept that expresses the emotional response of the viewer when observing a humanoid's resemblance to a human being.

engines that use different methods such as ray-tracing, rasterization and path-tracing are also available for transforming a 3d-scene to a photorealistic one. Additional compositing and editing software have also been developed, for merging these scenes with camera footage and visual effects, such as *Adobe After Effects* and *The Foundry Nuke*.

Figure 31: Lang, F. (1927). Metropolis. The New Tower of Babel.

Once again, the Tower of Babel

One of the earliest examples of architectural fantasies in movies, and widely known in the circles of architecture is the German expressionist film *Metropolis* (1927) of Fritz Lang. It was the most expensive silent film ever made at the time of its release, with a total cost of 5,000,000 Reichsmark and a return of only 75,000 Reichsmark at the box office in 1927. Metropolis, originally inspired by Lang's first impression of New York, is a city of city-towers, with the center one being a symbolic version of the tower of Babel. The urban layout is chaotic, representing the concerns of the modern movement of his times to resolve the problems of city extensions and traffic. The issue of increasing housing also included the necessity of a low-cost, since it was related to the working class needs, which also bothered Lang by representing two worlds: A visible one above for the upper-class and for the workers a hidden one below the Earth's surface, with no interaction between them.

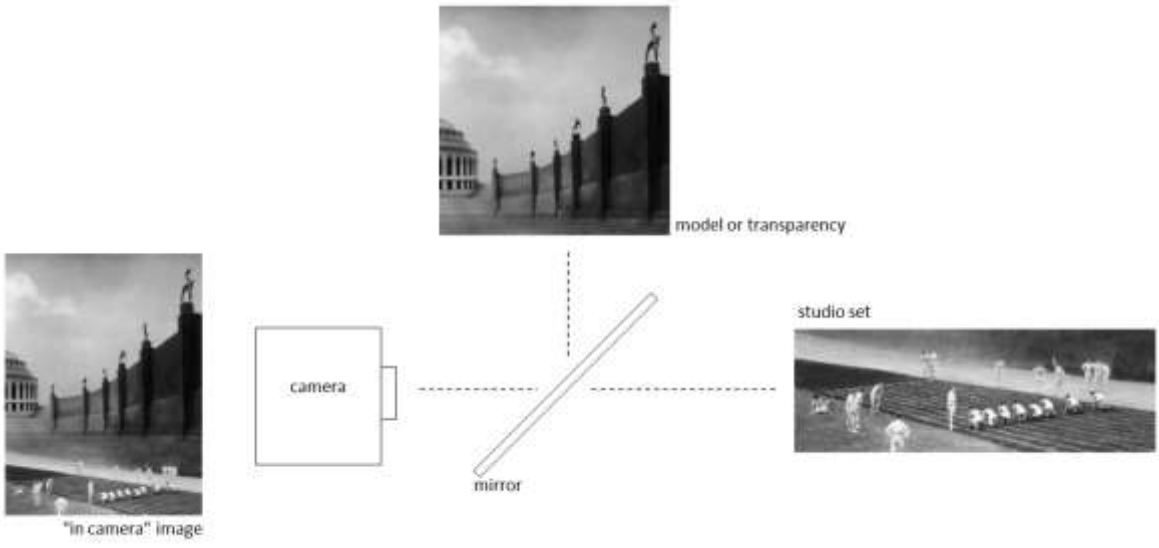

Figure 32: Lang, F. (1927). Metropolis. Diagram explaining the Schüfftan process.

Figure 33: Lang, F. (1927). Metropolis. Making of the traffic.

Figure 34: Scott, R. (1982). Blade Runner. Police Tower.

Figure 35: Scott, R. (1982). Blade Runner. Making of the city of Los Angeles.

Figure 36: Scott, R. (1982). Blade Runner. Tyrell's Pyramid

The city-set consists of high-rise 3d models, paintings, urban canyons, and miniatures. For the traffic simulation scenes, each frame was photographed separately, with the crew moving the 300 car-miniatures some milometers every time. For other scenes such as the "City of the Sons" one, in which the sons of the chosen few are competing in the stadium, the Schüfftan process[6] was used to project a 3d model to a 3-meter-high angled wall.

Another interpretation of the tower of Babel, deeply inspired by Metropolis, takes place in Ridley Scott's masterpiece from the 80's *Blade Runner* (1982). It is a 700-story skyscraper set in a technological and advertising architecture, similar to where America is heading, but more colorful and exaggerated. The creator of this city is American futurist Syd Mead, already noted in the previous chapter of painting representations. Both the city exteriors and interiors are a combination of miniatures and real-world buildings such as the leading role's home: The exterior, is actually the Mayan-Revival-styled *Ennis House* (1924) by architect Frank Lloyd Wright and the interior's repetitive tiles were molded directly from Wright's original design.

Tyrell's Pyramid was over a mile high, from 600 to 900 stories tall, and was built at about 1/750 scale. For the construction, brass sheets were used, acid etched by hand. The middle section of the

[6] The Schüfftan process was used in the first part of the 20th century and it makes use of a mirror being placed at an angle in front of the camera. Parts of the reflective surface of the mirror are being removed so that sets behind the mirror can be also seen. The process was later replaced by the blue screen technique.

pyramid was composed of rubber-molded parts, cast in polyester and backed with acrylic sheets so that the geometry wouldn't be affected by any shrinkage. For lighting it, fiber-optic strands and light points were used, as in the case of any other miniature used in the set. The method of miniatures with fiber-optic lighting was also used in its 2017 sequel, *Blade Runner 2017*, but with the extra help of the contemporary modeling technology: CAD software was used for modeling the buildings whose parts were later laser-cut and then assembled together in the studio.

Figure 37: Scott, R. (1982). Blade Runner. Making of Tyrell's Pyramid.

The Architecture of Star Wars

One of the most popular and talked-about pieces of work in science-fiction history is the film-series *Star Wars.* One of the most distinctive features of *Star Wars* is the size and complexity of the environment in which the story unfolds, hosting several regions and sectors with their own civilization, history and technological progress. One of the ways to manifest this cultural complexity is the built environment, through which Lucas portrays his dubious personal feelings about urban space. According to architectural critic Mark Lamster, the cities of George Lucas's Star Wars films, are "places of danger and corruption" (Lamster, 2000, pp. 6), whereas at the same time the forces of good find sanctuary in the natural world.

A futuristic hyper-structure in the film series is Cloud-City, a gas-mining colony floating above an uninhabitable gas-giant, and first appeared in the 1980 movie *Star Wars: Episode V - The Empire Strikes Back*. The exterior of the city was a saucer-shaped body, about 16 kilometers in diameter and 17 kilometers tall. In general, the tower's 392 levels included gas-mining and processing quarters, workers-housing floors, and factory zones at the lower part of the body, whereas the higher part was used as a luxury resort, with rooms for the visitors, landing pads, casinos and even a top-side surface-level plaza concourse.

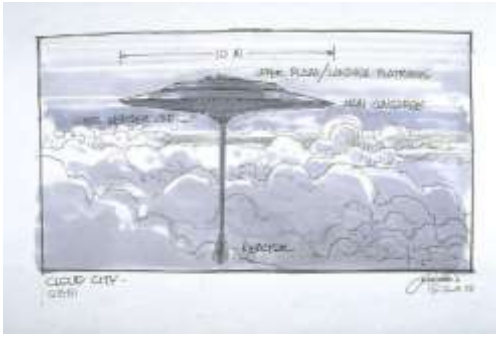

Figure 38: Lucas, G. (1980). Star Wars: Episode V - The Empire Strikes Back. A concept drawing by storyboard-artist Joe Johnston of Cloud City

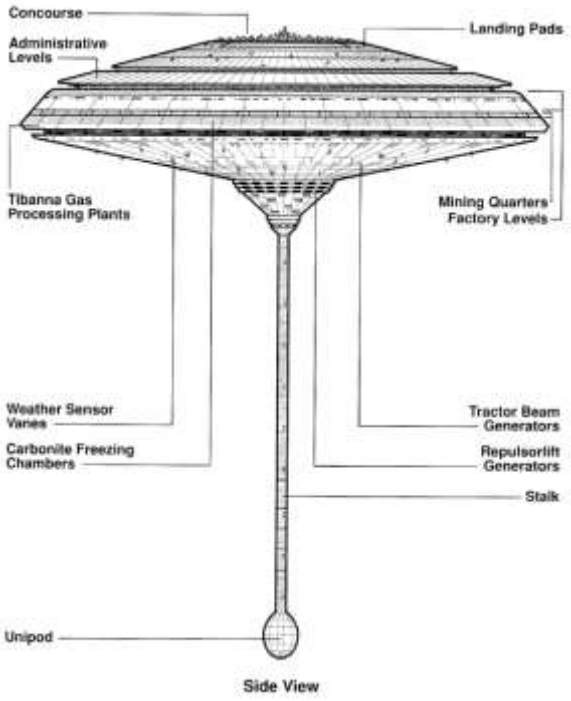

Figure 39: Lucas, G. (1980). Star Wars: Episode V - The Empire Strikes Back. Side View. Technical Drawing

On the contrary, smaller scale structures of the city, such as housing units and a landing platform, were easier to be produced in sufficient detail and were built as miniatures. The "inside the city" architecture they form is described as "art deco." These miniatures were used in two ways: As they were, in their 3d form for a scene of landing on the city by the main characters, but also as paintings. The models were requested by matte painting artist Michael Pangrazio to be used as a lighting reference for his paintings. They were also photographed, cut, and pasted into more matte paintings. The connection of this methodology of work, like in other earlier examples of video representations, with the former medium of fantasy representations, the painting, is still

Concerning the mechanical effects, the main body of Cloud-City was never brought to reality as a 3d model for the purposes of the film. All scenes containing the exterior form of the tower consisted of paintings, cut-outs, and foreground 3d objects, such as vehicles. Three paintings of cloud city were needed for the scenes, providing a different detail each time. Both the hyper-structure and the clouds were placed as layers, painted on transparent animation celluloid, giving the impression of depth. The backgrounds are real-world photographs captured by director of special effects Brian Johnson.

Figure 40: Michael Pangrazio's matte painting of clouds in the foreground combined with a matte painting of cloud city by Ralph McQuarrie.

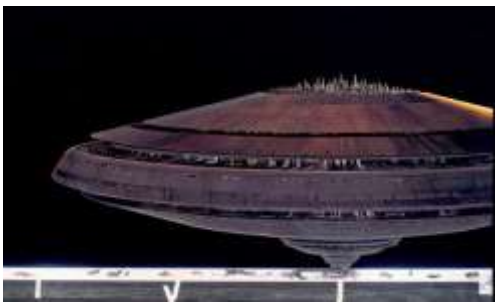

Figure 41: A more detailed painting of Cloud City by Ralph McQuarrie.

Figure 42: Lucas, G. (1980). Star Wars: Episode V - The Empire Strikes Back. Model maker Mark Thorpe works on miniatures of Cloud City buildings.

remarkable. It shows the transition from an era to another, as well as the intension of environmental functionality or at least the illusion of it.

Some of Lucas's architectural creations though were not completely imaginary. Another structure of majestic architecture was *Theed Royal Palace* of the fictional planet Naboo, which first appeared in the 1999 movie Star Wars: Episode I - The Phantom Menace. The palace, a massive complex of sandstone-like blocks formed into towers and rotundas with cupolas covered in green tile, is settled at the edge of a cliff overlooking the valley below. It consists of a spacious drum-shaped structure, a taller, narrower tower, and several watch towers. The design has references to real-world architectural buildings: The exterior was inspired by the *Marin County Civic Centre* in San Rafael, California which was designed by Frank Lloyd Wright, whereas the interior scenes were shot in *the Caserta Palace* near Naples. The exterior, as in most cases of video representations, even the latest ones such as the ones of *Blade Runner 2049*, is a combination of miniatures and post-production effects. Even in the digital age, the use of scale-models in film industry plays the key-role of a physical interpretation of unreal and is essential for illustrating architectural fantasies, to provide a faithful and realistic blending.

Figure 43: Lucas, G. (1999). Star Wars: Episode I The Phantom Menace. The Royal Palace of Theed, Naboo.

Figure 44: Lucas, G. (1999). Star Wars: Episode I The Phantom Menace. Bringing Naboo to life.

2.5. Architectural Projects

Back to the *Under the Dome* example, noted in the first part of the dissertation, it reminds us of an actual gigantic architecture intervention proposed by American architect and inventor Richard Buckminster Fuller. Fascinated by dome's ability to enclose very large volumes with a minimum of materials and the advantages it could bring in energy and water consumption issues, he proposed his big idea of *Dome over Manhattan,* a 2-mile in diameter wide structure that would cover most of midtown Manhattan.

Figure 45: Fuller, R. B. (1968). Dome over Manhattan.

In order to realize this idea, Fuller incorporated into the design the structural properties of geodesic dome, a hemispherical structure based on the geometry of geodesic polyhedron. A geodesic polyhedron is formed by small triangular surfaces that approximate a sphere. The sides of these surfaces consist the rigid framework of the structure and can be made of steel, aluminium or wooden tubes or rods. The triangles themselves would be flat surface areas, covered with glass, plywood or plastic sheets.

Radical, yet rational in Fuller's mind, *Dome over Manhattan* is only one of the many visionary architectural projects created in the 1960s. Fuller probably knew that his proposal would not be realized during his -or our- times. It was more of where it would lead to though, such as one lighter but still strong architecture, providing a comfortable interior climate, so more energy efficient, an issue of greater and greater concern nowadays. As Fuller puts it for the interior qualities of the dome, "From the inside, there will be uninterrupted visual contact with the exterior world. The sun and moon will shine in the landscape, and the sky will be completely

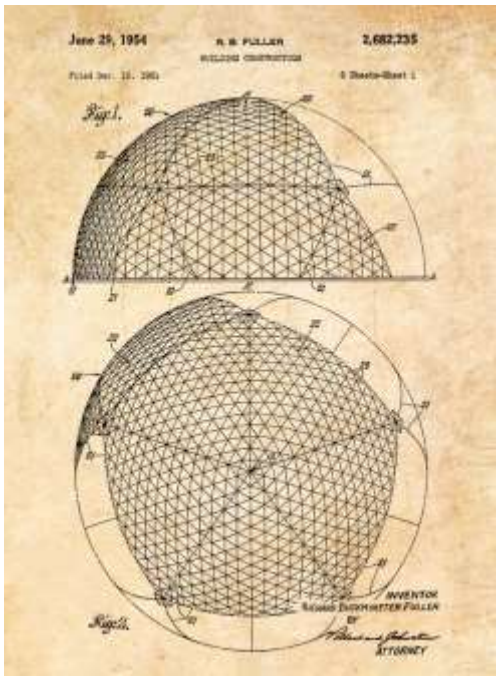

Figure 46: Fuller, R. B. (1954). Geodesic Dome patent.

visible, but the unpleasant effects of climate, heat, dust, bugs, glare, etc. will be modulated by the skin to provide a Garden of Eden interior." (Fuller, 2001, pp. 434).

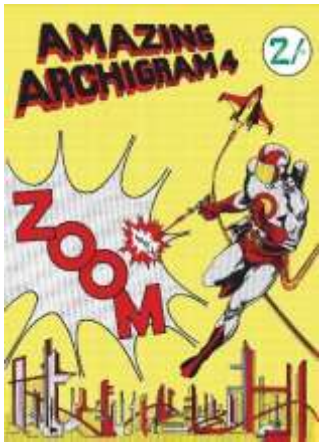

Figure 47: Archigram. (1960s). Poster.

Elsewhere, Fuller's Dome could also allow habitation in inhospitable environments. The concept of such environments was an area of focus for the post-war architectural movements in the 1960s. During the same period, another architectural group, *Archigram* were also experimenting with anti-architectural and radical design. *Archigram* consisted of a few avant-garde architects including Peter Cook, Warren Chalk, Ron Herron, Dennis Crompton, Michael Webb and David Greene who were the main members of the group. The main characteristics of the group is acceptance of the modern way of living, such as commercialism and consumerism, kinetics and non-conventional design to envision structures that resemble hybrids of machines and organisms. Their most famous projects lack technical plans since they were never meant to be built but to influence and include among others the *Plug-in-City*, the *Instant City,* and the *Tuned City*.


Figure 48: Herron, R. (1964). Walking City.


Figure 49: Maunsell Forts (1942-1943).

In 1964 Ron Herron came up with the idea of *Walking City*, a concept of a thirty-story high robotic metropolis that would wander the Earth by its enormous telescopic steel legs. As in Fuller's Dome, the concept of a protected environment deriving from the post-war atmosphere is dominant. In this case, though, the city can move, wherever it is needed. Except the concept, the city's architecture is also inspired by Second World War. Although its movement reminds more of an arthropod, its form may refer to the British "Maunsell Forts," armed towers built to defend United Kingdom during World War II.

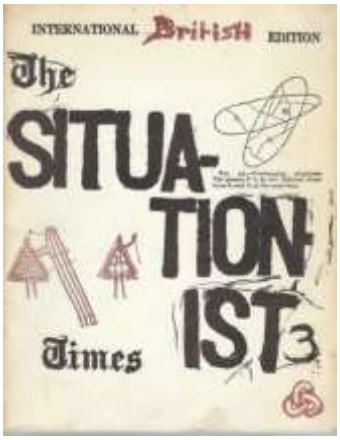

Figure 50: De Jong, J. (1964). Situationist Times 3. Hengelo, Copenhagen and Paris: Rhodos / International Science.

In contrast to the pop, commercial and even in some cases militarist -like in the case of *Walking City*- style of the British group Archigram, a more socialistic and anti-capitalistic group of artists, intellectuals and political theorists, mainly based in the Netherlands and in France, was forming the *Situationist International* organization. The movement had its origins in the early avant-garde artistic circles and their work concentrates on alternating practices of history, politics, art, architecture and everyday life according to their radical political theory.

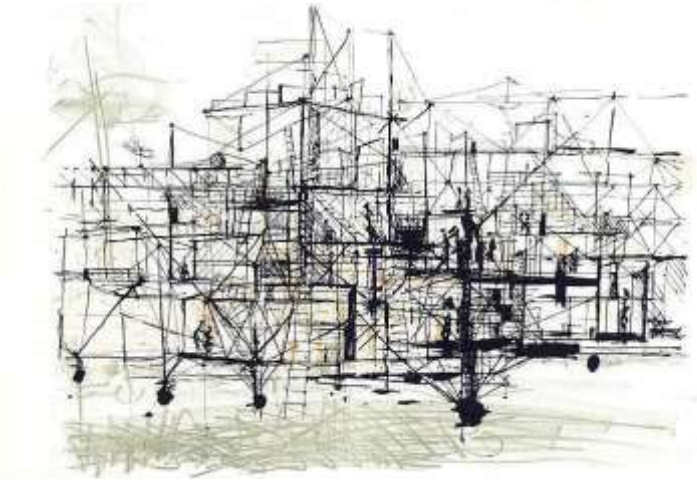

Figure 51: Nieuwenhuys, C. (1959-74). New Babylon. Lithograph.

One of the influential figures of the movement was Dutch painter Constant Nieuwenhuys. His masterwork, *New Babylon,* was being constantly developed for fifteen years and reflects his own and the situationists' architectural ambitions. Constant's city takes place in a space frame, raised on a grid of supporting columns (*pilotis*), elevated sixteen meters from the earth. As Constant explains, "The ground remains free for motorized transport and agriculture, wild nature and historical monuments" (Sadler, 1998, pp. 129). The urban tissue, on the other hand, has the chance to be designed and grown over the empty canvas of the elevated platform.

Figure 52: Nieuwenhuys, C. (1959-74). New Babylon. Collage.

Technological, international and playful, with an emphasis on social interactions and closer to the human scale, the New Babylon is a response to Constant's worries about the man's and artist's appearance during the new industrial revolution, derived from post-war reconstruction. Therefore, the role of the individual is also important. Each inhabitant is the one that will reconfigure the transformable space and interfere with it, according to his needs and his own artistic expression.

Somewhere in-between Archigram's and the Situationists' ideology -but possibly closer to Archigram's one- another movement of 1960s was envisioning cities as megastructures in Japan. It was the Metabolists, a group formed by architects and designers, who proposed a modern way of social living based on the new knowledge in biology and as in the previous cases, technology. The concept of a communal society was a central concern in the physical form of their cities. Therefore public facilities and civic spaces are being under public administration regularly in their projects. In contrast with Situationists' designs, the massive importance of public space volume lead to a minimum of individual living space and the need of absolute equality in their work to homogenous cell-like housing units: A biological metaphor for providing building systems, which can be followed for future growth similar to the process of reproduction.

Figure 53: Kikutake, K. (1962). Marine City. 3d Model.

Marine City is a series of projects delivered from 1958-1963 by Kiyonori Kikutake, one of the founders of the Japanese Metabolist group. The main idea of the three projects is the creation of sustainable industrial cities floating in the ocean, consisting of two basic architectural structures: the "Vertical Communities" and the "Floating Platforms." The Vertical Communities are cylindrical concrete towers, in which individual living units are installed, that could be easily replaced in case of need, without causing damage to the framework. The towers, also serve as floating buoys, supporting the platforms outside of them, which contain industrial and public facilities. The first project chronologically is designed for a population of 50.000 people, whereas the following two of 500.000. All of them, represent a contemporary response to a sustainable artificial island of adjustable size, to various environmental threats and overpopulation.

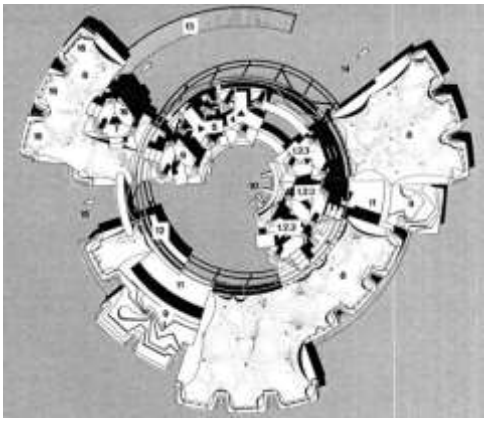

Figure 54: Kikutake, K. (1962). Marine City. Masterplan.

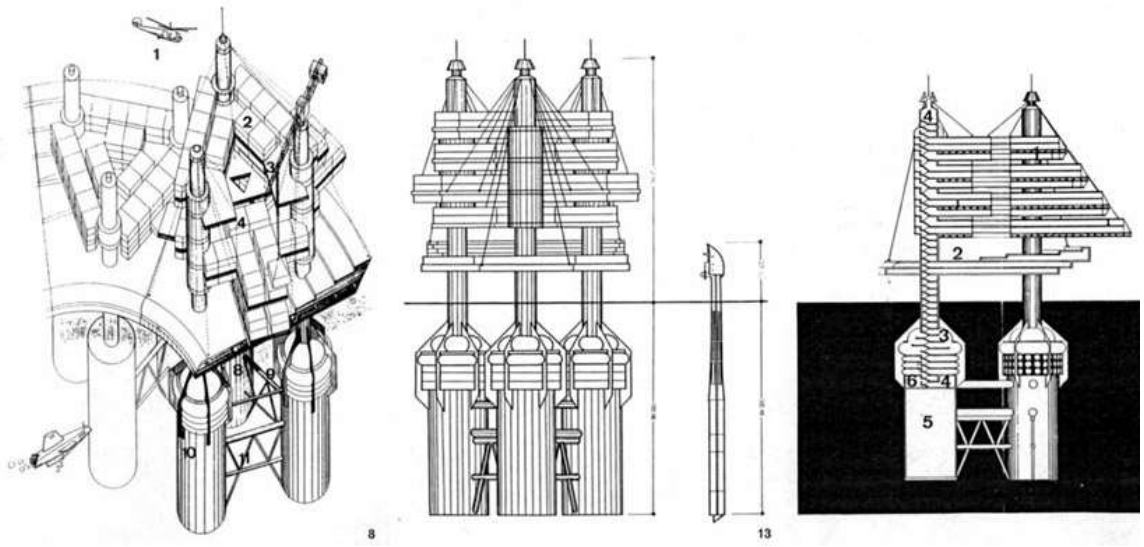

Figure 55: Kikutake, K. (1962). Marine City. Axonometric, Elevation and Section of Ocean Pylons.

2.6. Virtual Reality Representations

Although one would imagine that video game industry provides a rich digest of architectural fantasies, examples of a consistent imaginary architecture are limited in this field, possibly due to the effort being put into reaching the stage of a faithful imitation of real and familiar environments first. So while many video game publishers like Ubisoft, invest in the involvement of architects or professionals with an architectural background, the design of interactive spaces remains conventional, far away from being physically impossible, usually brutalist in terms of connecting the areas of action effectively. Still, there are representations of impossible structures, that even if they have more of a scenic role similar to the film-representation examples, with an interior that does not correspond necessarily to the exterior, they bring a strong impression to the environments' aesthetics. Two video game series that make use of such imaginary environments are the ones of *Halo* and *Destiny*.

Figure 56: Bungie. (2014). Destiny. The Citadel.

Halo takes place in a fictional universe, called the Halo Universe, but mainly in our galaxy, the Milky Way. The name "Halo" comes from the Halo Array: A group of artificial, habitable, ring-shaped megastructures orbiting around planets, which also serve as superweapons. Except these gigantic structures, there are some remarkable examples of smaller scale but a greater level of detail, such as one of space elevators, which is an actual yet still theoretical type of proposed transportation systems. As the name suggests, Space Elevators are immense structures that serve the purpose of transporting large amounts of mass into space. The base concept behind them is of a cable-structure starting from the surface of a planet and ending to that point in space so that the total centrifugal force exceeds the total gravity. It is probably the tallest tower of Babel ever imagined, in terms of a structure being based on land surface.

Figure 57: Bungie. (2009). Halo 3: ODST. New Mombasa Orbital Elevator.

Figure 58: Bungie, Microsoft Studios, Pi Studios, Hired Gun. (2004). Halo 2. High Charity.

In city-scale examples of the same series, *High Charity* is a mobile planet station, a religious center and a capital city, also known as the *Holy City* of a Halo empire. It is mushroom shaped, 348 kilometers in diameter and 505 kilometers high, partly made of a gigantic mass of rock. In the very upper part of High Charity, there is an artificial star that simulates natural sunlight for the city, which was multileveled, occupying the interior part of the structure. The *Holy City* or *Golden City* consisted of towers made of volcanic rock from the city's base, and open spaces which gave the city a terrestrial look. As a religious center, like another Mecca, it was thought that it should be visited at least once in a lifetime by true believers.

Architectural fantasies' potential in virtual worlds is not dedicated only to video game applications though. Even more and more artists including architects, are making use of user-friendly game engines, such as Unity and Unreal Engine, to build interactive environments and experimental applications through which they explore new ways of communication with their audience. Often, these environments are purposed to house their own or other creators' artworks and architectural fantasies may be the exhibits or the exhibition space, forming, as noted in previous chapters, the concept of a virtual museum.

DiMoDA represents this concept as a virtual reality exhibition platform created by the artists Alfredo Salazar-Caro and William Richard Robertson. The design is a hybrid of ancient and contemporary building styles. The entrance and the portals are inspired by classical Greek and Mayan architecture whereas the atrium is an organic form consisting of steel framework and glass. This form is based on the portrait

Figure 59: Salazar-Caro, A. and Robertson, W. (2015). DiMoDA Digital Museum of Digital Art. courtesy of DiMoDA.

of a Salazar-Caro's friend, whose head 3d-scan was glitched-out and redesigned as a glass atrium. The end result, is a combination of the platform's architecture and the ones surrounding the exhibits, as the intention of the creators was that each artist would be the architect of their own virtual environment. Therefore, separate installations are taking place inside and outside of the main museum area, floating in space, accessible by imaginary physics such as the one of teleportation.

Virtual museums are not only purposed to house exhibits exclusively from the digital world. Instead, they can provide solutions regarding the accessibility, display, and preservation of physical artworks, offering to the public a digitized version of them. Even if virtual space is unable to convey the qualities of physical space, it has its own qualities that physical space doesn't, while the technologies surrounding the digitization of matter tend to shrink the gap between them.

Figure 60: Salazar-Caro, A. and Robertson, W. (2015). DiMoDA Digital Museum of Digital Art. courtesy of DiMoDA.

A museum like this was designed and constructed for the housing needs of the Kremer collection by architect Johan van Lierop. The collection includes 70 works, mainly paintings, of Dutch and Flemish 17th-century artists by, among others, Rembrandt, Abraham Bloemaert, and Hendrick ter Brugghen. Lierop was inspired by the design of the museum by the Golden Age many of the exhibits represent. The final design consists of a central, huge domed lobby, and a web of bridges that seem to float in space. Around the lobby and connected with it by the bridges, the perimetrical walkway takes place, where all the paintings are being exhibited. The paintings, are floating over the marble flooring and are set some meters away from the wall so that the user can go around them.

Figure 61: Inside the Kremer Collection's virtual reality museum. (2017). Courtesy of the Kremer Collection.

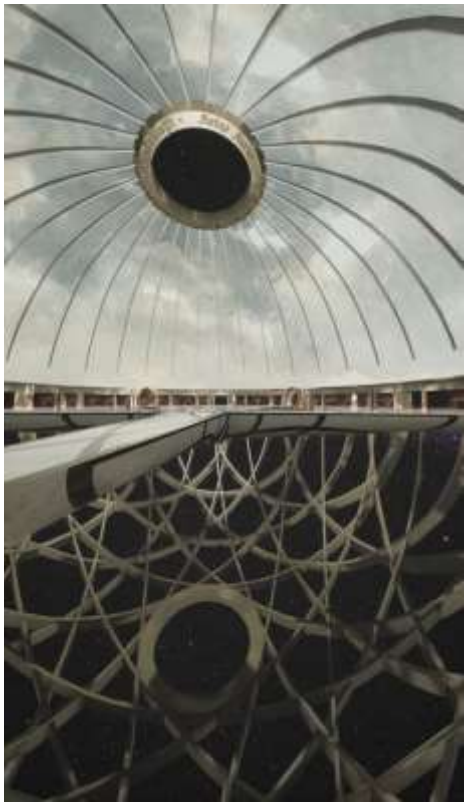

Figure 62: Lierop, J. (2017). Inside the Kremer Collection's virtual reality museum. Courtesy of the Kremer Collection.

For the scanning procedure of the paintings, the photogrammetry technique was used, not only for the representation of the paintings but also for their original framework. Each of the virtual models appears exactly like the original artwork in reality, highly detailed, consisting of between 2500-3500 high-resolution photographs taken from every angle. Even the traces of wear and the canvas cracks are also noticeable.

The overall aesthetics of the Kremer Collection Museum experience give the impression of a private guided tour. The lighting on the paintings is soft and dramatic. During the whole tour, an audio guide is provided, narrated by the Collection founder George Kremer and his wife Ilone, who also appear as holograms next to the paintings.

Apart from the level of detail when approaching the exhibits, the user can also observe the painting layers and go behind them to see additional material about the artwork, such as provenance stickers and notes. Such elements like interactive data visualization alongside with the exceptional architectural design can transform digital exhibitions to unique experiences. Even further, they guide and inspire creators of future applications, not by a modest imitation of the real, but by approaching the true nature of virtual environments and prove the potential of Virtual Museums.

Figure 63: Inside the Kremer Collection's virtual reality museum. (2017). Courtesy of the Kremer Collection.

Figure 64: Matthias Stom, Christ Chasing The Moneychangers From Temple (1630–1633). Courtesy of the Kremer Collection.

3. Experimenting with Architectural Fantasies

3.1. An Architectural Proposal

3.1.1. Groundline: An Underground City

My interest in architectural fantasies goes way back, and alongside with my architectural studies. One year after receiving my degree and in the frame of the 6th Advanced Architecture Contest, I came up with the idea of an Underground City, a project in collaboration with my former fellow student and architect Panos Kondylis. The competition was organized by the Institute for Advanced Architecture of Catalonia and FabLab Barcelona on the theme of Productive City, with an open call of proposals able to respond to current challenges of ecology, informative technology, and architecture. The participants were free to choose the size and location of their project, as well as the time projection which could be short, medium or long-term within the duration of the 21st century. The proposals should be presented on three A-3 panels.

With our anti-architectural proposal of Underground City, we tried to respond not exclusively to today's challenges, but also the ones of tomorrow. We often envision the future city as a utopia, either in an unchanged from today natural environment of the earth's surface, or on a far-away planet, which would be able to accommodate us. However, the scientific community has not yet reached the point to locate planets with both atmosphere and water, while the sustainability of the earth's surface seems to be questionable for the next decades. For these reasons, this proposal examines the prospect of an underground city, named as "Groundline," an idea initially inspired by the ways ants build and inhabit their colonies. The project is an architectural one, consisting of text, drawings, illustrations and a three-dimensional perspective representation of the city proposed, all included in three parts.

In the first part of our work, we give an illustrated idea of the abstract scenario hidden behind the creation of Groundline, through a sequence of edited newspaper templates. The titles of the newspapers bomb the viewer with a series of global catastrophic risks, while they also serve as the background behind the skyline of a simplified section drawing of the city. The risks that could lead to such a solution include among others, nuclear disasters, environmental crisis, and even extraterrestrial invasions. In the same part, we examine the

construction rules of a nest, alongside with the study of an underground geological pattern. As a result, three construction types are arising, shaping the concept of an "Underground Cartography":

1. Cylinder: The easiest and most functional way in terms of setting up the supportive network needed.
2. Pyramidal & Expansive: Suitable for cities that can be expanded. This type also provides the possibility of a “near the surface distribution” providing more space for habitation to the upper levels of the nest than in the lower ones, where other functions can be protectively placed, like nuclear energy production.
3. Dynamic: The dynamical type of nest meets no rules in terms of shape and symmetry. Its form depends directly on the habitats’ needs and the geological variations and differences that may be faced during the excavation work.

The cylinder type diagram, seen in the bottom left corner represents a section of a typical underground layout, in order to understand which parts are suitable for subtracting intervention. The limestone layers, consist of strong rock, ideal for holding structures in them, providing three layers of considerable height. As seen in the middle section of the first sheet, we experimented with all three construction types, to end up with a multileveled hydridic city, of a pyramidal layout with three cylindric mega-chambers.

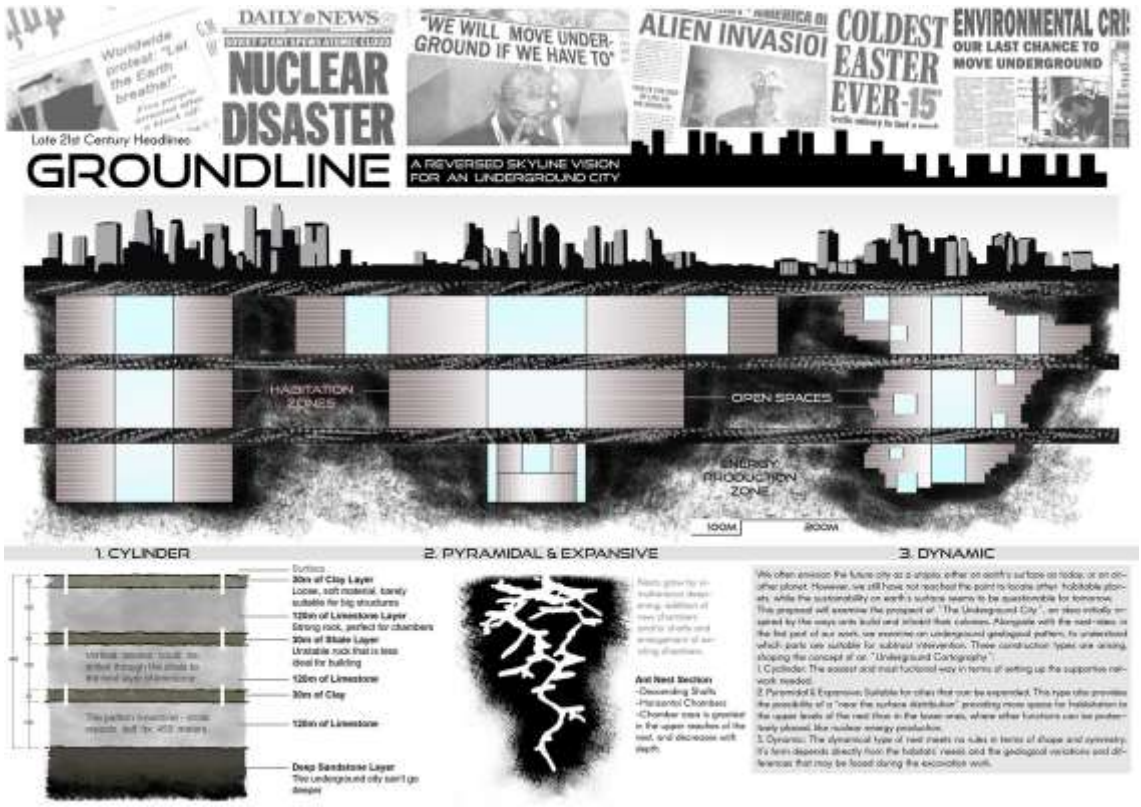

Figure 65: Personal Experimentations. (2014). Groundline. Part I.

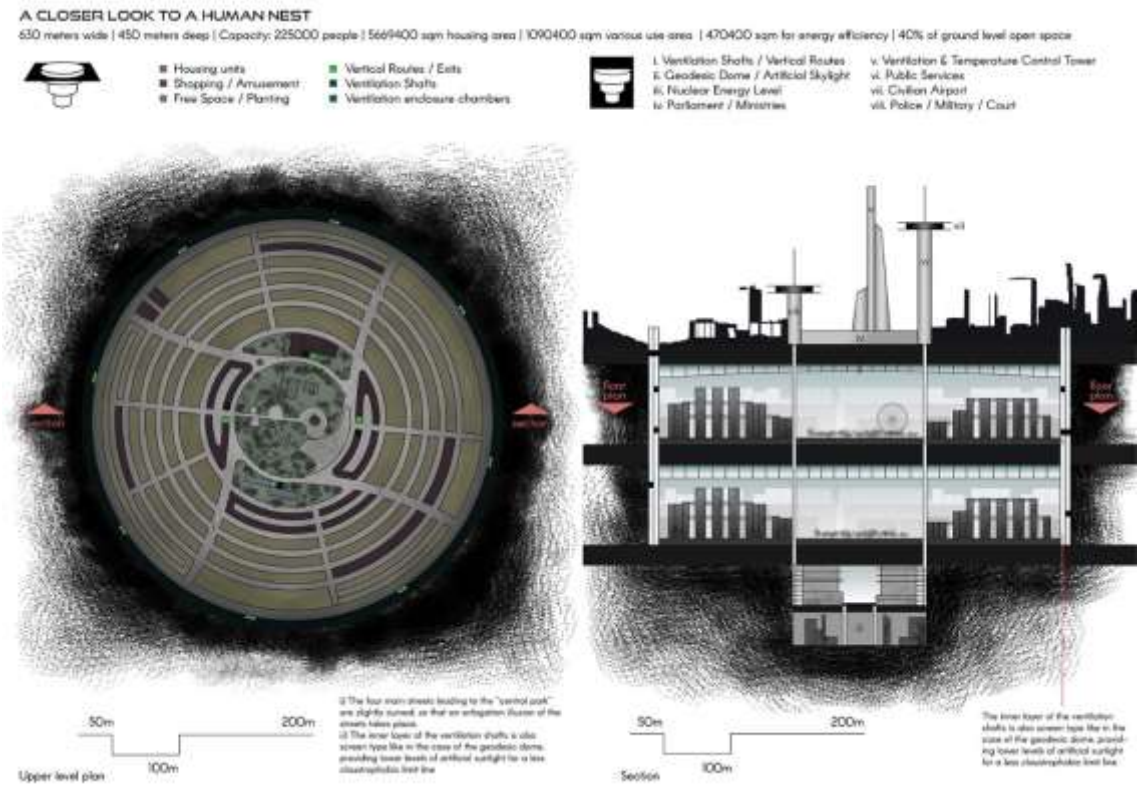

Figure 66: Personal Experimentations. (2014). Groundline. Part II.

In the second part of the project a further analysis of the chosen type takes place, through a closer look to the human nest, by drafting a master plan of the first city level and a section of the whole. A diagrammatic and spatial visualization arises, in which the main characteristics, the land use and the general functionality of the model can be observed. The first and widest level of the city is of circular shape in top view; it is 630 meters wide in diameter and 450 meters deep. A perimetrical framework of steel and concrete, as well as a series of vertical elements, provide ventilation and routes straight up to the outside world. Metallic space frames, provide additional support to the limestone remainings and form an elliptical dome of artificial sunlight.

The city layout is composed of four main routes leading from periphery to the city center, and additional perimetrical routes between the buildings. The main routes are slightly curved giving the illusion of greater length. The city center, consists of a large park in which low to medium height flora can be grown, surrounded by public facilities. The rest of the first level's buildings are housing areas, with a capacity for 225.000 people. Although individual living space is limited to the minimum, 40% of the level's surface consists of open spaces, aiming at a communal way of living. Special types of building-uses are occupying areas outside

the city levels, such as the energy production sector, which takes place at the deepest level of the structure, as well as the airport, legislative and executive which remain at the surface of the earth and serve as a portal between the inside and outside environment.

The third and final sheet of our proposal is a matte painting representing a view of the city from the central park. The project is an urban design one, so this conceptual representation intentionally lacks small-scale details such as doors, windows, and decorative elements. However, it clearly reflects our intentions: The architecture is minimalistic, focusing on giving the impression of a greater surrounding environment size, resembling open-air spaces. Inspired by the Metabolists' socialistic ideology, further focus is given to communal areas, such as the spacious park and the amusement zone, whereas the residential buildings share the same style symbolizing the equality among the members of this city.

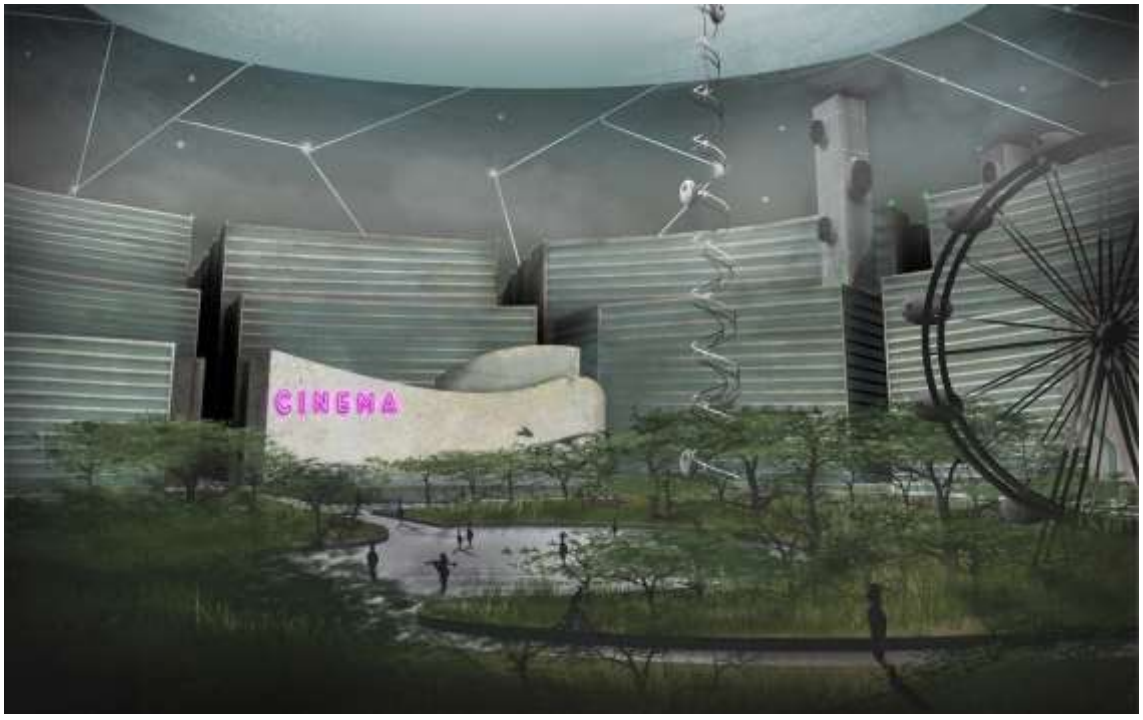

Figure 67: Personal Experimentations. (2014). Groundline. Part III.

3.1.2. Tools and Pipeline

Concerning the work method, a series of sources, mediums, software, and devices were used. After deciding to "go underground," our first concern was to inspire by nature and study the morphology of an ant nest. Based on the patterns we came across during our research, we started keeping notes about our intentions regarding our city and sketching on paper some rough ideas.

The notes were related to the technical specifications of the project. The morphology of an ant nest chamber defined a circular city-planning arrangement, whereas our intentions for a communal city limited the building-covered area to a percentage of 60%. This intention for a communal character alongside with respect to the ground loads, limited the size of our city not to exceed a capacity of 200.000-300.000 people. In size like this, one city center collecting open spaces and public facilities was the obvious and most functional solutions, whereas the housing areas would take place in zones around it. Each housing zones building height would correspond to its distance from the city center, offering an amphitheatrical view to all of them.

Soon the sketches were transformed to linework designs consisting a masterplan and a vertical section of our city using Autodesk's Autocad application. These designs were then transferred to Adobe Illustrator and later to Photoshop, where colors were added to indicate different features, and land uses, as well as hatches, atmospheric shadows, and textures to enhance the aesthetics of the drawings and give them a more ambient look.

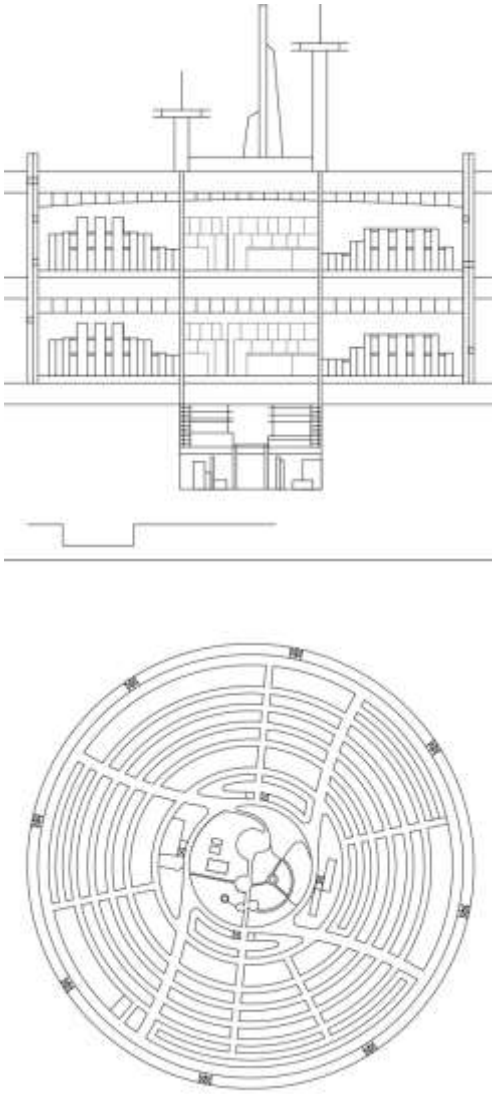

Figure 68: Personal Experimentations. (2014). Groundline. Plan and Section Drawings.

During the same time, the masterplan was imported to Autodesk 3ds Max where the building zones and other basic elements were extruded according to predefined values. The three-dimensional model built there, was not purposed to be rendered as a final photorealistic representation, but it would be used as a lighting reference, especially for global illumination, and a base for a matte painting composition. Only two materials were used: A very light greyish material for non-buildable areas, which would later be traced and filled with soil and hand-drawn flora, and a darker material with a soft concrete texture on it for the built ones. The scene was rendered with the V-Ray engine and completed in Adobe Photoshop, painted using neutral color libraries, natural brushes, textures and a graphic drawing tablet.

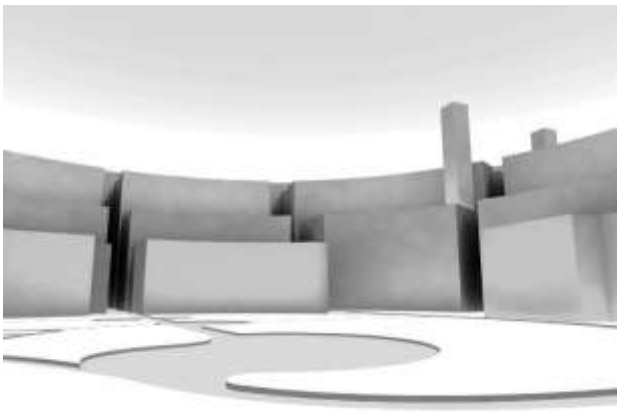

Figure 69: Personal Experimentations. (2014). Groundline. V-Ray Render.

3.2. Building Fantasies with Words

3.2.1. Project LEDA

My second project involving around architectural fantasies took place during the first year of my studies in the master program "Art, VR & Multiuser systems of Artistic Expression." Unlike *Groundline*, this project, entitled *LEDA,* is an interactive one, taking place in a virtual world, built for computer platforms and virtual reality headsets. The only factor shaping the creation of *LEDA* is a scenario, a backstory explaining the genesis and purpose of the

Figure 70: Spielberg, S. (2002). Minority Report. Precog.

key character of the application, a human and machine hybrid and is partly inspired from the science fiction movie of Steven Spielberg, *Minority Report* (Figure 70).

According to the script, in a future world, set in a few decades from now, the "ministry of global defense has developed a platform, capable to advise humanity for its survival against matters of catastrophic risks based on algorithmic thinking. This platform is able to receive massive amounts of information in minimum time, through direct verbal communication with human beings. This is achieved through *LEDA*, a genetically modified human brain, whose electrical activity formed the base-language of the platform's source code. For clear and distinct electrical signals, *LEDA*'s brain had to be isolated from the rest of her body, preventing any additional perceptions. The only way to communicate with her is by entering her regime through a virtual reality headset.

After wearing the headset, there are two directions the user can follow to interact with *LEDA*. A narrative one, through which he can be informed about the past of *LEDA* by having an artificial-intelligence-type discussion with her, and a creative one. Going the creative way, the user can have a world-building experience by using his language and in relation to certain global catastrophic risks which can be anthropogenic or not, and are among others, environmental disasters, mineral resource exhaustion, a nuclear holocaust, asteroid impacts even an extra-terrestrial invasion.

The goal for the user is to get involved in various threatening scenarios, by a procedure of playing with the relationship between data and result and if interested, learn more about the backstory. There are also three emotional goals – intentions of mine towards the user. First, creating an emotional state of awkwardness, when communicating with the brain of a deceased person, and through that brain with a machine. The second goal is the fear of a global threat, that would potentially lead to the awareness of the user. Third and final emotional goal is the enthusiasm of the user, for creating a spatial effect, always different depending on the data the user gives. This way, he becomes a creator using only his imagination and his formal language.

3.2.2. Scene Description

After lying down on a piece of furniture, like a couch or a fainting sofa, and wearing the virtual reality headset, the user finds himself in the dark, infinite and empty space. Around him, he sees a sky consisting of stars and letters whereas, under him, a liquid-like plane takes place, emitting glowing light and fog. It is Leda's realm, an invisible entity in this space which starts a textual conversation with him, with phrases being formed by the star-like letters around the sky. Leda will explain to the user that being confused is reasonable, as a symptom of using the platform. Then, she will guide him to use the letters, so that he will be able to communicate with her.

Figure 71: Personal Experimentations. (2017). LEDA. Screenshot.

Figure 72: Personal Experimentations. (2017). LEDA. Screenshot.

At the center of the user's vision a small, circular-shaped and flickering component lies around. Always reaching the center of the viewport, this dot moves alongside with the user's head rotation and indicates the use of a cursor. If he has ever used a mouse before, he will soon be familiar with it. Leda will ask him to type something simple, an answer to a yes or no question, by focusing and hovering for a couple of seconds on the letters, which are floating in the sky, with his cursor. Getting familiar with using the letters is of major importance so that the user will not quit. It has to be also noted, that the placement of the letters in the sky is similar to the placement on a typical laptop keyboard, for easier and faster access to them.

Leda's questions guide the user to follow the direction he prefers. The narrative way, meaning the play of discussions between himself and Leda, or one of the actions, meaning various creational transformations of the space. The transformations occur when the user reports a threatening scenario for humanity, according to which subtractive geometries will be created and shape patterns of habitation building forms such as super-skyscrapers, walking, underground and floating cities. These models are also related to numeric data that the user enters, such as the population that needs to be shelters, so that each new use of the platform will produce different spatial outcomes.

A page filled with cheat-words is provided for the user to read before wearing the VR headset, to enhance his imagination, ease his thoughts and prepare him for the point when Leda asks for the risk that is threatening humanity. These are the words given to the public, during "Portes Ouvertes" at Athens School of Fine Arts, held in May 2017:

"Virus, zombie, nuclear, ai, artificial, robots, machines, bacteria, biotechnology, fungi, globalwarming, climate change, environmental, sealevel, ecosystem, overpopulation, agriculture, pollution, warfare, massdestruction, aliens, cold, iceage, bioterrorism, chemical, solarflare, superstorm, asteroid, extraterrestrial, invasion, climatechange, blackhole, supernova, hypernova, geomagnetic, pandemic, volcano"

3.2.3. Tools and Pipeline

Project *LEDA* is a first-person virtual reality experience created for Oculus Rift and additionally for Windows and MacOS platforms. The core gameplay mechanics involve the use of artificial intelligence dialog systems, the creation of a graphical user interface, as well as procedural and parametric design. For the creation of *LEDA*, a series of software was used. In general, hard-surface models were created using 3ds Max and then imported to Unity Engine, whereas the models of a more organic form, such as the humanoids appearing in the "extra-terrestrial invasion" scenario were modeled in Pixologic ZBrush. Models that incorporate animations in them were further developed, rigged and animated in Autodesk Maya, as in the case of the robot-looking walking cities, inspired by Archigram's project of the same name.

Figure 73: Personal Experimentations. (2017). LEDA. Screenshot. Extra-terrestrial Invasion.

Figure 74: Personal Experimentations. (2017). LEDA. Screenshot. Floating Cities.

Figure 75: Personal Experimentations. (2017). LEDA. Screenshot. Super-skyscrapers.

Other models that are more related to numerical data given by the user are being

Figure 76: Personal Experimentations. (2017). LEDA. Screenshot. Walking Cities.

Figure 77: Personal Experimentations. (2017). LEDA. Screenshot. Underground City.

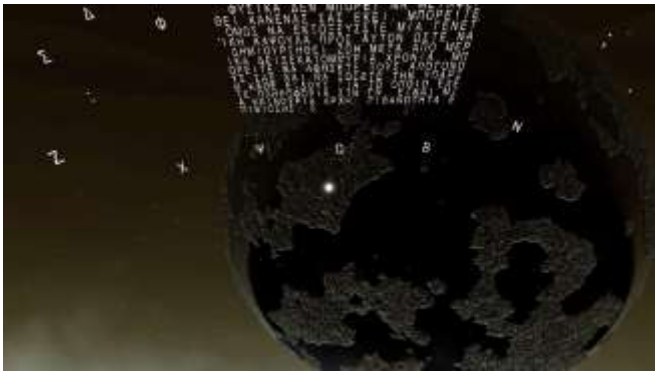

Figure 78: Personal Experimentations. (2017). LEDA. Screenshot. Another Earth.

created in real-time algorithmically using C# language and the basic 3d primitive shapes of Unity. The super-skyscrapers for example, which are created in case of an overpopulation risk, are simple Unity boxes, whose area size and height are being modified according to additional numerical data given by the user. Similarly, the floating cities, which appear in the nuclear holocaust scenario, are made by a large number of spheres, stretched in that way to create the illusion of domed structures. The bigger geodesic dome surrounding them and transforming these cities to floating micro-planets, is also a Unity sphere, with its normal reversed so that its semi-transparent material can be seen from the inside. In every case, concerning the models appearing in real-time during the game, a fade-in and fade-out technique was used, by manipulating each object material's alpha channel through a script, for a soft transition between each state.

Apart from the procedural models, the general environment and the graphical user interface were also built inside Unity. The fog, the emissive light coming from the plane, the stars, even the cursor were created using Unity's particle system. The letters are also Unity planes on which a cut-out, the letter-textured material is applied. A first issue was that both the letters and the cursor should always be visible to the user, even in the case of newly generated geometries between them. But this issue was easily resolved by adding these objects to a separate Unity layer, which would always be rendered in front of anything else using a second first-person camera.

A second issue was the transformation of the user's language, coming from the interaction with graphical objects to a language Unity could understand. Each letter is a plane game object, tagged with the character it is representing. So, when the user is "hitting" a letter in the sky, this tag is being converted to a character and the formed words to strings understandable by the script. A timer is constantly checking the amount of time passed from the user's last selection. If it has been more than 10 or 15 seconds, Leda understands that something is wrong, resets the user's string and helps him form a proper one.

The strings, coming from the letters-characters that the user picked, are being compared to some predefined ones, in relation to the question given and result in various outcomes, such as newly generated graphics or further dialogs. And vice versa, when Leda is responding to an input given by the user, the strings of her sentences are being transformed to character arrays. These characters are then being used as search terms, to find the game objects in the scene having them as a tag. Then the game objects are being instantiated as graphics, being read by the user and self-destroyed after a new response. Handling dialogs within a script is a painful procedure, so a dialog tree reference was created and kept being organized with the help of Adobe Chat Mapper (Figure 79).

Figure 79: Personal Experimentations. (2017). LEDA. Part of the Dialogue Tree in Adobe Chat Mapper.

3.3. An Alternate Reality

3.3.1. Dystopian Mind

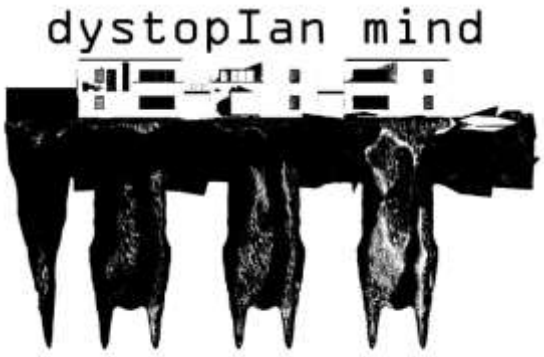

Figure 80: Personal Experimentations. (2018). Dystopian Mind. Poster.

In the frame of this research, another experimentation took place during my studies at the University of Paris VIII. *Dystopian Mind*, is a first-person virtual reality experience that implements all topics developed in the previous chapters, concerning architectural fantasies: Digital reconstruction of real places, manipulated in such way that they form an alternate reality, urban fantasies, real-life elements blended with unreal and of course, an imaginary building honouring my favoured theme of "Babels".

The time-setting of *Dystopian Mind* is undefined and open to interpretation. The experience takes place in the student residence of Paris VIII, not surely in Saint-Denis though or even in Paris, since the whole settlement is floating above a static, imaginary city impossible to exist in real life. During the whole experience, there is an atmosphere of deadlock and standstill. There is no evidence for any kind of life around, yet everything gives the impression to be moving but in a barely noticeable way.

In fact, the whole settlement is moving above the city, by having a soft floating behavior like a ship in calm waters. The settlement's ground is also having a secondary movement. Small and bigger pieces of rock are coming out of it, decomposing it and floating in the air in very slow motion. Actually, the movement of the rocks is an explosion simulation stretched in time by a factor of thousands. In real time, the ground would be destroyed in a few seconds making the whole settlement fall apart. The intention is to give the impression that the time is almost frozen, just moments before a total failure.

Recognizing the explosion could be a hint for the user, explaining what caused the creation of this dystopia. Nevertheless, there is no such hint. The scope of *Dystopian Mind* is to make a socio-political point regarding isolation of communes, residences and individuals in

metropolitan urban environments further explained in the following chapter. This one of the reasons, alongside with a homage to a favorite film of mine and the fact that time is stretching refers to a moment that has already passed, I chose black and white for representing my idea. Black and white, has occasionally been used by directors in cinematography to render political messages.

During the wandering of the user in the project environment, there are some points of interest he can observe. Above the residence entrance, there is an eyeball structure, constantly surveilling everything that is going on in the area. The residence building themselves, are purposed to be shelled, having a different usage than the one they have in real life. The area where the kitchen and some rooms of each building used to be, is now an empty space, potential for holding exhibitions in it. Right now, only one of the buildings holds a projection photography and installation exhibition, but the rest of them could also be destined for further development. Another point of interest, is the distorted city below him, with its central square on which some other, more commercial-typed images are being projected and its massive tower far ahead. The tower, is of a different architecture, majestic and foreboding at the same time, and it looks that it doesn't fit there like it was planted there afterward to reflect the dystopia's domination over the city.

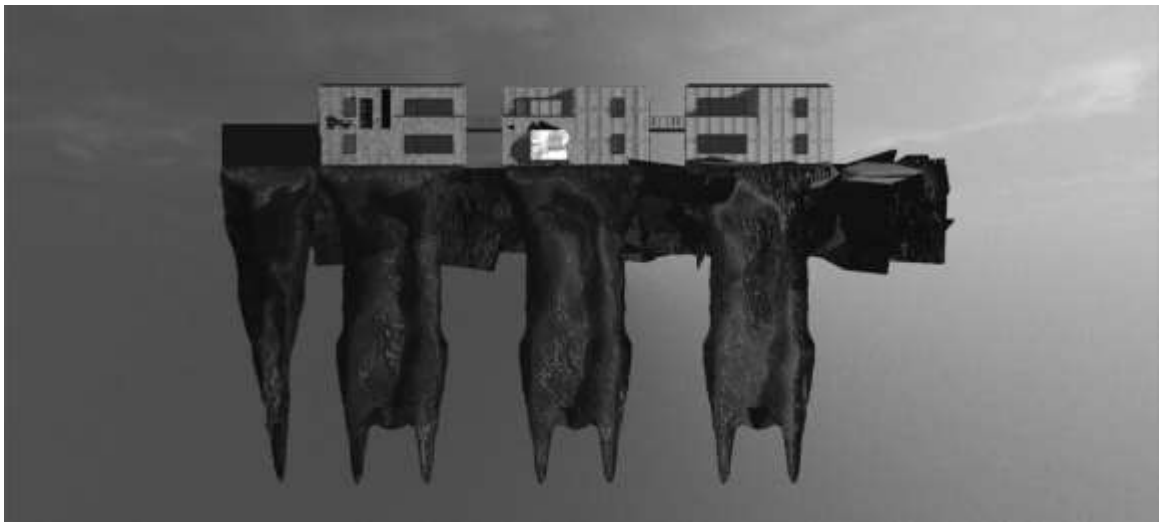

Figure 81: Personal Experimentations. (2018). Dystopian Mind. Screenshot. Residence Setting.

All these uncanny elements constitute an undisclosed environment, available to be explored for as long as the user doesn't put his full trust in it. As soon as he follows the city's projection guidance, the existence of dystopia ends. Taking the leap of faith to join the city below him, which symbolizes metropolitan society, is not the wrong or the right way, so the ending is also open to interpretation.

3.3.2. Scene Description

As the user enters the experience, he finds himself in one of the residence's bedrooms (Figure 82). Ambient music consisting of baritone voices is playing, resembling sounds of church psalmodies. Everything is in shades of black and white, composing a depressing atmosphere. The room's furniture is arranged in an abnormal way, and the door is closed not allowing any interaction with it. To the other side of the room though, a big part of the wall is missing, revealing the framework of the structure (Figure 83) and indicating an exit to the residence's patio.

Figure 82: Personal Experimentations. (2018). Dystopian Mind. Screenshot. The Bedroom.

Figure 83: Personal Experimentations. (2018). Dystopian Mind. Screenshot. Exterior of the Bedroom.

Jumping down to the patio the user comes across a scenery of destruction and damage. The ground underneath his legs is cracked and buckled like it has been hit by a massive earthquake (Figure 84). Rocks are coming out of it, floating in the air alongside with dust consisting a hazy, suffocating air around him. Big parts of the tarmac are missing, revealing that the whole settlement is floating in the air. The residence's buildings, some of them also half-destroyed, have grown a soil residuum hanging over them, as they have been violently detached from the earth. Through the tarmac's holes, a part of the city can also be seen. Cold, misty sunlight is illuminating the whole environment.

Figure 84: Personal Experimentations. (2018). Dystopian Mind. Screenshot. View of the Ground.

Figure 85: Personal Experimentations. (2018). Dystopian Mind. Screenshot. Skyspcraper Framework.

Behind the residence buildings some vast, indistinct structures can be observed. Made of steel, they resemble skyscraper frameworks, formed in an irregular way, lacking any alignments between its horizontal and vertical beams. Behind the user, as he looks straight

ahead to the Babel-like tower and next to the room he used to be, the eye structure takes place, monitoring any activity within the area including the ones of him.

One of the residential buildings is also half-destroyed, missing a part of the exterior wall. By approaching it, the user is listening another kind of music coming from it. It is the sound of electric bass, combined with a narrative of unclear words and phrases. In the building, a projection takes place, showing disturbing images of photography, mixed with text and graphic elements. A dark, cross-shaped sculpture is installed in one of the sidewalls right next to the first level bridge which, before being destroyed, was connecting all the buildings together.

Figure 86: Personal Experimentations. (2018). Dystopian Mind. Screenshot. View to the Eye-Structure.

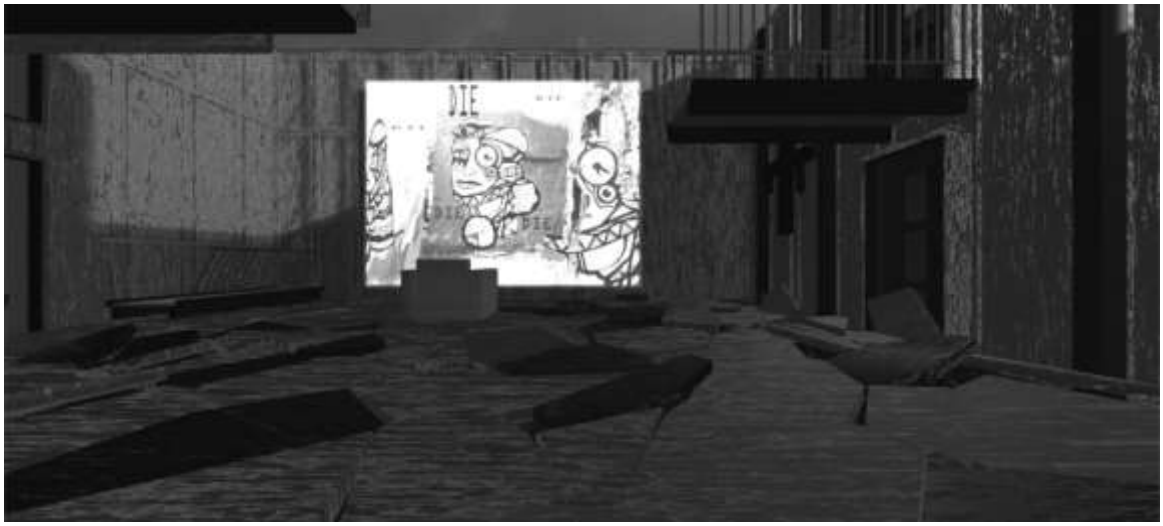

Figure 87: Personal Experimentations. (2018). Dystopian Mind. Screenshot. Exhibition Room.

After visiting the photography exhibition, the user can move towards the city, by approaching the open space the edge of the platform. The magnificence of the tower can now

be observed as a whole, unobstructed from interfering geometries within the panoramic view of the city and the background environment. The tower takes place at the point where the city ends, and an endless, desert-like landscape starts spreading. It is in the center of the user's view, and the housing settlement's position, like having a constant conversation with them, as the platform bearing them seems to be heading closer and closer to the tower.

Figure 88: Personal Experimentations. (2018). Dystopian Mind. Screenshot. Tower of Babel.

The city is enormous and buckled, forming a curve aligned with the direction of the residence platform, as if it tries to enclose it. The buildings have somewhat surreal qualities, not making clear of which way is up, by merging exterior components like doors, windows terraces, fencings and barriers altogether on the same facades. Close to the tower and in the same direction, the big central square of the city can be observed. On its surface, another projection of images takes place, carrying out subliminal messages, consisting of advertising material and small phrases. These phrases focus on making the user "trust" society and "dive" back into the urban environment.

Figure 89: Personal Experimentations. (2018). Dystopian Mind. Screenshot. View of the City from the Platform.

The scene ends when the user decides to follow the guidance and jump from the edge of the platform. The scene environment becomes all bright and white, and the music fades out as he is falling away from the audio source with a Doppler effect. and new music fades in, while the ending titles are making their appearance.

3.3.3. Inspirations and Meanings

The concept that blends the topics of digital reconstruction, blending real with unreal elements, urban fantasies, and imaginary buildings together, is a glimpse to a familiar environment in the alternate world of a dystopic way of thinking. The project is reflecting some personal thoughts of mine regarding the repetitive patterns of isolation I observed existing within metropolitan urban areas and their impact on the society living in it. In the particular case of living in the student residence of Paris VIII, there are three isolation phenomena from my point of view, that influenced me in forming this concept.

Figure 90: View of the Student's Residence from the Campus. Saint-Denis, France. 2018.

Figure 91: Levin, G. (2008). Double-Taker (Snout).

First, there is the awkward relationship between Paris and Saint-Denis commune. Saint-Denis has its own character, kind of culturally separated from the rest of Paris and some would say it is governed by different rules. The second phenomenon is based on the placement, the "outhouse-architecture" and the layout of the buildings forming the student residence. Laid on the terrace of the university's restaurant, more than a dozen meters above the ground level, and in big distance from other residential buildings, the student houses lack from connections with the rest of the city life, hardly even optical ones. The third level of isolation is more personal, in relation to individual personality and psychology after a change of scenery takes place. These phenomena arose questions to me about the nature of urban society and the pressure an individual feels or even accepts to join it.

Figure 92: Personal Experimentations. (2018). Dystopian Mind. Screenshot. The Eye.

Except personal experience, a big part of my influences come from the world of installation art, literature and especially cinema. The eyeball structure settled above the lobby is partly about the surveillance equipment used in interior spaces of the residence and criticism to it. The concept is inspired by dystopian novels containing the feature of surveillance, such as George Orwell's *Nineteen Eighty-Four*, whereas the form, from Golan Levin's interactive installation of 2008, *Double-Taker (Snout).*

Figure 93: A sticker found in my room. Saint-Denis, France. 2018.

The way the exhibition is being held, that is a series of quick cuts of flashing images and text projected on the surface of a wall, is inspired by the "Ludovico technique," a fictional type of aversion therapy used in Stanley Kubrick's *A Clock Orange* (1971). The sculpture, taking place in the same exhibition area is based on a sticker found over my room's door-frame when I moved in the student residence. It is an Eastern orthodox symbol, consisting of Byzantine characters and an odd figure of a cross, with its lower part being divided into two uneven stripes. In the case of my sculpture, I combine the typical stiff shape of a cross, with the more organic, human-like version of the sticker one, since their juxtaposition looked interesting to me.

Figure 94: Personal Experimentations. (2018). Dystopian Mind. Screenshot. Cross-Sculpture.

The city environment is inspired mostly by two science fiction movies. Cristopher Nolan's *Inception* (2010) influenced me on the design of the "bent" urban web, alongside with the computer-generated cityscapes of digital designer Daniel Brown. The city tower's architecture, placement, and framing between the buildings, is a reference to Fritz Lang's "New Tower of Babel" the machine center and highest building in the city of the 1927 expressionist film *Metropolis.* Lang's tower symbolizes similar issues of isolation in metropolitan environments in his film. In his case, it is the isolation

of the working class that built this tower from the upper class, isolation that as Lang's work suggests, should not exist.

> *"And the minds that conceived Babel cared nothing for the hands that built it."*
> *"The hymns of praise of the few became the curses of the many."*
> Lang, F. (1927). *Metropolis*.

Figure 95: View of the Real Residence. Saint-Denis, France. 2018.

Figure 96: Lang, F. (1927). Metropolis.

Figure 97: Personal Experimentations. (2018). Dystopian Mind. Screenshot. View of the Residence.

3.3.4. Tools and Pipeline

Creative Process

The idea of *Dystopian Mind* was formed during my research on the theme of using virtual reality as a tool, for simulating and proposing artistic interventions in actual architectural spaces, or in case such intervention would be impossible in the real world, holding fantasy-exhibitions in virtual reconstructed versions of such spaces. After deciding that an intervention like this would be a major part of my experimentation, I started thinking of places of cultural or historical interest in the city of Paris. As I was wandering around in one of the open areas of the student residence of Paris VIII, and more precisely the one above the lobby where the eye structure takes place in my project, I observed that the whole settlement resembles a cargo ship and the small student buildings like containers being carried by it. I decided then that the setting does not have to be of special interest, historical or cultural, as long as my personal experience in it would let me deeply express in an artistic way some personal thoughts about it, concerning the themes of isolation, surveillance, and urbanism.

After deciding that the students' residence would be my main setting, as a cargo ship, I should find out the surrounding environment. The questions were in regard to where this

ship would be heading to and in what kind of matter it would be floating, as well as the concept that blends everything together. The obvious answer to the first question was that it would be floating in the air and over a city like it already looks like doing. My already shaped preference to the theme of “Babels,” soon gave an answer to the second question too, by concluding that the symbolical destination of the “freighter” would be an architectural fantasy too: One more interpretation —among hundreds of others in the world of arts— of the Babel Tower.

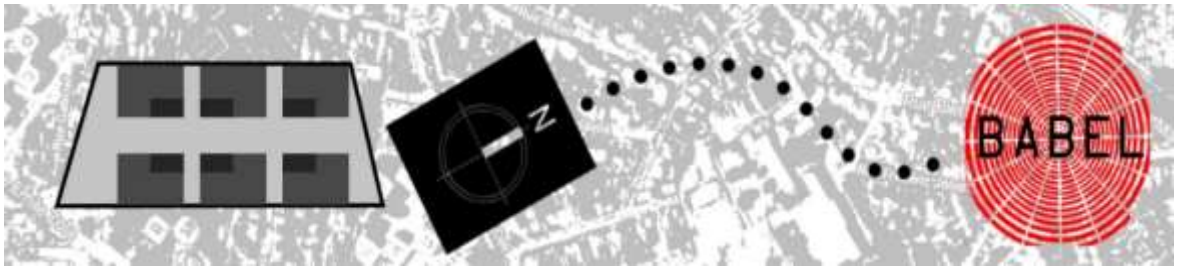

Figure 98: Personal Experimentations. (2018). Dystopian Mind. Macro-Scale Concept. Collage.

When these basic decisions were taken, I was ready to start drafting some macro-scale siting concepts. Because of the backing and enclosure, the lobby provides to the residence, this side would play the role of the stern, whereas the north-west side would be the bow, consequently towards this direction the tower would take place. Initially, in their virtual version, all six buildings of the residence were purposed to host installations in them. Since my artistic-installations portfolio though is empty, I decided to use only one of the buildings and give an example of the potential these spaces have. Hopefully, all of them will be further developed hosting work of various artists.

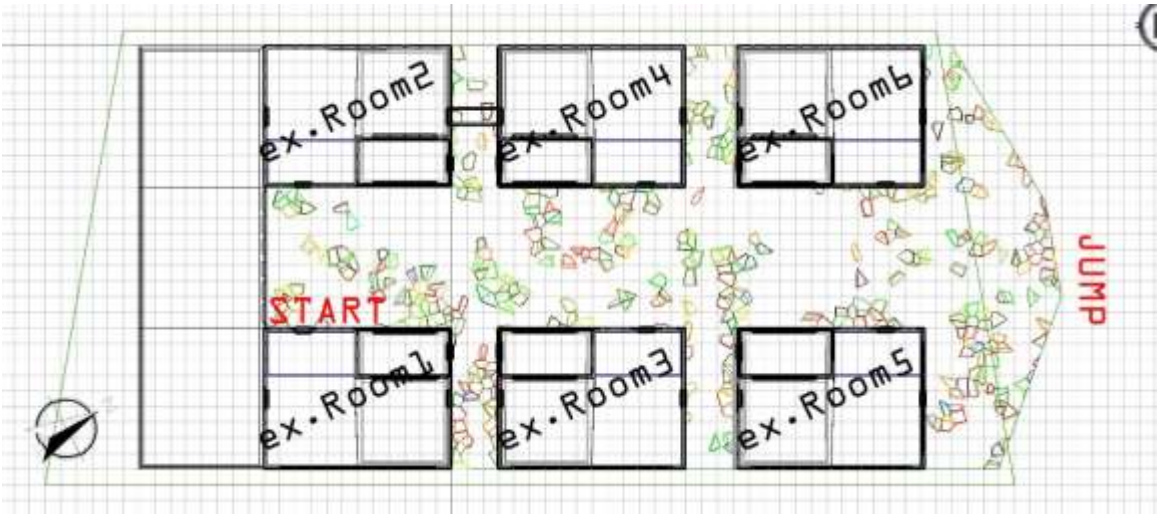

Figure 99: Personal Experimentations. (2018). Dystopian Mind. Concept Stage. Use of Space Diagram.

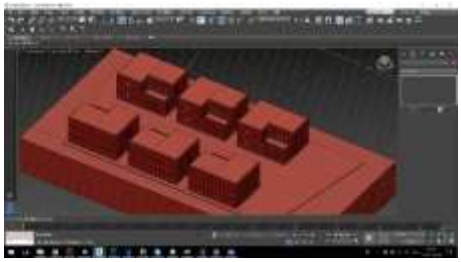

Figure 100: Personal Experimentations. (2018). Dystopian Mind. Modelling in 3ds Max.

Figure 101: Personal Experimentations. (2018). Dystopian Mind. Modelling in zBrush.

After having the macro-scale arrangement drafted, I was ready to move to a smaller scale and start drafting the basis of my project, which is the residence. Since I had already decided that the platform would be almost destructed and that the buildings would serve as empty shells for exhibition purposes, only the exterior of the buildings should be accurately measured. An exact measurement was important for a result replicating reality so that people familiar with the residence and try the experience, get really absorbed in it. Thankfully, the whole buildings' exterior is covered with wooden panels whose size was easy to measure and alongside with a google maps reference a first small-scale masterplan was drafted. Then, the plan was imported into 3ds Max, and a three-dimensional model was built as a prototype for each building, using simple box-modeling techniques. Additionally, the "ground residuum" hanging under each building was modeled in ZBrush, using digital sculpting tools.

From this point, I had a basis to work from. The model was imported into Unity Engine, and the environment started to take an initial form. After this stage, all of the elements consisting the scene were further developed separately and altogether at the same time. A further examination of the process behind their creation will take place in the next chapters.

Modeling Destruction

For having the aesthetics of a post-apocalyptic environment, a series of explosions were simulated, in order to leave a trail of destruction behind them. The scene elements most affected by it, are the platform's cracked ground, the animated rocks coming out of it and some of the buildings' walls.

After the manual modeling stage, I made use of a plugin for 3ds Max called *Rayfire*, which is widely used in video games and film industry for simulating physical destructions, such as the impact of earthquakes and explosions. At first, I started experimenting with the various fragmentation types offered by the plugin's *fragmenter* modifier and their properties. There are two basic methods of fragmentation forming these types: ProBoolean method,

which uses 3ds Max's ProBoolean or ProCutter engine for fragmentation based on repeating cuts of the geometry in different places and Voronoi fragmentation, which uses point clouds, corresponding to fragmentation partitions, and the Delaunay triangulation process. Both of them, include several subtypes that define the partitioning distribution over the geometry such as uniform and irregular.

Figure 102: Rayfire. Fragmentation Types. From top to Bottom: ProBoolean Uniform, ProBoolean Irregular, Voronoi Uniform, Voronoi Irregular. Source: http://rayfirestudios.com/features/fragmentation-types/

For the platform of the scene, I ended up using the Voronoi Uniform fragmentation type, with a small number of iterations so that they would form a look of a cracked ground, almost split to a small number of big rocks. Even though I wanted an irregular distribution of fragmentation, so that particular areas would consist of smaller rocks in favor of a naturally random look, I chose to perform first a uniform one, and later additional smaller-scale fragmentations to some of the newly created partitions. This way I would have better control of the main area where the user moves and avoid obstacles like holes, blocking the entrance to an exhibition space.

After fragmenting the model, the next step was to create a force that would push all these fragments away. Since I wanted more of a vertical distortion, so that my model would still fit between the residence buildings, I created a linear explosion of planar symmetry, using the built-in "PBomb" force. Then, the elements consisting the scene should be defined for their physical behavior. Using 3ds Max's MassFX tools, the Voronoi platform was set as a dynamic rigid body with the behavior of concrete material, whereas the buildings as static. A static plane under the platform holding all the rock elements from falling was not needed, as the simulation would not serve animation purposes. Only one of the first frames with the minimum distortion just before the platform is blown up was used as the permanent state of the model.

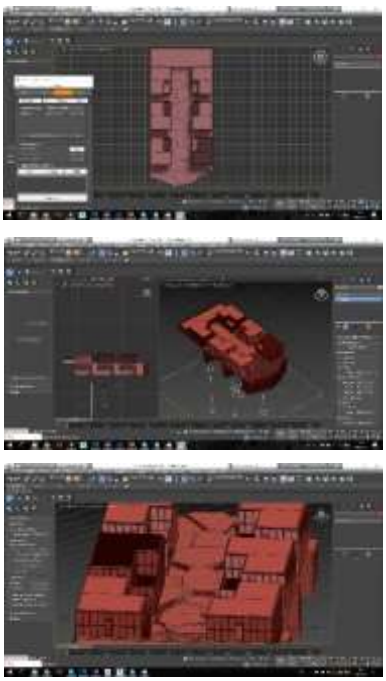

Figure 103: Fragmenting and Exploding "Dystopian Mind's" Platform using 3ds Max, PhysX and Rayfire.

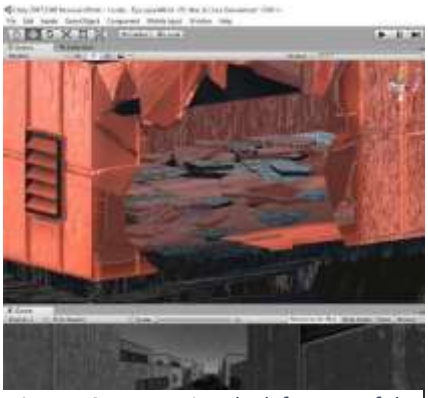

Figure 104: Importing the left-overs of the exhibition room in Unity Engine.

The exact same method was used for the creation of the wrecked wall of the exhibition building, offering an entrance to it, as well as its flooring. In this case, though it was not the first frame of the animation that was used for the build of the final model, but the last one, with all the wall and floor parts being laid down on the ground after the explosion has finished.

A similar method was used to create the small rocks coming from the platform and floating in slow motion around the environment. A replicate of the platform but with a significantly smaller height was used as a basis. In this case, a more irregular fragmentation method was used, to achieve a variety of different sized rocks. Since I didn't want too many rocks though, blocking the user's view, more than the half of them were selected according to their size, using the Rayfire selection tools, and deleted. The next steps remain the same as the ones followed in the previous for the previous models, nevertheless, in this case, the whole animation was baked and imported in Unity with a time scale of 0.01, which was scaled down even more in Unity during the building of the scene.

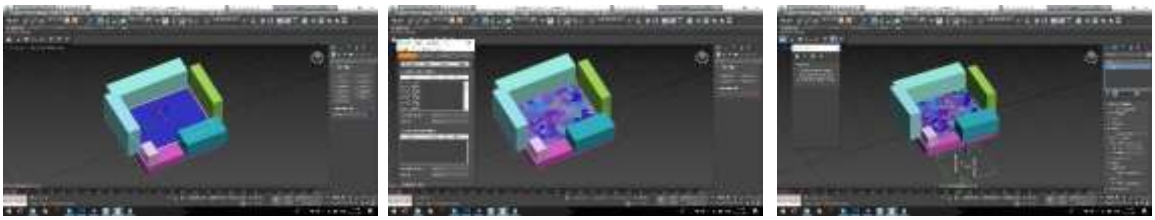

Figure 105: Fragmenting and Exploding the "Exhibition Room", using 3ds Max, PhysX and Rayfire.

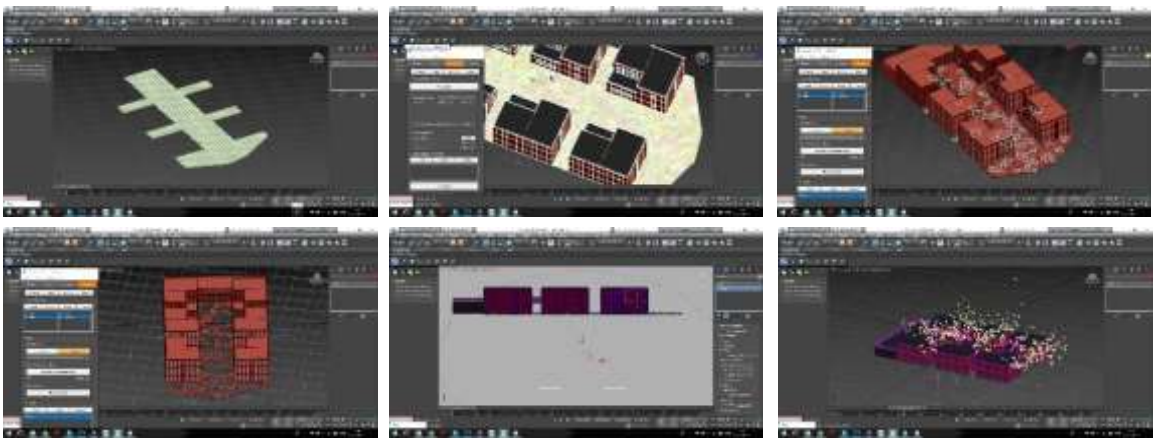

Figure 106: Fragmenting, exploding and animating the "Floating Rocks" using 3ds Max, PhysX and Rayfire.

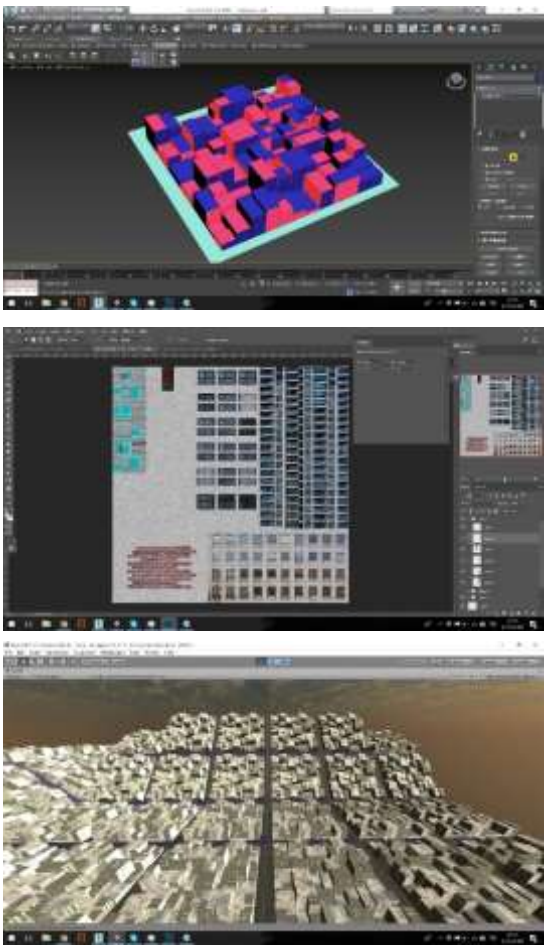

Figure 107: Making of the City under the platform, using 3ds Max, Greeble modifier, Photoshop and Unity.

Procedural Tools

The city-scape, that would form the lower level of my project's environment, should be enormous, and even as a background have a satisfying level of detail. For this reason, a procedural workflow should be adapted. After some research, I came across Tom Hudson's *Greeble* modifier, a 3ds Max plug-in, used for generating procedural surface details to 3ds Max models. When applied to a surface, *Greeble* generates random subdivisions and extrudes them in random heights, between values defined by the user. Each building block of the city we are floating on is a plane surface of multiple segments, on which the *Greeble* modifier has been applied.

For the *Inception*-like look, a method of also random surface texturing has been followed. Using the 3ds Max selection tools, the faces were detached from each other, and reattached, in a random way as three separate groups, each one having its own texture. The textures themselves, are also odd. Each one of them contains elements of both horizontal and vertical exterior architectural features, such as doors, windows, street and terrace elements, one next to each other reminding of a sprite sheet, yet arranged in a random way.

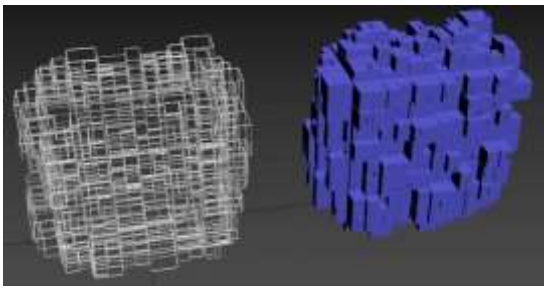

Figure 108: Using "Greeble" and "Lattice" modifiers to model the adjacent skyscraper frameworks.

Playing around with *Greeble*, the idea of the adjacent skyscrapers came up. These giant steel-framework structures are made from cuboid geometries, on which the greeble modifier has been applied. Then, the *3ds Max* built-in "Lattice" modifier has been applied, in order to give the edges a radial thickness and after the material assignation a metallic beam look.

The last application of *Greeble* modifier took place for the creation of the eye-structure. The eye's hairy "body" is actually a bent, cylindrical geometry on which the modifier has been applied, forming hundreds of extrusions that were beveled to look like spikes. The eyeball was modeled in 3ds Max and its texture created in Adobe Photoshop using the software's render tools and distortion filters. The continuous rotation is controlled by a script, towards random targets, including the one of the user.

Additional Visual and Audio Effects

The audio-visual effects being applied in the project, play a key role in the expression of its dystopian feeling. As already noted, the "black and white" effect, alongside with a "noise and grain" one and additional tone mapping, were also applied as a reference to the aesthetics of the film *Metropolis.* The steamy atmosphere of light scattering, fog, and density, is being achieved by the use of volumetric lighting.

The image projections in the exhibition building and on the city square, are simple unity planes with a material applied that uses an unlit shader. The rendering mode of this material is additive, and the color mode is set to multiply so that the projected images blend with the texture of the geometries behind them. The images are the texture of the material, and they are being swapped at runtime by a C# script applied to the planes, at a random rate between 0.05 and 0.5 seconds.

The music was created using Ableton Live. There are four audio sources in the project. The first one is in the bedroom where the experience starts, second and third one in the exhibition room, and the fourth one takes place in the scene of the ending titles. All four sources use logarithmic falloff, with various distances from which they can be heard so that different mixes are being produced according to the user's position.

The instruments are based on Ableton's built-in instrument library, whereas the melodies were created algorithmically: A number of note values were chosen and assigned to a sequence of midi clips at the setting of one, half, quarter and eighth of a bar. Duplicates of these clips were moved up an octave for a wider variety of instrumental combinations. These clips were then put to play in almost random order, using Ableton's follow actions and probability fields. Each midi source was recorded, exported to a .wav file and imported as a separate audio source into Unity. All audio sources share the same tempo so that a proper mixing takes place when the user stands or moves between them.

4. Conclusion

Following the examples analyzed in the second part of this essay, that conform with the development of old and new media, a transition of architectural fantasies from one state to another is observed. That is, the transition from serving as an exhibit in drawing representations, to semi-functional –or pseudo-functional– representations in film, where fictional characters seem to act and live in them, and then as a fully functional environment in the medium of virtual reality. The functional character of architectural fantasies, even today, is not mandatory though. The level of functionality offered depends on the purpose of the project. When they are intended to inspire or convey a message, the user's personal interpretation plays a key role, which could possibly mean a lack of detail about how the spatial environment works.

What is interesting though for further examination nowadays, is that this transition leads towards a new type of reality, whose properties require –or offer– a design process distinctive from the conventional one. Such properties mainly rely on the relation between the physics of real-world and virtual reality, a relation defined by the designer. Physical phenomena like gravity, decomposition and typical behaviors of collision are only references to the constitution of the user as a human being. Overturning such phenomena means a different approach to the creative process followed by the designer: an approach focusing more on the design of a user-experience rather than of a spatial layout, which does not necessarily correspond to the adjacency diagram of the same space.

In terms of context, the latest medium of virtual reality offers architects and artists the necessary tools to realize their impossible spatial fantasies, frame socio-political messages and carry out their multidimensional architectural thinking, by creating totally fictional worlds or re-imagined versions of the real. For physical reality, the same tools and the surrounding technologies can be used for proposing and solving complex structural concepts and bring architectural fantasies and artistic interventions, intended for real environments, to life.

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9. Index

Delaunay Triangulation for a set of points ensures the circumcircle associated with each triangle (formed by points of the set) contains does not contain a fourth point in its interior.

Doppler Effect is the change of the wavelength of a sound coming from an audio source, when the listener, or the source is moving.

Infrared Reflectography is an imagining technique that reveals the ground layers under the paint, using near infrared radiation. This layer can be scanned separately and be exposed in Virtual Museums for a greater user experience.

Ludovico Technique a fictional type of aversion treatment used in Stanley Kubrick's film of 1971, *A Clock Orange*. It incorporates forcing a subject to watch violent scenes with the use of nausea-inducing drugs with the purpose of causing negative emotional responses to criminal thoughts.

Point Cloud is a set of data points in a coordinate system.

Primary World is a term used by Tolkien to describe reality

ProBoolean / ProCutter is a 3ds Max operation for combining or sectioning multiple 2d or 3d objects.

Secondary World is, according to J. R. R. Tolkien, a sub-created, fictional world. It can be done not only in literature but in various media forms. According to Dan Hassler-Forest, secondary worlds are always projections of tensions, desires, anxieties, and contradictions that define our own material world.

Schüfftan Process is a mechanical effect technique used widely in film industry. It makes use of a mirror being placed at an angle in front of the camera. Parts of the reflective surface of the mirror are being removed so that sets behind the mirror can be also seen. The process was later replaced by the blue screen technique.

Silverpoint is the technique of drawing with a sharp piece of silver, like metalpoints, wires or styluses on to a carefully prepared surface. It was broadly used by European artists before the invention of graphite pencils.

Swarm Intelligence is the behavior emerging from systems composed of simple individual components, following simple rules regarding only their immediate environment.

Triptych is a work of art made of three hinged panels, all presenting a main subject.

10. Appendix

[1] The title of this dissertation is a reference to the self-funded book of the same name[7] published by the constructivist architect and graphic designer Yakov Georgievich Chernikhov in 1933. Radical by nature, his “abnormal and chaotic” work has been discarded by his government and a big part of it has gone missing from the Russian State Archives. In “Architectural Fantasies”, he envisions and predicts the city of tomorrow using symbolic colours and glorifies the upcoming mechanical evolution.

[2] A source of my research for *Dystopian Mind* and more particularly for the phenomenon of isolation of the Saint-Denis commune is an article written by broadcast journalist Cagil Kasapoglu for BBC Turkish. The article focuses on the relation of Saint-Denis society with the central districts, after the triggering event of a police operation followed by the attacks that took place in Paris in November 13th, 2015.

“Residents here see themselves as separate from the rest of Paris. I frequently hear remarks about us and them"

"Those who become radicalised are mentally weak. I used to get upset by what people said about the banlieues, but now I don't even care. They have their lives, we have ours."

The whole article can be found in the following link:

http://www.bbc.com/news/world-europe-34855612

[3] The interiors of the “safe house” seen in the film of 2012 *Cloud Atlas,* directed by Tom Tykwer and Lana Wachowski, were an influence that gave me the final boost regarding the way the State of the Art part was going to be organized. The fact that industrial revolutions entirely changed how cities look like arose the question of how they are going to be affected by virtual reality. Consequently, the examination of examples was decided to be structured under the prism of usability

[5] In the same context, an important influence was the work of the media theorist Marshall McLuhan, with which I dealt with during the first year of my master studies. McLuhan, observed that in the world of new media the boundaries between art, function

[7] Chernikhov, I. (1933). Architectural Fantasies: 101 Compositions. Leningrad: Mezhdunarodnaia kniga.

and utility are being erased and the one, should serve the purpose of the other. He also insisted that technology is the extension of human functions, an assertion that could integrate virtual reality into the perceptual mechanisms of human being, rather than being one of his tools. Such a concept could deform the notion of reality as we mean it today and bring virtual environments to their essential context.

[6] The definition given for the term *fantasy* in the first part was chosen among others, for its close connection with backstories and written descriptions, which formulated the elementary prism for this dissertation. Numerous definitions were given to the term of fantasy by different fields of study. For psychiatrist and writer Nikos Sideris, *"Creation is the result of interaction between five fields – Myth, History, Biography (personal history), Imagination and Work. Their interplay ultimately constitutes the singular psychic formulation of one's sense of the world and personal destiny – his fundamental fantasy."*[8]

[7] In his article *Fantasy, Construction and the Dual Spatiality,* the same writer, Nikos Sideris, defines the specifity of architecture by a mathematic "quasi=formula", which was also intended to be used for the cover page of this dissertation:

$$A = (fa)^{lc}$$

"Architecture = the architect's fantasy (fa) formulated in the language of construction (lc)."

[8] For Sigmund Freud, fantasy is a mental and intellectual work and art is the way to obtain pleasure from it. As he notes in his book *Civilization and its Discontents*, talking about subjectivity and pleasure:

"A satisfaction of this kind, such as an artist's joy in creating, in giving is phantasies body […] has a special quality which we shall certainly one day be able to characterize in metapsychological terms."[9]

[8] Sideris, N. (2016). Fantasy, Construction and the dual Spatiality. In *Architecture and the Unconscious*. (pp. 187). Routledge.
[9] Freud, S. (1961). *Civilization and Its Discontents*. New York: W. W. Norton & Company.