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In the Space and in the Time. Representing Architectural Ideas by Digital Animation †

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Abstract: Since the late Nineties, digital architectural animation emerged as one of the main methods for representing design ideas. The 'spectacle of architecture' created by digital representation of space and time, arose as one of the most effective media for the prefiguration of architectural design. The great complexity of architectural video's production quickly led to the birth of new professionals and creative companies specialized in modelling, rendering, animation, graphics, montage, editing and post production. The author investigates on the methods, techniques and languages of the fourth-dimensional representation of architecture, almost unexplored area of research thus far, by relating them with the architects' personal poetics. To support observations, discoveries and theses, this paper provides analysis and critics of several case studies and traces an ideal interpretative path, considering both to the changing technologies and the emerging specific languages.

Keywords: digital animation; architectural videos; 3D modeling; representation; architectural design

1. Introduction

"I would like to encourage all architects to tell the story of their designs by using videos, because it is a tool which helps people to see a design in a different way. Our experience of architecture is dynamic: we move through spaces and it is precisely this aspect that a film is able to explore" [1].

Since the late Nineties, digital architectural animation emerged as one of the main methods for representing design ideas. The 'spectacle of architecture' created by digital representation of space and time, arose as one of the most effective media for the prefiguration of a architectural design allowing to preview master plans, buildings, spaces and urban environments before their construction.

The ability to access the fourth dimension through the construction of a sequence of images constitutes a specific prerogative of digital representation, which goes beyond the static constraint imposed by methods codified by Descriptive Geometry.

The great complexity of architectural video's production quickly led to the birth of new professionals and creative companies specialized in modeling, rendering, animation, graphics, montage, editing and post production.

As a fairly recent medium, the animation of digital models requires the establishment of new relationships with several disciplines such as communication sciences and cinema engineering and with technologies like that of video games and it must also pass the test of comparisons with the established conventional technologies of film production. Considering architecture as a form of art, "we might learn from other artistic disciplines, such as moviemaking (cinematographic approaches, sequencing and animation), theatre (physical expression, interaction, improvisation) and music (rhythm, harmonic variation, but also digital recording and sampling). These may expand the

palette of architecture (traditionally making use of drawings, models, pictures and symbols)" [2] (p. 132).

This triggers a critical discussion on the ontological nature of films, on their narrative form and on their character of exploring human emotions, and it implies the attention of the videos of architecture to the perceptual effects produced by relations between persons and space.

Three dimensional digital models frequently constitute the basis for the production of particularly effective visualizations, using a variety of techniques, which can be exploited for different purposes.

The author investigates on the methods, techniques and languages of the fourth-dimensional representation of architecture, almost unexplored area of research thus far, by relating them with the designers' personal poetics.

To support observations, discoveries and theses, this paper provides analysis and critics of several case studies, collected by the author from the beginning of the phenomenon, and trace an ideal interpretative path, considering both to the changing technologies and the emerging specific languages.

2. Background

Some essential references aimed to understanding the language of this *medium* applied to architectural representation could be recognized in the works of Maldonado (2005), Manovich (2011), and Engeli (1999).

Maldonado underlines that the syncretic nature of digital models offers new opportunities to the scientific research and architectural design. Tests and errors occur in a space in which our experience of problems is rendered fluid and immediate as in an architectural promenade, "3D computer models … are able to cover the whole range of possible models in a single system of representation" [3] (p. 104).

Manovich states that, "as the computer culture is gradually spatializing all representations and experiences, they become subjected to the camera particular grammar of data access" [4] (p. 88). Indeed, by means of zoom, tilt, pan and track now we are able to interact with data spaces, models, objects and bodies.

Engeli notes that "the creation of specific messages relating to space requires an in-depth knowledge of the intrinsic characteristics, the different possibilities and the aspects that are wished to emphasize... The main parameters (light, materials, perspective) can bring out the nature of an object, work against it, reveal new information and add or hide aspects of the object" [5] (pp. 43–44). She underlines the role of the narration in the communication of a design, giving the public an opportunity to identify with the object that is being presented.

3. Protagonists, Sceneries, Contexts

The volatility of materials deposited on the web involves that reasoning about the evolution of project representation through animations is necessarily partial and relies on the analysis of videos collected over the years, which nowadays there is no longer any public trace. It can therefore generate subjective and different readings that in turn can generate narratives that focus on different protagonists, scenarios, contexts.

The stories and the pathways of designers, ateliers, engineering companies and those of creative agencies promoting their projects are intertwined and diverged over time. True fidelizations can be observed, as well as births of rendering farm within design studies.

Over the years, the rise of some creative agencies, their specialization in the field of architectural video production, but also their movement towards new forms of interactivity or, yet, towards the production of software and apps for computer graphics or their leaving towards advertising, video installations, and cartoons can be investigated through the periodic consultation of their sites. Even more interesting is the analysis of the composition of the team, generally led by architects, along with the presentation of poetics in the field of communication aimed at identifying the agency.

The scenarios that give rise to the production of professional video are mostly due to the ambits of the architectural competitions, public presentations and temporary exhibitions.

It results in different characteristics of the movies influenced, in terms of content and duration, by the requirements of the competition announcement and composition of the juries, or by the public authority, the circle of experts, and the audience they are intended.

They are products with a very high cost, in economic and time terms, to which has to be added their timely use and limited to a small audience. It results a rapid obsolescence, however, over the past decade, they are still at the center of interest in the design representation. In addition, they may enjoy, at least for some time, further dissemination through computer stations located at the physical places they have previewed, and within the websites of designers and creative agencies, as well as being freely shared in the web.

The contexts are subject to the scalar logic of the project: ranging between extensive masterplan for new settlements, urban regeneration projects, landscape projects, urban and architectural restorations, infrastructure projects, large utility buildings, diffused settlements, and individual artefacts, generally landmarks.

They affect not only the use of languages that maintain their consistency and recognizability, but the balance between digital techniques used: modeling, aerial and terrestrial shoting, photography, digital sketching…

4. Case Studies

Following the development of the architectural videos from the outset it is believed that, with some simplification, after a first moment of the centrality of digital modelling within which paths were created or singular elements of the building were animated a following moment in which photo-realistic and hyper-realistic results were chased and another, still, characterized by the pursuit and consolidation of narrative styles, is witnessing nowadays a phase of reflection and refinement, with a return of the communication process production within the atelier of architecture, which addresses, therefore, technical choices and languages consistent with its design poetics.

The current trend, in fact, is to turn increasingly to the opportunities offered by the motion graphics, through the hybridization between static and dynamic images of different nature, and a search for greater deepening of contents takes advantage of the development of the narration on motives, concept phases and constructive solutions.

The below developed discussion, traces, through the comments of the peculiarities of several videos found online (not always available even today), an ideal path built on some case studies illustrating the developments outlined above.

At the beginning of the phenomenon emerged the centrality of digital modelling within which paths were created or singular elements of the building were animated.

Zaha Hadid is one of the first architects who use the digital tools for the design, presentation and communication via video of the project. Central themes of her poetry, such as dynamism, fluidity, transparency, found a solution to the problems of design and representation in the digital modeling.

The animation of the three-dimensional models offers an opportunity to overcome the two-dimensional characteristics of her drawings and paintings and to move around buildings generated by the computer while they are still in the design phase [6]. A video realized in 1999 is the first that the author was able to find, which uses the techniques of animation of three-dimensional model in an architectural project. It shows the spatial characteristics of the architectural competition proposal for the Casino and the Grand Hotel in Lugano submitted by Hadid. In the short video (0:58), produced by the computer graphics studio Neutral in London, UK, a pioneer in the specific professional field, a lava flow cools and consolidates into a new architectural form that wraps the existing buildings. The model is rendered with only two colours, red and white, in order to resume the metaphor of lava and ice, in complete harmony with Hadid's the figurative language (Figure 1).

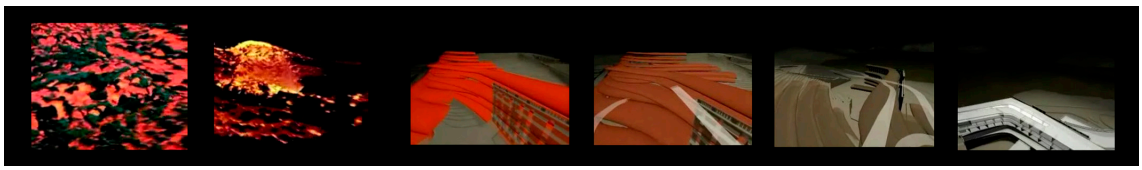

Figure 1. Zaha Hadid, Casino and Grand Hotel in Lugano. Movie by Neutral (0:58), 1999.

CCTV's new headquarters is one of the first European skyscrapers to be built in China.

As part of an international architectural competition organized by the Beijing International Tendering Co. (Beijing, China), the scheme presented by the Office for Metropolitan Architecture (OMA) (Rotterdam, The Netherlands) was awarded the contract on December 2002. On the 10-hectare site in the new Central Business District in Beijing, the OMA proposal consolidates the program in an iconic configuration. This landmark exemplifies the OMA idea of bigness.

It combines administration with news, broadcasting, studios and program production—the entire process of TV making—in a building. The building adds the three-dimensional figure of a loop to Beijing's skyline of towers.

The construction begins in 2004 and finishes in 2008.

As required by the client "the architectural designs should be innovative and the environment beautiful. Efforts should be made to ensure the finished new CCTV compound would be a landmark architecture recognized both at home and abroad, which markedly reflects the spirit of the times and a high level of cultural taste" [7].

The CCTV building is an angular loop formed by a low-rise on the bottom, two towers situated diagonally across from one another on the sides, and a bridge connecting the two towers at the top, leaving a hollowed-out cube in the center of the building. An irregular diagonal mesh, a brace frame engineered by Arup, wraps around the exterior of the building and forms its primary structure, giving the building unparalleled stability.

This innovative building was the subject of an exhibition at MoMA, in 2007. In this regard, the curator said: "The project is one of the most visionary since modernism and beyond. It pushes the limits of architecture, not just formally but, more importantly, socially, culturally, and technologically through the reinvention of the tall building. The various functions of buildings, their spatial articulation and organization, have been completely rethought to provoke a new kind of collective construct with the potential for social and urban change" [8].

The short competition video (3:08), was produced in 2002 by Neutral.

It starts with a question: "Today what makes a landmark?" and shows two counterposed images of the new skyscrapers and the Forbidden City. The functions of the future CCTV tower, represented as a histogram, move and rotate to shape the three-dimensional loop. Also the context, characterized by several high buildings, is completely modeled. The contrast between their parallelepiped shapes and the loop immediately appears. The camera turns around the building showing the transparency of its surfaces and the structural system. In the final sequences it rains and the ground is filled by some multicolor umbrella. It is a frequent and quite suggestive image of the climate of Beijing.

The film ends with another suggestive long sequence of the shining building in the night (Figure 2).

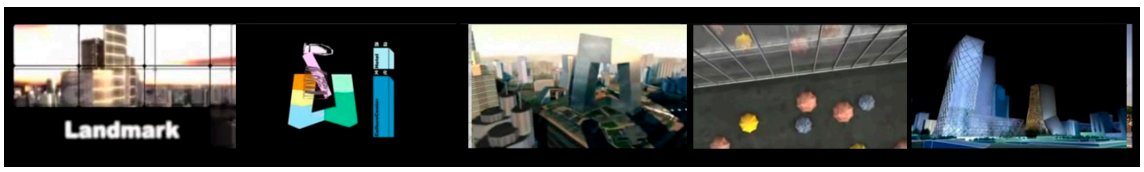

Figure 2. OMA, CCTV Headquarters in Beijing. Movie by Neutral (3:08), 2002.

In subsequent years, the improvement of digital techniques and tools accompanies the transition from animation resolved within the conceptual modelling to an extreme tendency toward

photorealism. The tendency to create photorealistic images aspiring to become perfect copies of reality establishes itself at this stage, in which rendering engines, textures of materials and systems for setting the lights are improving. Also some suggestions coming from the world of digital games and computer animation films are sometimes present in the architectural videos.

The launch of YouTube (San Mateo, CA, USA) in 2005, promotes the proliferation and spread of design representation through video.

Architectural competition for the Musée des Confluences in Lyon, won by Coop Himmelb(l)au (Frankfurt, Germany) in 2001, awards a project aimed at the needs of information-society: to make perceivable current knowledge to a broad public in a process of constant change.

Coop Himmelb(l)au says that "in the same way the future Musée des Confluences in Lyon is defined through the convergence of two currents, its architecture is characterised by the merging of two entities that are given urban stature with a local, regional and supra-regional significance, thus contributing to the self esteem of the city of Lyon within the regional boundaries of France" [9] (p. 14).

The concept, named Crystal and Cloud, combines a hard space (the crystal rising towards the city, conceived as an urban space and an entrance hall for visitors) and a soft space (the cloud intended by the designers to hide the knowledge of the future).

"The Crystal tunes into our daily world, its contours are clear and easy to measure, whereas the Cloud, containing a cloudy space of hidden currents and countless transitions, hints at what tomorrow might bring; knowledge of predicting future that has yet to be initiated. Present and future, the familiar and the unknown, merge in this crystal cloud to become an irresistible place of discovery, it is suspended above ground and removed from immediate grasp" [10]. A short movie presenting the project has been included in the Coop Himmelb(l)au website, since 2007.

A longer movie (7:30), produced in 2006 by Isochrom in Wien, Austria, is today in the Musee website. It starts exploring the area of Confluences by an aerial view, first zenith and then perspective, which shows a wide urban tissue extended to the town hall, modelled with simple volumes and rendered as a plaster model lit by natural light. As the approach is made from the river to the building, the model takes on greater realism and the movement of the camera transforms into a walk through towards and inside the building. A virtual person guides the observers through the main halls to the different floors and invites them to appreciate the architecture and examine the main collections by the way the shots are framed. During the tour the visitors meet "Crystal and Cloud" which characterize the shape of the building defined by "the interactions, the fusion and mutation of different entities" [10]. The model is realistically, but delicately, rendered with a particular focus on bringing out the quality of the materials, transparencies, reflections and opacities and interactions between the materials and the lights. A few blobs of warm colours attributed to the entrances of some halls, arousing the curiosity to enter them. They emerge in the interiors having cold colours, all ranging from white to grey and blue (Figure 3).

Figure 3. Coop Himmelb(l)au, Musée des Confluences in Lyon. Movie by Isochrom (7:30), 2006.

The project named 56 Leonard Street by Herzog & de Meuron consists of an iconic tower in the Manhattan skyline. The building is a vertical glass expression of sculpted surfaces, cantilevers and sparkling glass.

One hundred forty-five spatially innovative homes, looking like modernist villas, visibly stack upon on another to create a cascading sixty-storey structure, projecting a keenly evolved image of New York living, a global landmark.

In an unprecedented collaboration between artist and architect, the tower is seamlessly integrated with a specially commissioned work, a reflective squashed ball, by sculptor Anish Kapoor

at its base. The relationship between building and sculpture is so closely cultivated that they appear to form a single unified object, exemplifying true synergy between art and architecture.

The promotional video of the intervention was commissioned to Tronic, a firm of filmmakers in New York, in 2008.

Jesse Seppi and Vivian Rosenthal, founders of Tronic, in an interview by Justin Cone, affirm: "Herzog and de Meuron were interested in collaborating with us specifically because of our shared aesthetic and conceptual language. Not only did we need to technically be able to understand their design of the building, but we needed to be able to imagine, using that knowledge, how the architectonic components of the building could animate and come together to form the building in its entirety in a way that stayed true to the architect's vision … it is about positioning the film in such a way as to create an alternate reality, one based not on representation necessarily but on projected desires and possibilities. This shift away from pure representation is what is compelling to us and why we chose to work on both of these projects" [11]

In another interview for *Archinect* they state that "the intersections between the body, space, form and technology have always been what has interested us and what we have explored in the work. We were drawn to the immediacy and intimacy of film, animation and digital design. These digital mediums allowed for explorations that were more time consuming and costly to achieve in the built form" [12].

The opening sequence of the short video (2:06) shows a reflective ball falling from the sky to the ground of Manhattan. At the same time the elements that compose the building gradually come down squashing the ball. This imagery recalls the language of some action films and video-games.

Then the building exploration starts, while the higher floors fall down.

The camera focuses on orthographic views; its movement zooms on the roof views and slides the elevations views. The break from an apartment to another is solved by means of the changing of camera shots from the interiors to the building elements falling down. The building elements are geometrically modeled using some simplification: the glass walls and the railings in several views have not frames and the walls intersect the pavements without baseboard. The future building is soft rendered by neutral colors and light textures.

The virtual camera moves with a constant speed inside the rooms while a black silhouette observes the spaces and their furniture. At the beginning and the end of the film, the context of Manhattan is represented by a real aerial shooting. In other parts of the video the surrounding buildings are modeled as demonstrate the reflections of the falling elements on their windows (Figure 4).

Figure 4. Herzog & d Meuron, 56 Leonard Street in New York. Movie by Tronic (Hong Kong, China) (2:06), 2008.

In the same and following period it could observe a transition from the technical virtuosism to the research and consolidation of a narrative style.

This step intended to prevent the technocratic homologation by the software, and led the video producers to create personal and recognizable narrative languages. As stated by the following case studies, this choice anticipates the current developments.

The submission by Steven Holl for the international architecture competition to design the future Musée du Louvre-Lens in the north of France, launched in early 2005, is a building wrapped in Corten steel, in which the reddish-brown hue is reminiscent of the local brick architecture and the body of the gallery floats over a level of transparent glass. The idea of a walk through time organizes the plan of the new museum according to a linear time increment along the rectangular frame, which is crossed by cyclical time (represented by the arcs) in short circuits and different access points. The

basic grid of galleries forms a flexible morphology of spaces allowing north-south, or east-west circulation. The crossing four arcs, beginning with the entrance lobby, allow the flexibility of closing some portions down for installation, while still offering flowing public circulation routes. The arcs house the function of receptions and meetings: beginning with the lobby, to the access for a large auditorium, to the foyer for the Media Laboratory of the future, to the entrance to the gallery level and orientation towards thematic gardens and the restaurant.

The competition animation (4:00), made by Neutral, deepens the concept ideas, showing the aquarelle sketch drawn by Holl as the basis for the three-dimensional geometric construction. It develops the idea of intersection between linear time (a parallelepiped) and cyclical time (four cylindrical rings cut to make four arcs). When the geometries become buildings, the parallelepiped appears as a hard block of bricks and the arcs as light curtains of glass. The architecture, surrounded by the green, is connected to the built city in which it is wedged. The new museum and the settings are modeled and soft rendered. The camera movement, characterized by a constant speed, guides the spectators outside (by a fly trough) and inside (by a walk trough) towards the knowledge of the design. Therefore most of the animation is produced by modeling software [13] (p. 1013) (Figure 5).

Figure 5. Steven Holl, Musée du Louvre-Lens. Movie by Neutral (4:00), 2005.

The Design International Competition for a new headquarters building for the German rail group Deutsche Bahn at Washingtonplatz in Berlin (2008), won by 3XN with the "Cube", awarded a project that combines the even-sided geometrical shape with diagonal arrays on the façades. The basic structure of the Cube is a cross shape with four main cores. The cross is formed from fan-shaped floors rotated around the building's axis, creating a natural movement that pulls up through the building like a spiral. The proposal represents, regarding to its dimensions and its massive shape, a building with a strong design that offers a strong message and a clearly designed landmark. 3XN claims to be deeply involved in the digital revolution [14] and this seems to reverberate in their choices of projectual communication, entrusted to the studio Cadpeople in Aarhus, Denmark. In particular 3XN are interested in "Design with time as a fourth dimension. It often involves software which is primarily used by the film and gaming industry. In animated design, volumes can be changed into dynamic objects/soft bodies, and be impacted by different force fields, which makes the design vivid and dynamic" [14]. The short video (3:41) by Cadpeople, demonstrate close collaboration of producers with 3XN, understanding the ideas and following the graphic style. The video is entirely made up thanks to the digital modeling and shows an original communication and visual approach. Using the shape of the cube like a "curtain" between different topics, it gives evidence to the context, the concept process, the accessibility. Then, in illustrating the project, it uses particular camera motions alternating accelerations and stop image and singular representation's techniques changing from conceptual visual style (in greyscale with some spots of primary colours) to static photorealistic images delicately rendered (Figure 6).

Figure 6. 3XN, Cube, Berlin. Movie by Cadpeople (Edinburg, TX, USA) (3:41), 2008.

Opposed to the essentiality carried out in the previous case study, the imaginative language, rich in contaminations between real and virtual can be found in the next case. It was produced by

Squint/Opera in London, perhaps the most famous filmmakers firm in the world, which communicative style is unique.

In the movie representing the Plan Abu Dhabi 2030 (5:29), produced in 2007, some snapshots taken from an orbiting satellite; helicopter-shot footage of skyscrapers; huge letters from invisible strings hand in a city's streets, explains the necessity of Abu Dhabi's Urban Planning Council ambitious plan for the city's future. The masterplan is complex, dealing with transport, habitation and sustainability. In this desert city population is set to triple in less than thirty years; it was required a film capable of describing a huge project without losing sight of the benefits for the individuals who will be living and working in it.

Abu Dhabi's video is visualized in detailed renderings that combine live action with an animated cityscape in stylized plan and cross-section; original tracking shots and sudden shifts in scale elegantly reveal different components of the master plan in human terms. Later photographs and realized buildings emerge from the maps that detail the elements of the masterplan.

The video begins with a panorama of the city to go to the four key features of the plan, presented in the form of spots. Each theme is introduced by a schematic explanation, made with flash, to which follows the exploration of a photorealistic digital model. The technique used melts shootings of moving people and vehicles with the exploration of the virtual model. This union adds dynamism to the movie, in order to faithfully reproduce, with a very high quality, the city of the future. The movement of the camera is slow and linear, moving alongside people who live the virtual environment.

In order to deeply explore the model, the camera changes speed and type of projection, which loops to one side to another of a hypothetical cube containing the entire model: from a top view to a lateral one, to some perspective sections, starting from the outside (of common spaces, connections, urban furniture) to the inside (solutions for energy savings): this is an original device to deeply explore a city of rare complexity.

The dynamism of the video is guaranteed not only by walking people, but also from vehicles leaving the section plan (bus, metro). It ends with a bird-eye projection to show the complexity of the intervention.

The film is produced through hybridization of materials and languages, real footage and photographs with digital artefacts; the animation of the three-dimensional model is reduced to a minimum in favour of applying dynamic post-production tools to the static views [15] (Figure 7).

Figure 7. Plan Abu Dhabi 2030. Movie by Squint/Opera (London, UK), (5:29), 2007.

Among the current trends of the animation aimed to design representation it seems to prevail some minimalist choices, such as: conceptual views, animations using the simple camera movements indicated by Manovich, focuses on the concept communication and the artefact constructability.

Moreover, the video production within the same atelier of architecture is witnessed in many cases, facilitated by the most common software for modeling, rendering and post-production.

Differently from the most of the architects' websites, that of AllDesign, (London, UK), a work group led by Will Alsop, shows the projects by movies besides static renders. These movies at first realized by Squint/Opera and Virtual Artworks (London, UK) are nowadays produced inside the studio.

The choice of attributing a central role to the movies in the communication strategy of the architect's team is in tune with the graphic style of the website and stimulates more involvement by the viewers.

The video presenting the project for the complex of three theatres in Langfang, near Beijing, in 2010, was produced inside AllDesign studio. They claim to create movies since the best way to express their own ideas is telling a story [16].

The short video (2:44) introduces the narration with a recall to some images of the traditional Chinese landscape: vegetation of bamboo, flowering cherry-trees, canoes on the lakes and, finally, the wild boar, of which metamorphosis, described as the initial concept, gives shape to the project. The complex aims to fit into the natural environment with the creation of a park with ship canals and walkways leading to theatres and shady spots designed as a meeting place. The buildings are, displayed in conceptual clay-render, on which the connecting blue ring raises, and are part of the system of the green. Animations, fly-through, static rendering zoom and scroll and simulations of the growth of the buildings and the green, combined with the apparition of evocative images (musical notes that come out of the buildings and moulds of traditional theatre masks) constitute the sequence (Figure 8).

Figure 8. AllDesign, Great Beijing Theatre and Masterplan, Langfang. Movie by AllDesign (2:44), 2010.

The video for the architectural competition in 2012 for Copenhagen Arena, presented by C.F. Møllers, shows a multifunctional complex intended for sports and concerts, without losing its human scale and becoming a landmark, a building element of the landscape and an attractive element of activity. The animation (3:54), presumably produced by the same architectural studio, initially presents, in a bird eye view, the structural technologic and constructive elements and the building phases of the stadium, set within a context geometrically modeled and clay-rendered. When the video camera is lowered to the human level, its recurrent motion is the rotation around the conceptual model. The following still image is characterized by the representation as a realistic static rendering to which actions of scroll up or zoom out are slowly applied (Figure 9).

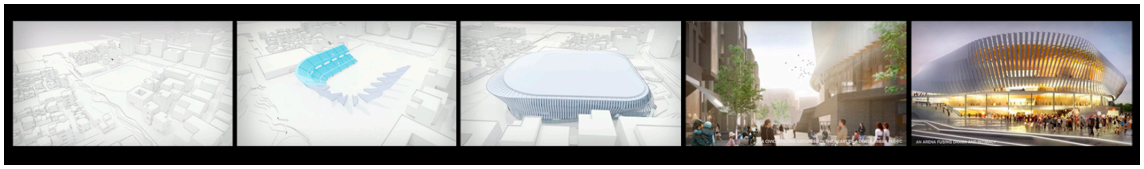

Figure 9. C.F. Møllers, Suggestion to Copenhagen Arena. Movie by C.F. Møllers (3:54), 2012.

MVRDV proposal for the new Zoo in Maubeuge, an old city characterized by the rest of the Seventeenth Century fortification by Vauban, aims to define a new, unique and iconic zoo and to reveal the heritage and character of the Vauban fortifications contained in the site of the view, and the remarkable landscape around them. The Vauban fortifications have been transformed and distorted significantly over time. MVRDV considers the project as an opportunity to rediscover and enhance them through careful interventions in the historic walls.

The new design of the zoo should inhabit this historical landscape without distorting it: new programs and pathways must sit moderately. The foundations of the new zoo should be shallow and reversible so they can be easily removed, the building structures should be modular and demountable, preferably made out of metal and glass. The zoo should become a living place where multiple and exotic natures can express themselves in the scope of the geometry of Vauban's landscape.

The long movie (6:05) was created by Luxigon in Paris, France, a firm specialized in static renders realized, as the founder confirms, with Photoshop, because of "the limitations I had with

computer when I started… That led to our 3D style, a lot of which is created by us rather than relying on software. That means it's more pure" [17] (p. 117).

Moreover he states that "drawings are even more influential than real buildings, because a drawing is the simplest, most genuine form of architecture. It demonstrates what the architect had in their mind… Anything depicted in the rendering should be something that could happen for real… it's really important that people understand that it's not a picture, but an illustration" [17] (pp. 117–118).

Their movie for the Zoo wholly represents their way of looking at rendering and, above all, is mainly made up by a sequence of static renders.

It starts showing the meaning of a zoo in Maubeuge inside the European context. Then it focuses on the aerial photograph and historical maps of the intervention site.

Some others photo that show the fortifications are overlapped by a wireframe model highlighting the geometries of Vauban's original design, today disappeared. Then a conceptual digital model of the existing bastions demonstrates the interventions to be made and the phases of their realization. More than 3:30 of the video are composed by a sequence of photograph, images, photomontages and renders, without any animation. When it starts, it shows the promenade inside the zoo, from the entrance to the location of different animals. Also in this part static render and post-production tools seem to prevail: people and animals are static, some views are moved by tilts, zooms, and rotations (Figure 10).

Figure 10. MVRDV, Zooban, Maubeuge, France. Movie by Luxigon (6:05), 2013.

Danjiang Bridge International Competition in Taiwan (2015) awards Zaha Hadid Architects as winner. The new bridge was designed as says Patrik Schumacher to "make a conspicuous landmark against the backdrop of Tamsui's famous sunset" [18].

The new bridge is integral to the infrastructure upgrading program of northern Taiwan and will increase connectivity between neighborhoods and reduce through-traffic on roads within local town centers.

It will be comprised of a cable-stayed bridge design that will minimize its visual impact by needing only one concrete structural mass to support its 920-m-long span.

"The Danjiang Bridge will be the world's longest single-tower, asymmetric cable-stayed bridge… The mast is designed and engineered to be as slender as possible and positioned to offer the best structural performance, avoid impeding the navigability of the river and also minimize any interference with the views of the sunset from popular viewing points along the river. This single-mast design also minimizes structural elements in the riverbed in accordance with the increased protection programs of the estuary's ecosystems" [19].

Mir is a creative studio having seat in Bergen, compound by fifteenth people that specializes in portraying unbuilt architecture.

As they said: "we aim to produce images that are outside the '3d architectural visualization' category. Our focus is on creating a unique overall feeling in the image, instead of forcefully instructing the viewer in what to think and feel about the project. A Mir image gives space for an individual experience. We want to create images that humans instinctively relate to and connect with" [20].

They work with natural light because: "manipulating away shadows or faking light can backfire and result in images that feel 'disguisive' and unnatural". They believe that "camera angle, lighting, colour, and composition are the key ingredients that together make up the foundation of an image. A poor foundation cannot be saved with flares, fog and effects" [20].

The movie realized for the architectural competition as in the previous case study makes extensive use of static renderings moved by post-production tools.

Its original approach simulates the visualizations from different view-points and cameras, guiding the spectator to focus attention on some aspects of the project.

The bridge is defined 'the serene dancer of the night' represented by a logo. Some texts and a voice over adjoin information to the video. Firstly the bridge, as the focus of the project, is visualized with a photo-realistic style and explored by aerial and ground views and a constant speed of camera. Then the potential of connecting different parts of the city and the phases of construction are highlighted by a volumetric 3D model of the context. The buildings are simplified by geometric white volumes and the trees by green spheres. The construction of the single-tower, the main characteristic of the bridge, is carefully explained with consecutive zooms of the static rendering. The central part of the video, about 2:30, is dedicated to the construction. The last minute is dedicated to emotional visions: people who takes pictures of the bridge, sunset and night views in which the illuminated bridge with a slight fog becomes the only protagonist of the urban landscape (Figure 11).

Figure 11. Hadid, Danjiang Bridge, Taipei. Movie by MIR (Bergen, Norway) (4:44), 2015.

5. Conclusions

Following the development of the architectural representation by animation, it can be individuated some phases, from the beginning to our days.

1 In the first step, the centrality of digital modeling within which paths were created or singular elements of the building were animated, affirms itself. First videos, numerically limited, had generally low resolution and a prevalence of conceptual renders.

2 A following step, characterized by the improvement of digital techniques and tools, showed the transition from animation resolved within conceptual modeling to an extreme tendency toward photorealism and even hyper-realism. The availability of software used in computer-gaming and animation films, along with the launch of YouTube, promoted the proliferation and spread of architectural representation through video, in particular in the fields of international architecture competitions, presentations to the community and exhibitions. Thanks to the improving of rendering engines, textures of materials and systems for setting the lights, the tendency to create imageries aspiring to gain the truth-likeness established itself at this stage.

3 Another step, characterized by the pursuit and consolidation of narrative styles, was witnessing a phase of reflection and refinement. The project's concept arises as one of the main topic of the films. This step intended to prevent the technocratic homologation by the software, and led architects and video makers to create together personal and recognizable narrative languages: this choice anticipates the current developments.

4 The current trend is to turn increasingly to the opportunities offered by the motion graphics, through the hybridization between static and dynamic images of different nature, photorealistic renderings tend to be singular, as they are snapshots within conceptual dynamic views, while a search for greater deepening of content takes advantage of the development of the narration on concept phases and constructive solutions. Among these trends it could find the minimalist choices consisting in the conceptual views, in the animations that refer to the simple movements indicated by Manovich, in the attention to the concept communication and the artefact constructability. Moreover, the video production within the same atelier of architecture is witnessed in many cases, facilitated by the most common software for modeling, rendering

and post-production and, in particular by some new software dedicated to render and animation in real-time.

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