



Back to the Future: Interpretation of Post-COVID-19 Architecture through 1960s Futurism

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Abstract

COVID-19 has changed the configuration and needs in architectural and urban spaces. Today, only the pandemic's short-term consequences have been seen in architecture, whereas the long-term influences are still being discussed. This article aims to look for an insight into post-pandemic architecture in the long term through the futuristic architectural projects of the 1960s. For that purpose, this study primarily conducts a literature review about post-disease architecture after 19th-century epidemics. Following that, three significant figures of the futurist architecture movement, Buckminster Fuller, Reyner Banham, and Archigram, were chosen as case studies to highlight the sterile, isolated, and technology bounded aspects of this movement. By also looking at the healthy environment criteria and the short-term architectural discussions after the COVID-19 outbreak, the selected architects' distinctive theories and unique science-fiction projects were examined and discussed concerning contagious diseases and pandemic's reflections on spaces. According to the interpretation of these architect's works and arguments, an open-ended, nomadic, formless architecture in which technology and infrastructure gave the individual better freedom could be associated with the post-pandemic built environment.

Keywords: COVID-19 architecture, post-pandemic architecture, architectural utopias, futurist architecture.

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Geleceğe Dönüş: COVID-19 Sonrası Mimarlığını 1960'lar Fütürizmi Üzerinden Yorumlama

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Öz

COVID-19 pandemisi, mimari ve kentsel mekan ihtiyaçlarını ve pratiklerini değiştirmeye başladı. Bugüne dek pandeminin mimarlık üzerindeki yalnızca kısa vadeli etkileri görülmüştür ve uzun vadeli etkileri hakkında tartışmalar hâlâ devam etmektedir. Bu makale, 1960'larda diğer salgınlar ve savaşlar sonrası yaratılan fütüristik mimari projeler aracılığıyla, pandemi sonrası mimarisinin uzun vadeli sonuçlarını öngörmeyi amaçlar. Bu amaç doğrultusunda bu çalışmada öncelikle 19. yüzyılda başlayan salgınlar sonrası oluşturulan mimari kriterler hakkında literatür taraması yapılmıştır. Ardından, fütürist mimarlık hareketinin üç önemli figürü olan Buckminster Fuller, Reyner Banham ve Archigram, örnek vakalar olarak seçilmiştir. Bu mimarların teorileri ve projeleri, 60lar fütürizminin steril, izole ve teknolojiye dayanan yönlerini vurgulayarak incelenmiştir. COVID-19 salgını sonrası belirlenen sağlıklı çevre kriterlerini ve kısa dönemde ortaya çıkan mimari tartışmaları da irdeleyerek, bu mimarların özgün teorileri ve bilimkurgu projeleri, günümüzdeki pandemi sürecinin mekansal pratikleri açısından incelenmiş ve tartışılmıştır. Bu önemli figürlerin eserleri yorumlandığında; teknoloji ve altyapının bireyi özgürleştirdiği, açık-uçlu, göçebe, formsuz bir mimarlık, pandemi sonrası yapılı çevre ile ilişkilendirilebilir.

Anahtar Kelimeler: COVID-19 mimarisi, pandemi sonrası mimarlık, mimari ütopyalar, fütürist mimarlık.

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Introduction

As a global issue that has been changing human beings' daily lives worldwide, the recent COVID-19 pandemic has triggered an inquiry in many human practices, including the built spaces. The solutions to the rapid transmission of the virus have changed many daily practices of people and have abruptly altered the experiencing of spaces, which can be illustrated by the surprisingly emptied city squares and limited daily life into the house and workspace mainly. Yet, regarding that COVID-19 is not the primary pandemic that humanity is facing, it is not hard to foresee that these are only the short-term responses to the situation. Considering that numerous authors point out the influence of the previous pandemics on the built space; it may be anticipated that the change in the architectural spaces will not only remain as a change of experience of the existing spaces, but the outcomes of the crisis will reverberate in architectural practice and planning of the cities in the long term. Whereas the medical methods had been prominent in fighting contagious diseases in recent years, the absence of a guaranteed treatment or a vaccine necessitates a return to the solutions that are bound to space, such as isolation, social distancing, or quarantine (Budds, 2020; William J. Hercules, Diana C. Anderson & Marc Sansom, 2020). Hence, it becomes worth looking at the previous pandemics to see the already found answers to some questions. Accordingly, research questions that direct the study are as follows:

- What are the architectural solutions preferred in previous epidemics or worldwide catastrophes?
- What are the short-term solutions that emerged for the control of the COVID-19 pandemic?
- Could previous experiences in post-disaster architecture give clues about the long-term effects of COVID-19 on architectural styles?

Some previous architectural ideas seem particularly valuable for answering these research questions, as their solutions are compatible with the conditions created by the recent pandemic. In this regard, the futuristic architecture of the 1960s comes to the fore, as it constitutes a bridge between the 20th century post-pandemic, post-war architecture and today's automatized and computerized architectural practices. Therefore, this paper elaborates on architecture's rapid responses to the worldwide catastrophe, together with the futuristic architectural ideas of the 1960s. The emerging architectural practices, ideas, and changing daily habits due to the current

pandemic can be evaluated to make a connection between the futuristic architectural designs or discourses and the very recent examples of COVID-19 architecture. Therefore, this paper aims to shed light on the architectural necessities of the COVID-19 crisis and provide new insight into the future architectural approaches by associating today's applications and ideas with the futurist examples of the 1960s.

Methodology of the Study

Production of architectural knowledge is a deontological process as theories are produced not after the practices but simultaneously or beforehand (Groat & Wang, 2013, p.116). This feature of the architectural research intrinsically provides insight into future conditions (Groat & Wang, 2013, p.130-131). Similarly, this study looks for an understanding of post-pandemic architecture through similar experiences and movements in the 1960s' futurism. Therefore, after a literature review about post-disease architecture in former epidemics, this study investigates the futuristic architectural projects of the 1960s. Three architects or architectural teams who were among the most remarkable figures of this movement were chosen as case studies: Buckminster Fuller, Reyner Banham, and Archigram. These architects are seen valuable to mention in this study as they have already analyzed the better and sterile life conditions that came with technologies and presented a new lifestyle together with a paradigm shift in cities. In their ideas, they referred to technology and isolation, with seeking freedom and mobility at the same time, which COVID-19 pandemic might force masses to be.

In order to analyze these architectural ideas of the post-epidemics and 1960s futurism properly in relation to the pandemic, this study continues by revealing the short-term architectural solutions and healthy environment criteria found in existing COVID-19 literature. Then, in the discussion part, the 1960s' distinctive theories and unique science-fiction projects were intertwined with the post-pandemic architecture. As a result, this study aims to bring a new point of view to the practice of architecture as well as the academic field related to the current pandemic by examining discourse and positions in the 1960s.

Post-disease Architecture in the Former Epidemics

In the 19th century, the immigration of large populations from agricultural areas to cities to work in factories caused European countries to suffer several

contagious diseases (Porter, 1999, p.77). Overcrowding due to industrialization, urban sprawl, lack of clean water, deprivation of hygiene in domestic and urban areas, poor sanitation, and environmental pollution are the reasons for these diseases (Porter, 1999, p.77; Kılıç, Şahan & Bahadır, 2014, p.497-498; Park, 2018, p.10). Diphtheria, tuberculosis, typhoid, typhus, and cholera are some of the epidemics that occurred in 19th century industrialized cities. In these epidemics, quarantine and isolation procedures remained inefficient; therefore, epidemics forced governments to take precautions in the urban environment (Porter, 1999, 79). Thus, infectious diseases impacted the transformation of the built environment in urban, domestic, and infrastructural scales and public hygiene programs.

The United Kingdom was prior to public health efforts by enacting Public Health Acts in 1872 and 1875. The act was a reform that involves sewerage, refuse, and freshwater. Governmental officers and doctors were commissioned in order to monitor and enforce public health decisions (Gorsky, 2011, p.43). The sanitary systems were improved in cities, and environmental pollution was eliminated to overcome the contagion (Porter, 1999, 80-81). In London, crowded and low-income populations were given proper houses, and infected houses were immediately destroyed (Porter, 1999, 88). In the 19th century France, the concept of hygiene was given importance, intertwined with political, social, and urban actions (Park, 2018, p.14). Similar to London, sanitary reform had been done in Paris. The city's infrastructure was built to increase sanitation and to introduce public hygiene programs (Park, 2018, p.5). The city was re-planned and had a massive reconstruction in the reign of Napoleon III and his aidant Hausmann in the 19th century. Large streets opened in between congested areas, which became fever nests. By this action, it was also aimed to prevent social disorder and possible upheavals, which are implicitly correlated to the effects of epidemics (Park, 2018, p.11; Porter, 2018, 79). In Germany, due to outbreaks, national campaigns were started to raise public awareness on hygiene, infection, and its control at the beginning of the 20th century. Health exhibitions were done to inform people about contagious diseases. (Brecht & Nikolow, 2000, p.511). The First International Hygiene Exhibition in Dresden could be shown as an example. Founded in 1903, the exhibition drew such a great deal of attention that it visited other cities of Germany and then turned into a permanent collection (Brecht & Nikolow, 2000, p.511).

Modern architecture and planning parallel this international hygiene movement (Yılmaz, 2016, p.503). Colomina states that tuberculosis, an

epidemic in the early 20th century, deeply influenced modern architecture's formation and success (2008, p.31). Modernization presented a protective life without infections and germs because a healthy worker is fundamental for the continuity and efficacy of the production system (Yılmaz, 2016, p. 504). Therefore, features of modern architecture promised healthy spaces. While dirt, disorder, darkness, and infectious diseases were linked to the traditional understanding, hygiene, lightness, and a clean future were matched to modernity (Yılmaz, 2016, p.503). To illustrate, sufficient sunlight, adequate ventilation, and white-clean surfaces were used to prevent conditions that cause tuberculosis' emergence and spread (Colomina, 2008, p.31). These ideas also contributed to Le Corbusier's five principles of architecture. For Le Corbusier, as technology developed, humans threw away the old tools and adopted the new ones as part of a healthier behavior. So the architect implies that, at the beginning of the 20th century, houses should transform as well. For him, the conventional house is dusty, unhealthy, disgusting, and immoral (Le Corbusier, 1931/1986, p.13). On the other hand, the elevated buildings on pilotis could protect the residents from humidity, and a roof garden promotes them to sunbathe and do exercises, which are beneficial for health (Colomina, 2008, p.31-32). Furthermore, in his book entitled *Towards A New Architecture*, he criticizes places that are not exposed to wind and sunlight, such as courtyards and narrow streets, and finds them unhealthy. Instead, Corbusier proposes large flat areas that get sunlight and air and have greenery, lots of trees, and sports areas (Le Corbusier, 1931/1986, p.46).

Since the style was promoted by medical discourse, modern architecture's internationality has resulted from the globality of the contagion (Colomina, 2008, p.31-32). The health concepts influenced the production of space and architectural form in the early 20th century, but the issue lost its topicality since hygiene concern left its place to economic values and liberalization in the 1960s (Yılmaz, 2016, p.505). Nevertheless, 20th-century architecture presents a striking example of how epidemics can influence architecture. Also, as an alternative to traditional preventive methods like quarantine and isolation, modern architecture in the 20th century presents similar experiences to the current day, so it could offer an insight into post-pandemic architecture.

Futuristic Projections in the 1960s: Fuller, Banham, and Archigram's Bubbles

The compelling conditions created by the COVID-19 pandemic are not only compared to the previous pandemics but also the previous world wars due to the health-related, economic, and social problems. The effects of World War II reverberated until after the 1960s and changed the pace of architecture by the futurist projections of the architects. With an idealist approach enabled by the emerging technologies, futurist architecture is revived in the 60s by numerous architects or groups, including Eero Saarinen, Alvar Aalto, Cedric Price, Ant Farm, Haus-Rucker-Co, as well as Buckminster Fuller, Reyner Banham, and Archigram. As this paper argues that the technology-bound responses to the post-war situation are compatible with the current spatial necessities, the last three architects/groups will be investigated as examples.

In the post-war period, the new technologies were highly influential on architecture, including the spread of cars or automotive production and technology, wartime technologies, and most importantly, space exploration technologies and aircraft production. The architects, including Reyner Banham and Buckminster Fuller, worked for the aircraft industry and achieved to reflect their wartime experiences upon their designs by envisioning a science-fiction-like life that could put the technology into the service and benefit of humanity. The sci-fi architecture of the era was based on new technologies such as spacecraft, aircraft, or automobiles, which had an extensive impact on popular culture as well. Sci-fi was valued because it triggers the imagination or the technological developments, and in architecture, experimentations with the new technologies emerged. Mechanized production and automatization systems triggered the design of pneumatic or prefabricated temporary structures combined with infrastructures and information processing systems.

Buckminster Fuller, a pioneer designer with his futuristic constructions, inspired many architects to develop fictive ideas on the future of architecture. The main focuses of his designs are on celebrating technology and mass production, in addition to minor aims like structural firmness and affordability or providing a healthy environment (Fuller, 1953). However, he was aware of exhaustible resources of energy and sustainability (Bober & Oktaba, 2019, p.668), and he used environmental conditioning cores and machines in some of his designs.

Fuller's early projects, the Dymaxion car and the house, were based on a house's mobility and lightness. The architect, inspired by the technological

improvements in aviation and naval technologies, thought of dymaxion as a four-dimensional "floating structure" (Leslie, 2001, p.162). His main concern was benefiting from technology and industry; therefore, Fuller considered a house as a machine to be manufactured in the factory (Keats, 2016, p.57). Inspired by the automobiles, the architect also gave mobility to the house.

It could be said that the dome structures developed by Fuller had long-term reverberations as those inspired many architects to create bubble-like spaces, including Reyner Banham and Archigram. He envisaged a dome that covers Manhattan (Figure.1) (Keats, 2016, p.35; Bober & Oktaba, 2019, p.667). The dome's purpose was to exclude unwanted dust, environmental conditions, and traffic from the city. In fact, Fuller claimed that the dome would also save energy and cost, preventing heat loss in winter (Bober & Oktaba, 2019, p.667). Similarly, his geodesic dome projects, such as the Cardboard House, Hollywood Hills Dome, and The Montreal Biosphere, are other examples of futuristic bubble projects.



Figure 1. The dome over Manhattan (Source: Courtesy The Estate of R. Buckminster Fuller, 1960 as cited in Keats, 2017)

Similar to Fuller, Reyner Banham also had concerns about healthy, comfortable spaces provided by mechanized systems. In his book entitled "Theory and Design in the First Machine Age," Banham claims that technology is the central concept that creates new design problems and leads

to generating new forms and styles. Not just from the Industrial Revolution to today, but from the origins of architecture, technology has been changing and constituting new environments (Banham, 1967, p.12). Thus, architectural history is not a sequence of styles, but technology directs these styles (Rubin, 2015, p.114). Regarding this idea, for Banham, it is possible to predict the prospective situation of architecture by reviewing new technologies.

For the importance that he gives to technology, Banham was influenced deeply by Buckminster Fuller's ideas merging architecture and science (Rubin, 2015, p.116). Similar to Fuller, Banham also interrogated about the future conditions of housing. In his article entitled "A Home Is Not a House," he claims that in the 20th century, the house had become only a cover for hiding all mechanical services needed for living, such as water and sewage pipes, electrical network, air ducts, and suspended ceilings (1965, p.70). He states that the ideal of cleanliness leads to improved mechanical services in modern American buildings (1965, p.73), which can be associated with infrastructure development after the epidemics of the 19th century. For Banham, since these services are recently emerging technology, those do not precisely fit in modern architecture's aesthetics. These new infrastructures could not be transformed into a new type of aesthetic and architecture, so a paradigm shift is needed to integrate mechanics in architecture. (1965, p.70)

Moreover, according to Banham, mechanical services are the only part that is required for a decent shelter; therefore, he proposes "The Environment Bubble" (Figure 2). This bubble includes a car, food, clothes, and a transparent pneumatic dome in addition to mechanical services, which is "a properly set-up standard of living package" with Buckminster Fuller's words (1965, p.76). It could be said that the mechanical services in Banham's environmental bubble are a developed version of Fuller's mechanical core at the center of his house designs, as in the Dymaxion house or Hollywood Hills dome.

Like Fuller, Banham foresees a new architecture that frees itself from the foundations or the other connections to the earth and includes all necessary functions in a compact mobile space. Furthermore, the architect emphasizes the nomadic lifestyle and mobility of the spaces, as he states that "...if it could be rendered more compact and mobile, and be uprooted from its dependency on static utilities, the trailer could fulfill its promise to put a nation on wheels" (Banham, 1965, p.72).

The architect regards this kind of flexibility as the next stage of architecture and highlights the advantage of mobility in terms of creating less weight by

referring to Buckminster Fuller's words that draw attention to the unnecessary monumentality: "Madam, do you know what your house weighs?" (1965, p.74).

Banham corroborates his idea of "Environmental Bubble" by emphasizing its similarity to modern class houses. The architect says a glasshouse is "little more than service core" and only simplifies it (1965, p.79). The fireplace is replaced with a campfire as part of a nomadic lifestyle. "Interpenetration of indoor to outdoor" is provided by the transparent, mobile membrane (1965, p.79). Banham also reminds us that this type of formation is for isolated individuals, not for crowds (1965, p.76), making his designs relatable to our day. Thus, envisioning an individualist, nomadic lifestyle, Fuller said that "the environment will be completely controlled, and the house concept will be eliminated" (As cited in Whiteley, 2002, p.190).

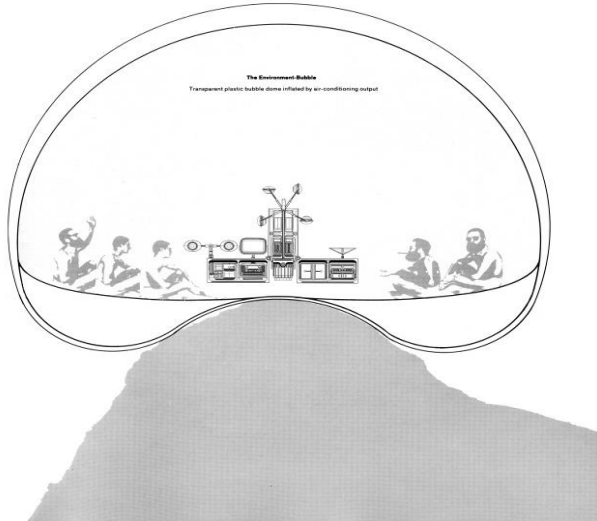


Figure2. Banham's Environmental Bubble (Source:Banham, 1965, p.77)

The Archigram group also had similar tendencies with Fuller and Banham for valuing technological progress and aiming to revitalize the faith in progress that has been lost after the war. The group was advocating a technological revolution that would benefit the affluence and comfort of societies, and by using the power of technology, they refused the uncomfortable monumentalism of architecture (Sadler, 2005, p.,50). As well as the technological innovations, they were inspired by Fuller's works. So the group utilized systems rather than forms, including Fuller's geodesic systems (Sadler, 2005, p.8). Adding up a pop cachet

on the "science fiction aura" of Fuller's architecture, Archigram created a sci-fi architecture, which, according to Banham, is necessary for technological improvement and building the future (Sadler, 2005, p.37). The computers and communications were also inspirational for Archigram. Communication by transportation as well as images and technology were valued. They envisioned computer systems controlling the environment and designed according to these future technologies. For instance, the Computer City project included sensory devices that can detect the citizens' needs and changes and computer systems responding to those.

For providing technological opportunities, the infrastructure becomes essential, as was for Fuller and Banham. Archigram was concerned with infrastructure in the first years, so they developed megastructure projects that provided technical systems to organize the community. For instance, the Plug-in-City project, inspired by Japanese metabolism, was composed of an infrastructure system and modular living units that can be plugged in. In fact, in the latter years, Archigram focused on modular living units and produced self-contained kits or skins which would respond to the post-war housing crisis in England (Sadler, 2005; Steiner, 2009).

Under the influence of mass production and consumer culture, Archigram prioritized the living units' prefabrication, modularity, and flexibility. The prefabricated houses were designed with three elements, which Banham also emphasized: bathroom (Core), bubble (prefabricated shelter), systems (infrastructure) (Steiner, 2009). The prefabrication system was seen as a tool for producing disposable houses and providing factory-made shelters to solve the housing problem (Sadler, 2005, p.37). The group was well aware that technology would enable nomadism and the disposable systems, living kits can provide more freedom, flow for the human being (Steiner, 2009, p.105-106).

Also, the ideas of flexibility and mobility were being considered as in the seminal project Walking City. Yet the Group's work tended to be even more indeterminate, open-ended by time. An essential step for this indeterminate, open-ended architecture were the capsule-like kits and nomadic systems. Many prefabricated capsule homes were designed, such as the Living Pod (1966), Gasket Homes (1965), and Capsule Homes (1964). Those were inspired by Fuller's wartime works and emergency dwelling units, as well as the space technologies, spacesuits, as habitable skins (Sadler, 2005, p.100; Steiner, 2009, p.136-137). The group was dreaming of a mobile world and imagining architecture as something that can be carried with individuals (Steiner, 2009, p.

144). To illustrate, David Greene's Living Pod project was inspired by the lunar modules of NASA, which made "heroic efforts to inhabit alien environments" (Figure 3) (Sadler, 2005, p. 129). Later on, this idea of inhabiting alien environments was seen as suitable for adventurous individuals who do not want to stay in the same place and enabled them to survive in compelling conditions.

Another example of these kits is the cushicle/suitaloon designed by Mike Webb as a pneumatic, dome-shaped membrane (Figure 4). Inspired by Frei Otto's spacesuit design that behaved like a part of the human skin, the cushicle was a mixture of the two boundaries: outfits and buildings. In this example, architecture becomes a surface that separates the inside from the outside or clean from dirty. Also, as the responsive computerized systems unite the body with the environment, home becomes clothing, clothing becomes home. As seen in the below image, it also strikes attention that David Green is wearing the Infogonk spectacles, which are the prototype of virtual reality headset for educational or informative purposes. The suitaloon, in this sense, predicts the isolated but virtually connected lifestyle of the 2020 pandemic.

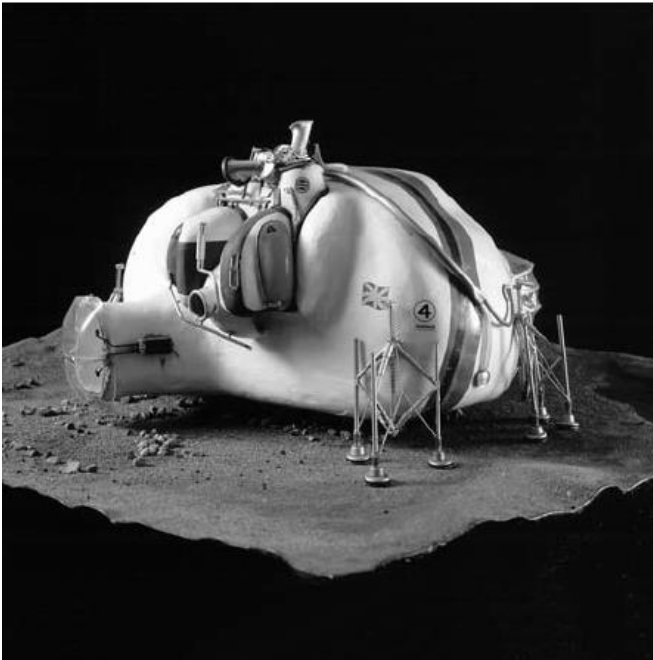


Figure 3. David Greene's Living Pod project (Source: Sadler, 2005)



Figure 4. Cushicle in Milan Triennale, 1968 (Source: "Milanogram (Triennale)", 2010)

In both Archigram's living kits and Banham's environmental bubble, an issue that strikes attention is that the spaces are designed mostly for the individual. Sadler states that the bare-naked man was the actual subject of the avant-garde architecture of the 50s and 60s (2005, p.65). Although he says that this interest in the single human body tended towards individualism or even hedonism, this discussion can be brought back to the agenda because now it is known that the isolation and health of every individual can influence the health of millions.

Short term responses to Covid-19 Architecture

With the emergence of the Coronavirus, health concepts in the spatial realm came to the agenda again. At our current day, the impact of architectural design on healthy living and prevention of contamination has become an important topic, and it is possible to observe architectural reactions similar to the previous epidemics as well as the post-war idealism of the 1960s. Hence, it is worth considering the literature on COVID-19 architecture before discussing the examples of spatial experiments that resemble futuristic cases.

It is seen that at this point, COVID-19 architecture has two major missions: preserving healthy individuals and providing medical support for contaminated ones, and it is observed that the recent literature on the architecture of the COVID-19 pandemic has two major foci: the daily spaces and the emergency hospitals. The studies about the daily spaces mainly tend to envision the upcoming changes in the built space by looking at the short-term responses, whereas the studies about the rapidly built hospitals look at the novel construction methods.

The new daily habits imposed by the pandemic were mostly reflected upon the workspaces and homes. A striking difference of the recent pandemic from the previous ones can be pointed out as the technological facilities that allowed many people to continue their work or education remotely. Although the opportunity to work from home provides more personal space, the high populations living in the smaller areas make the mass housing and apartments a critical issue. The common spaces of high-rise housings are suggested to be more spacious, and smart technologies are prioritized for the shared equipment such as elevators, and sterile materials are promoted (Alter, 2020; Lubell, 2020). Moreover, as time passed at the house has increased drastically, the types of domestic activities have increased, and the living space is adapted as a workspace, gym, school, or an area for various other activities (Lubell, 2020).

Nevertheless, home office is not possible for numerous jobs (Dejtar, 2020; Papu & Pal, 2020); thus, a change in workspaces is still in demand. One of the central ideas is that the open-plan working spaces will no longer be preferred, as more private spaces and partitions are necessitated in the offices (Wainwright, 2020; Alter, 2020; Lubell, 2020; Molla, 2020). It is also suggested that the density of the workspaces will have to be decreased by either limiting the number of users within the offices or by enlarging the building footprint. Even with the increased area and partitions, the workspaces are still public spaces; thus, the virus transmission via the surfaces has to be resolved either by using sanitary materials or smart technologies that restrict touching the surfaces (Wainwright, 2020; Molla, 2020). Also, as an issue before the recent crisis, healthier standards of the buildings are promoted. The workspaces are expected to receive necessary amounts of natural light and ventilation, include fewer toxic materials and have easy access to the open spaces, and relate to the natural elements (Lubell, 2020).

The ideas about offices and housing are also related to some common proponents about the cities. As the suggested implementations of smart technologies and enlarging spaces will increase the expense of the construction, it is assumed that the low-rise buildings will be preferred in the following years. Following that, it is suggested that the population density can be decreased by decentralizing the cities with low-rise buildings (Acuto, 2020; Makhno, 2020). Besides smart cities (Allam & Jones, 2020) the future settlements are also envisaged as sustainable, self-sufficient, and more pedestrian and bicycle-friendly, which will reduce the interaction with the

crowds. (Wainwright, 2020, Megaheda & Ghoneimb, 2020; Makhno, 2020; Dreessen, 2020; Muggah & Ermacora, 2020).

Along with these rapid changes and predictions about the daily spaces, the new hospitals and building technologies also became the focus of architecture. One of the main reasons why Coronavirus caused a global crisis was its rapid transmission to numerous people in a short while and the inadequate capacity of hospitals. With the help of novel building technologies, the hospitals suitable for the specific conditions of COVID-19 treatments and prevention regulations were constructed rapidly. These construction methods are valued as examples of upcoming necessities in medical and daily spaces. Three construction strategies are mainly followed for providing medical support during the pandemics: modular construction, adaptive reuse, and lightweight architecture (Lubell, 2020; Megaheda & Ghoneimb, 2020).

Many hospitals' primary choice for additional structures or building emergency hospitals from scratch has been modular construction. The Huoshenshan and Leishenshan hospitals built in China are prominent examples of modularly constructed COVID-19 hospitals (CBC, 2020; Lubell, 2020). Both have more than 1000 beds capacity and were built in under two weeks due to modular construction convenience. Modular buildings are also preferred for the low cost. The mechanical services necessary to provide the standards of COVID-19 treatment, such as negative pressure rooms, are pre-installed. Besides increasing the construction speed, these pre-installed services also reduce human interaction during the construction, which is a significant precaution (Hatcher, 2020).

As the second strategy, fabric and inflatable structures are preferred due to their speed, portability, and low cost. The inflatable structures are preferred in all types of emergencies and disasters, such as temporary care units, inspired by the wartime tent-like structures (Lubell, 2020; Megaheda & Ghoneimb, 2020). The most prominent example of this construction type is the emergency hospital built in Hidalgo, Mexico, designed as composed of inflatable modular units (Lubell, 2020; Megaheda & Ghoneimb, 2020; TechnoDimension, 2020). Whereas it stands out as a relatively temporary method compared to modular construction, inflatable systems are recyclable, so more sustainable (TechnoDimension, 2020).

The adaptive reuse of the emptied public spaces such as sports venues or parking lots has been another way to support the existing hospitals. In some cases, such as the Nightingale Hospital in London, temporary structures are installed in the existing hospitals (Lubell, 2020; Megaheda & Ghoneimb,

2020). There are also examples of permanent transformations of other facilities to hospitals, such as the emergency hospital built over the Atatürk Airport runways in Istanbul (Reuters, 2020). Also, hotels or dormitories are used as hospitals as well, as the room arrangements and technical infrastructures are suitable for transforming into hospitals (Lubell, 2020).

The importance of the adaptive reuse strategy lies in the fact that it sheds light on the discussions about flexible spaces that can accord with the rapid change of humanity's needs (Molla, 2020). Yet, the same is the case for modular construction and lightweight architectures. Although these hospitals are the primary examples of the COVID-19 architecture, it could be anticipated that the fast change of daily habits necessitates an immediate shift in architecture which could follow the steps of medical architecture.

Discussion: Bubble Architecture as a long term response to Covid-19 Environment

When the ideas of Fuller, Banham, and Archigram are reviewed, all envisaged a future with a transparent dome or bubble with necessary services and technology that could serve for a mobile, nomadic, individualist, and formless architecture. In these futuristic ideas, the architects' focus is providing a controlled environment and optimum conditions for individuals. These features can contribute to spatial changes necessitated by the new normal in the Coronavirus pandemic. To illustrate, Buckminster Fuller's aim to create a healthier, controlled environment with geodesic domes and mechanical systems seems very relevant to the current concerns on designing healthy environments. Even if building a geodesic dome upon an isolated or quarantined city is still a futuristic or utopic/dystopic idea, the geodesic dome systems' descendants, as in Banham or Archigram's paper-based projects, highly relate to our current day.

The bubble or kit projects were important for separating inside from outside or clean from the dirty. Today, again, the two kinds of boundaries, buildings, and clothes, play a crucial role in preventing transmission. The people are encouraged to stay within these boundaries by either wearing facemasks and transparent face shields or staying at their homes. The bubble architectures of Fuller, Banham, and Archigram seem to be an alternative solution for COVID-19 architecture. The infrastructure bubble can be a rapid, modular, and flexible system as the transparency can enable socializing and isolating at the same time. In fact, the inflatable hospitals are not the only examples of pneumatic, bubble-like structures used after the COVID

pandemic, but the bubble spaces are being offered as a solution for isolating and socializing at the same time. For instance, the Berlin-based art group "Plastique Fantastique," which had been experimenting with plastic materials on temporary spaces, developed projects such as transparent sphere masks or mobile personal protective space for doctors (PlastiqueFantastique, 2020) (Figure 5). Also, the band Flaming Lips organized a concert in Oklahoma, in which both the artists and audiences participated inside individual bubbles. (Savage, 2021) (Figure 6). Thus, it seems as the inflatable spaces which Banham, Fuller, and Archigram envisioned might isolate the individuals as compulsory in the COVID-19 pandemic while enabling them to socialize at the same time.



Figure 5. Mobile personal protective space for doctors (Source: "Plastique Fantastique", 2010)



Figure 6. A concert in Oklahoma (Source: "The Flaming Lips Announce 'World's First Space Bubble Concert'", 2020)

Moreover, Fuller, Archigram, and especially Banham foresaw the "uprooted" or rootless houses corroborating with the nomadic lifestyle. All three pictured a living space around the fireplace like in camping, as the bubble architecture enables the residents to live a mobile, individual and nomadic life. The flexibility and mobility of spaces that these architects emphasize are crucial in our day. Coronavirus contagion fastened the transition process from conventional architecture to this kind of lifestyle envisioned by futurist architects. As many spaces can not be used now, rapid, emergent solutions to convert and transform the spaces are necessary. Today, the quick modular construction rooting from the post-war Japanese architectural movement, metabolism, is a very suitable response to many challenging life conditions. However, even more, flexible solutions are in demand. People need more individual and isolated spaces, whereas they do not want to stay fixed in the same place and plan configuration. Therefore, the idea of building-in-becoming seems very valuable for the COVID-19 architecture.

The mobility of the bubbles seems useful for not only supporting everyday tasks but also for enabling a nomadic lifestyle. The freedom supported by the technology has already been bringing the ideas of distance-working or digital nomadism even before the recent pandemic. The infrastructure, which Fuller, Banham, and Archigram prioritized, became more compact day by day after the 1960s; evolving into the smart cities of the current day. Today, with wireless technologies, not only the houses but also the individuals became uprooted. Therefore, the idea of nomadism has been reflecting in architecture as well. For instance, the bubble hotels were already a trend before the pandemic and created the concept of 'glamping,' which brings luxurious comfort to camping. After the Coronavirus breakout, camping became much more popular among people, as they can be better isolated and connected to nature.

Conclusion

The sci-fi, futuristic architecture that Fuller, Banham, and Archigram envisaged depicts an open-ended, nomadic, formless architecture in which the technology and infrastructure gave the individual better freedom. Today, it has become easier to realize their dreams due to the much-developed communication and infrastructure systems. Also, with the COVID-19 pandemic, some of their envisionings became necessary. The shared vision of

Fuller, Banham, and Archigram indicates today as a transitional phase into post-covid architecture. This transition phase has already started before the pandemic with the rapidly evolving technology and informational devices. In our current day, it might be easily observed that with the help of accelerating digitalization and developing technologies, humanity has much more opportunities and facilities than the dreams of the previous century's visionaries. Besides making the social isolation process easier, the current technologies were already enabling the freedom of movement. Distance working is not a new paradigm, but digital nomadism was an issue well before the pandemic. This transition could be indicated as a digital turn or a paradigm shift. Whatever the name is, it could be said that Fuller, Banham, and Archigram predicted some of the features of future architecture. These features are being technology-based, mobile, nomadic, or formless like a bubble. Regarding the COVID-19 pandemic, it could be interpreted that these aspects are valid for today. Corona disease increased, supported, and fastened this transition from the conventional, static architecture to moveable, inflatable, flexible, lightweight, rapid solutions, which are systems rather than forms.

It should also be indicated that they could not wholly foresee the concepts of sustainability and exhaustible energy resources. Although Fuller noticed these issues, others supported disposable and mass-produced houses. Mass production and disposable spaces are problematic issues today, but it should be remembered that one of Archigram's motivations was producing low-cost, rapid buildings. As Archigram was criticized for disregarding natural sources and supporting capitalist economies, the rapid, low-cost construction systems should be reconsidered to find relatively sustainable and eco-friendly solutions. Regarding that the post-covid cities are expected to be more connected with nature, it is understood that the technology could and should be used to re-connect humanity and nature back to each other.

Today, it is not hard to imagine that many people, including business people, students, artists, or any other who live in highly populated cities, in high-rise mass houses can live in nature, with minimal carbon footprint glamping tents or bubbles or any nomadic shelter that could cover their needs. Therefore, it can be concluded that the post-covid architecture would be much more dependent on technology, but in such a way that technology will be a tool for an uprooted, mobile, sterile, and nature-connected lifestyle.

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