TAKIS ZENETOS'S CONCEPTION OF REMOTENESS

TELE-OPERATIONS AS SOCIO-TECHNOLOGICAL TRANSFORMATIONS

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ELECTRONIC URBANISM
TAKIS ZENETOS
TELE-COMMUNICATION
TELE-EDUCATION
TELE-WORK

The article explores how Greek architect Takis Zenetos conceptualized the reinvention of the relationship between the living units and home-office conditions. Zenetos, like Yona Friedman was interested in the reinvention of the home-office conditions and in how architecture and urban design strategies could respond to distance working. It also examines how architecture and urban design methods could incorporate the impact of the new conceptions of 'tele-work', 'tele-communication', and 'tele-education' on the relationships between the different social classes. Special attention is paid to how Zenetos envisioned a new mode of thinking urbanism able to be adapted to the continuous mutations in both social and technological domains. Additionally, the article sheds light on Zenetos's critique of low density living, as well as his conception of circular economy, and his intention to provide environments for heterogeneous patterns of domesticity. It also investigates which were the interdisciplinary references in Zenetos's writings. Central for the paper is *The City and the House of the Future* by Zenetos, which aimed at the design of flexible systems for both buildings and infrastructures, and was based on his intention to take into consideration the accelerating mutation of the living units in the cities of the future. Zenetos and Friedman's intention to provide comfortable, flexible and independent home-office conditions through the design of 'individual living units' using advanced technological achievements could be helpful for better understanding how architecture and urban design could respond to the challenge of providing contemporary home-office conditions.

INTRODUCTION

Within the context of the COVID-19 pandemic breakout, an ensemble of approaches that emerged during the 1960s and concerned the reinvention of living units in relation to the possibilities of advanced technologies have gained a renewed interest. An architect who is understudied in the existing scholarship, but worked extensively during his short life on the role of tele-work, tele-communication, and tele-education in architecture and urban planning is Greek visionary architect Takis Zenetos (1926-1977). His ideas about the autonomous living units and their place within the framework of his endeavour to reinvent the practice of urban planning are of great significance, especially for understanding what is at stake within the current situation. Their importance lies in the fact that they provide a fertile terrain for reflecting upon the role of architecture and urban planning in accommodating the needs that emerge within an emergency situation such as a pandemic breakout. More specifically, his project entitled "Electronic Urbanism" could enrich the present-day debates around the efforts to provide architecture and urban planning solutions that enhance work from home or the 'home-office', to borrow an expression that now dominates discussions on work and space. In the first issue of *Architecture in Greece*, Zenetos published an article entitled "Problems of Construction in Greece: The City of the Future" (1967a). During the following years, he also published a series of four articles under the title "City Planning and Electronics" in the same annual review, in 1969a, 1970, 1973a and 1974. All these articles were elements of one broad study. In his article of 1973, Zenetos shed light on the increase of the "remoteness between living and working areas" (1973a, p. 112).

ZENETOS'S CRITIQUE OF LOW DENSITY LIVING

During the early seventies, Zenetos was actively participating in ongoing debates within a transnational con-

text, as is evidenced not only by the references in his own writings, which include figures such as American mathematician Norbert Wiener, South African-American geophysicist and oceanographer Athelstan Spilhaus, Greek American architect Nicholas Negroponte, American urban sociologist Gerald Dale Suttles, and American architect Richard Saul Wurman among other, but also by the publication of his work in *Archigram*, published by the homonymous British group, and in *Architectural Design*. Among the references used by Zenetos in the article "Town Planning and Electronics" published in the eighth issue of *Architecture in Greece* in 1974 devoted to the theme "Leisure Time, Recreation, Tourism" (1973), are Wiener's *Cybernetics, or the Control and Communication in the Animal and the Machine* (1965), and Spilhaus' "Ecolibrium" published in *Science* (1972), Negroponte's *Architecture Machine: Toward a More Human Environment* (1973). A text that had an important impact on Zenetos's work was a one-page report entitled "Mobile Home Report" published in *Architectural Design* in 1972. Zenetos refers to this short report in the article "Town Planning and Electronics" published in the eighth issue of *Architecture in Greece* in 1974 devoted to the theme "Leisure time, recreation, tourism". The aforementioned report highlighted the cost-efficiency of mobile-home solutions, underscoring that "[f]abricating dwellings via assembly line techniques is less costly than using conventional construction methods" (1972, p. 6).

The same year he published the third of his series of articles entitled "Town Planning and Electronics" in *Architecture in Greece* Zenetos also penned an article entitled "Myths of Low Density Living" for *Architectural Design* (1973b). In this text, he placed particular emphasis on the issue of mobile housing. In parallel, he claimed that "social life cannot develop" in a "non-urban environment" (1973b, p. 247). In "Myths of Low Density Living", Zenetos criticised the "autonomous 'subcultures', which, according to him, fail to satisfactorily accommodate the social need of citizens. He

believed that the so-called "autonomous 'subcultures'" were created by two types of specialists: "ideologists" and "technocratic specialists" (1973b, p. 247). He claimed that the limited success of the social structures encountered in the "autonomous 'subcultures' lies in the fact that they depend on "the aspirations of the planner" (p. 247). Zenetos suggests as a solution the "semi-urban garden housing" (p. 247). To historically contextualize citizens's need for access to their own garden-house, he refers to the fact that "the garden cities are merely an after-thought that resulted from the general deterioration of the quality of urban life" (p. 247). His main point, in this text, is that "technological man needs to be in proximity to virgin nature" (p. 247). He also underscores that this view lay at the heart of his conception of the project entitled "The suspended city" (*La ville suspendue*) (Figure 1). This project was based on the combination of "a dense urban environment" with the existence of "a natural landscape". Each living unit had an individual garden, a backyard playground, and access to "virgin nature within walking distance (impossible in horizontal garden cities)" (p. 247).

In his article in *Architectural Design*, Zenetos included a graph showing expenditure and soil pollution, comparing the "conventional city", a "'garbage housing' city", a "suspended 'electronic' city" and "underdeveloped countries". This graph illustrated his predictions in a comparative perspective, and functioned as an argument regarding the efficiency of the "suspended 'electronic' city" (p. 248). Among the advantages of "The suspended city", he refers to "the avoidance of expensive transportation of the working population [and to the elimination of] […] the need to acquire the land for the establishment of such a city, since the airspace is not private property" (p. 247). However, the most significant characteristic of Zenetos's suspended city was its capacity to adapt to the mutations of the "urban-social structure" thanks to its great flexibility.

Zenetos criticized the "[s]helter systems for very low income groups (a large percentage of AD's contents)

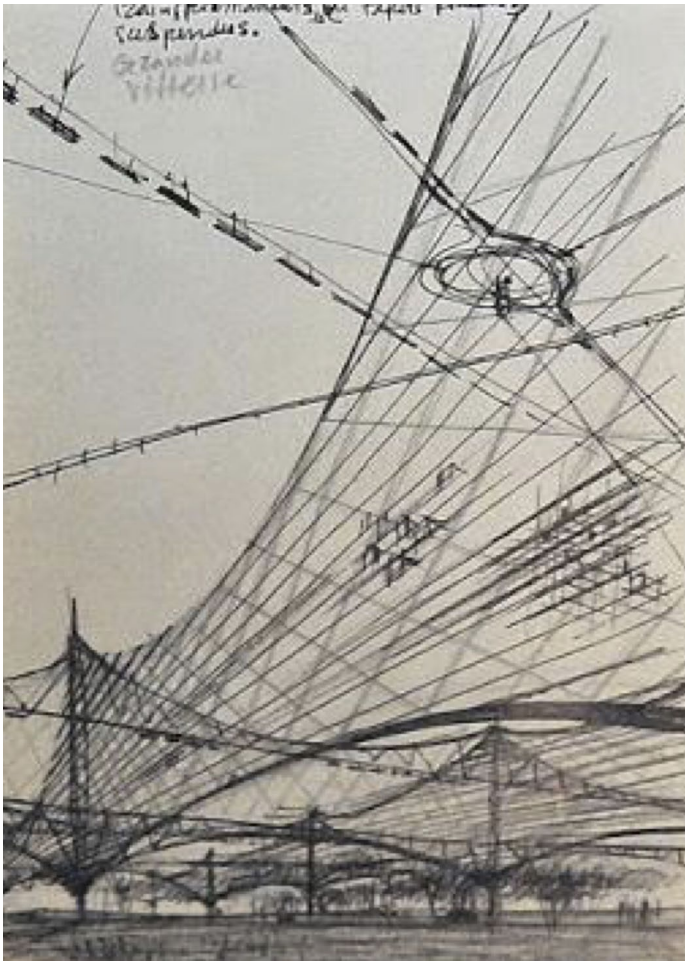

Fig. 1 Takis Zenetos, *Cable City*. Project for a suspended city, designed in 1961. Credits: Personal archives of Zenetos family; Archive T. CH. Zenetos.

[which] should not be considered as a suitable standard for the housing industry to aim at. There must be provision for a higher quality of life than the shelter + food + 'emergency' syndrome" (p. 247). Zenetos and Yona Friedman shared their scepticism *vis-à-vis* the idealistic view of low-density housing. Friedman was also supportive of high-density housing, as it becomes evident, in "Towards a Mobile Architecture", where he remarks his "Paris Spatial" proposed "to triple the density of dwellings in the town itself" (1963, p. 510), constructing a grid structure above the existing city.

BETWEEN INVISIBLE CITY AND IMMATERIAL ARCHITECTURE

A year after Zenetos published "Myths of Low Density Living", in *Architectural Design*, his article "Town Planning and Electronics" appeared in the eighth issue of *Architecture in Greece*. A reference in this article was Horst Rittel's article "Democratic Decision Making" in *Architectural Design*. Rittel distinguished between four types of planners: the doctor planner, the egalitarian planner, the needs planner and the decisions planner (1972, pp. 233-234). Some other references in the text "Town Planning and Electronics", published in the eighth issue of *Architecture in Greece*, is an article entitled "The invisible City" focused on American architect and graphic designer Richard Saul Wurman's work published in the March 1972 issue of *Architectural Design*, and Wurman's *Making the City Observable* (1971). Among Zenetos's references in "Myths of Low Density Living", was a short statement concerning Greece under the title "Spatial Urbanism" published in the issue of May 1964 of *Architectural Design* (p. 207). "Spatial Urbanism", which was part of the section entitled "World News", contained the following words: "The international school of 'immaterial architecture' has engendered yet another visionary spirit, the Greek architect Zenetos, to enjoin company with Friedman, Constant, Ruhnau and Schulze-Fielitz. Zenetos proposes a continuous urban structure, covering and extending the surface of the earth in the form of a suspended network. His continuous town utilizes tensile structural systems similar to those exhaustively examined by Lehman in AD, Nov. 1963. The pattern of life in the future, appears to vary according to the temperament of the individual visualiser. Whereas Zenetos foresees solutions encouraging the minimum movement of man, Constant visualises an urbanisation of the earth which will promote continual nomadic activity" (1964, p. 207).

The expression "invisible city" that Wurman often uses in his writings could be juxtaposed to that of "immaterial architecture" that often appears in Zenetos's writings. At the centre

of both Zenetos and Wurman's thought lay the understanding of "the city as an environment for learning" (1972, p. 191) and "as a schoolhouse" (1972, p. 4). As Molly Wright Steenson remarks, in her book entitled *Architectural Intelligence: How Designers and Architects Created the Digital Landscape* (2017), the article "The invisible City" published in *Architectural Design* in 1972 collected some of the ideas that were presented at the 1972 International Design Conference in Aspen (IDCA) chaired by Wurman. This conference was focused on the interaction between government, transportation, schools, and social services. Bringing together both theoreticians and practitioners, the 1972 IDCA emphasized the social and philosophical aspects related to the shifts within educational models. Zenetos was aware of the content of this conference and was particularly interested in the notion of 'invisible city'. Interestingly, Wurman used the following words to describe the theme of the aforementioned conference: "We live in the invisible city. A place where public information is not public; a place where the young are shunted to fenced-in buildings, amidst islands of macadam, under the guise of learning. The architecture of learning, however, rarely is concerned with the building of schools. The architecture of learning instead is the city as a schoolhouse whose ground floor is both bulletin board and library" (p. 4).

Zenetos writes, in "City and House of the Future": "The proposed wired space-frame system, consisted out of cables in tension like the web of a spider, provides a solution for vertical development freeing earth space. It could contain vertical garden cities in combination with dense networks of advanced media of telecommunication and teleactivities" (1972, p. 10). German pioneer of structural morphology Eckhard Schulze-Fielitz and German architect and pioneer of the construction of spacenets (tensile structures) Conrad Roland Lehman's approaches had many affinities with those of Zenetos and Friedman. Zenetos also refers to English science-fiction writer Sir Arthur Charles Clarke, who co-wrote the screenplay for the famous 1968 film *2001: A Space Odyssey*.

Zenetos concluded his article in the eighth issue of *Architecture in Greece* with a critique of Clarke's vision, claiming that "[t]he 'conventional' robots along with the 'intelligent' animals of A. C. Clarke will be completely useless, because technological developments in the immaterial fields will proceed at a much faster pace (and will be more effective) than what we usually expect them to be" (1974, p. 135).

FROM THE NOMAD TO THE FARMER: THE BODY CARRIER AS AN EXTENSION OF MAN

The interest in the nomad was also a meeting point between Zenetos, Friedman, Constant Nieuwenhuys and *Archigram*. For the eighth issue of the magazine Archigram devoted to "For an Instant Moment-Village", published in 1968, Peter Cook wrote an article titled "The Nomad". Archigram, apart from the 'nomad', also envisaged the "Electronic Aborigine" (1970), who could be compared with Zenetos's "farmer". Marshal McLuhan, in *Understanding Media: The Extensions of Man*, cites R. Buckminster Fuller's *Education Automation* (1962). McLuhan also refers to the notion of the nomad. He writes: "Men are suddenly nomadic gatherers of knowledge, nomadic as never before, informed as never before, free from fragmentary specialism as never before –but also involved in the total social process as never before" (McLuhan, 1964, p. 358). McLuhan claimed that "the work of the city is the remaking or translating of man into a more suitable form than his nomadic ancestors achieved". McLuhan believed that the "translation of […] lives into the spiritual form of information seem to make of the entire globe, and of the human family, a single consciousness" (p. 61). Among Zenetos's references in the first of his series of articles "City Planning and Electronics" is Marshall McLuhan's *Understanding Media: The Extensions of Man*.

Zenetos envisioned a society inhabited by two types of citizens: the 'nomads' and the 'farmers'. Each of these types corresponded to a different kind of living unit: the "nomad"

would live in ready-made units and the 'farmer' in "tissue elements that receive (individual) home and garden elements (even vegetable garden)" (1972, p. 10). According to Zenetos, the living units corresponding to the needs of the 'farmer' would prevail in the near future since, thanks to "the perfected means of tele-communication –tele-work– tele-information", "the importance of the place of residence" (p. 10) would progressively disappear. A term that Zenetos often employed in his texts were those of "tele-operation" ("τηλε-ενέργεια") –which, according to its Greek etymology, means operation from a distant location. Zenetos was concerned about providing the inhabitant of his envisioned cities with the "freedom of isolation [combined with the] [...] opportunities for social contacts and events of maximum influence" (p. 10). The bubbles that appear in many of Zenetos's drawings for this project were the "envelop of 'organs' serving the different functions of everyday life" (p. 10) (Figures 2 and 3). Regarding the distinction drawn by Zenetos between the 'farmers' and the 'nomads', it would be useful to recall the first issue of *Street Farmer*, a self-published journal at the Architectural Association edited by Peter Crump and Bruce Haggart and published in 1971. According to Crump's comments in an interview given to Lydia Kallipoliti in Bristol in July 2011 "Archigram did not like [...] [Peter Crump and Bruce Haggart, because] [t]hey thought of [them] [...] as anti-technology"[1].

In 1967, Zenetos, as part of "Electronic Urbanism", conceived the so-called "posture chair", "[a] mobile spinal agent of the body for every use, equipped with a remote control for tele-activities and a control center for optical-acoustic contacts, which will aid in the execution of tele-activities" (1972, p. 11) (Figures 4-5). As Lydia Kallipoliti has underscored, Zenetos's main concern was "how electronic devices and hardware developments would physically affect the urban corporeal body" (2014, p. 679) (Figure 6). Zenetos' Spinal Body Carrier could be compared with Archigram's Cushicle and Suitaloon designed by Michael Webb in 1966-1967, as well as Archigram's Bathamatic designed by Warren Chalk

in 1969, and David Greene's "living pod" (1965). Both the *Cushicle* and *Suitaloon* are featured as separate projects in the eighth issue of *Archigram* published in 1968. Peter Cook described the *Cushicle* and *Suitaloon* as follows: "we get close to something very like man-as-a-bat where the skin of the enclosure is dependent upon a system of vertebrae that respond very directly to the nervous system of the person within" (1970, p. 55). In the case of *Suitaloon*, as Hadas A. Steiner remarks, "biology was not technology's unifying principle as Moholy-Nagy conceived, but rather its primary motivator" (2008, p. 92). Enlightening regarding how each of the architects under study conceived the notion of 'living unit' are the terms used by each of them. For instance, Warren Chalk from *Archigram* started using the term capsule in 1964.

In "City and House of the Future", Zenetos also refers to the "posture chair", describing it as a "mobile vertebrate body of all uses with remote control" (1972, p. 11). Zenetos incorporated in this project his design for an all-purpose furniture, including the design for the so-called "posture chair", which was distinguished in October 1967 with an honourable mention at the *InterDesign 2000* competition, for which he manufactured a 1/1 prototype of the chair. This competition focused on a furniture that one believed would be used in the year 2000. Worth mentioning is the fact that Zenetos had described this chair as "a second human body-support" (p. 11). The "posture chair" was conceived as a multi-purpose furniture serving to work, rest and sleep and its main objective was to supplement "the technological possibilities of extending the average actions of the man of 2000" (p. 10).

Zenetos paid special attention to the accommodation of activities such as "telephone-contacts, telephone-work, telephone-manipulations" (p. 11), to use his own expressions. Zenetos describes it as "an 'orthopedic' seat padded on human limbs and joints [enveloped by a] surface [consisting] […] of a sum of small hemispheres, allowing mini-

mal contact between the lying body and the support" (p. 12). The "posture chair" would be located in a capsule providing the opportunity for several audio-visual operations. In this cell, the individual would be completely isolated and would be able to self-concentrate and relax. In parallel, this same cell would include "any means extending his physical potential" (p. 12). One of these means would have been a "wall-screen TV with the possibility of 'active participation' of the viewer [offering] […] an infinite number of tele-activities" (p. 12). The high-precision colour 3D image of this wall-screen TV would be "supplemented […] with the transmission of smell and touch 'information'", and would offer the possibility to change environments by "tele-traveling" (p. 12). Through the screen, the inhabitant would be able to "watch or participate in spectacles, visit a house of friends (on the other side of the earth), do shopping" (p. 16).

Zenetos claimed that the "free time that will result will give a new dimension to relations between cohabiting individuals, which will be heard by the quiet contemplation of the essence of things" (1974, p. 123). In his texts on "Electronic Urbanism", Zenetos highlighted that the term "transportation" would have a different meaning in the future. He paid special attention "to the need for man's transportation to the very place of tertiary activities which, for the most part, consist of the transmission and processing of information" (1969a, p. 116). Zenetos's social vision concerning the new practices of everyday life was based on the replacement of transportation by communication devices.

TOWARDS A VARIETY OF PATTERNS OF DOMESTICITY

Zenetos envisioned a society whose daily activities would be organized around the following five categories of activities: 'tele-operations' such as 'tele-work'; bodily exercise; needs such as sexual intercourse and rest; consumption of goods and disposal of waste; social activities.

Fig. 2 Takis Zenetos, physical model for "Electronic Urbanism". Credits: Personal archives of Zenetos family; Archive T. CH. Zenetos.

Interestingly enough he did not include nutrition in the category concerning sexual intercourse and rest. There is no exact reference to nutrition, but it is implied that it is included in the category concerning the consumption of goods. The living units of Zenetos's "Electronic Urbanism" included a tele-education unit, which was, to borrow his own expression, an "apparatus for individual learning and memory training" (1974, p. 134). Zenetos tried to design the living units in a way that would provide as many possibilities as possible to the inhabitants to improve their skills without isolating themselves from the exterior world. Additionally, he was really concerned with incorporating into the living units devices and spaces that would respect as much as possible the variety of patterns of domesticity.

Reading Zenetos's texts and observing the detailed drawings and photographs of physical models that accompanied them, one becomes aware that Zenetos respected the fact that the needs of the users are not universal, but

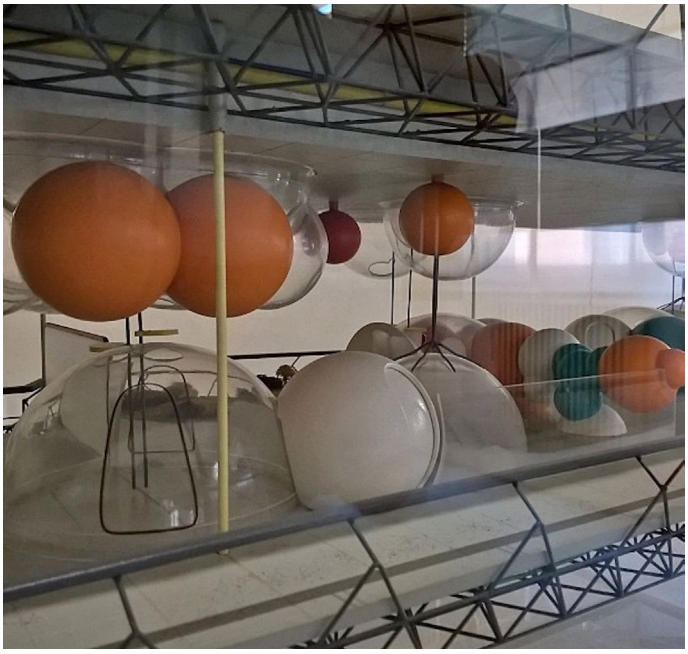

Fig. 3 Takis Zenetos, physical model for "Electronic Urbanism". Credits: Personal archives of Zenetos family; Archive T. CH. Zenetos.

depend on their personality, age, cultural background, etc. One of his remarks that proves his interest in accommodating inhabitants' needs for different degrees of isolation is his note according to which living units would comprise a "mechanism for folding and unfolding the isolation membrane" and "individual tele-activities cell", to offer more private conditions, and a "space for social contacts-meals-groups discussions", for moments of socialization. His concern about providing conditions of privacy if needed is evident when he writes that "[a] switch will at all times guarantee the privacy of the shelter" (1974, p. 124). His conviction that the capabilities of advanced technology could replace physical contact with tele-operations was manifested through the conception of a "[s]creen wall for tele-contacts, (2.25 x 5.00 m) with colour three dimensional picture, touch and smell information reception, two way active participation supplied with recording units" (p. 134).

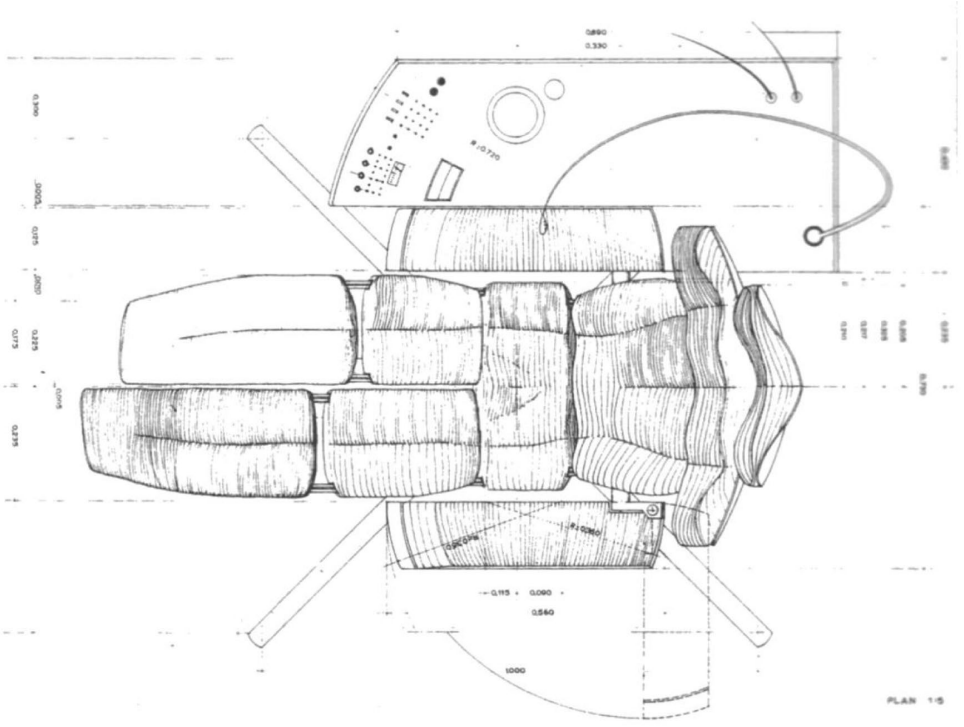

Fig. 4 Takis Zenetos' Spinal Body Carrier. Credtis: Personal archives of Zenetos family.

TAKIS ZENETOS *VIS-À-VIS* ARCHIGRAM

Archigram shared with Zenetos a vision for a renewed system of education. David Greene's "Imagining the Invisible University", published in *Architectural Design* in 1971, regarding the re-invented role of the university (1971/1972). In the fifth issue of the journal Archigram, published in 1964 by *Archigram*, one can see *Plug-in City* by Archigram, *New Babylon* by Nieuwenhuys and a sketch of a floating megastructure by Zenetos. In the page featuring these drawings, one can read under the title "Within the Big Structure": "Within the big structure, almost anything can happen. This is in effect, the brief from which *Plug-in City* develops. In T.C. Zenetos's city project (detail of which is shown bottom left) there is a system of trays slung within a wire network. Constant, in a part of *New Babylon* (bottom right) uses a close-knit diagonal net

Fig. 5 Takis Zenetos's multi-purpose furniture. Credits: Archive T. CH. Zenetos.

to establish platforms and building-objects. The big structure in *Plug-in City* is at the other end of the scale in that it incorporates lifts and services within the structure tubes. It controls the discipline of the whole city, but on a very large scale" (Anon, 1964).

Although these projects have affinities as far as their morphology is concerned, they differ in terms of vision. What distinguishes Zenetos' approach from those of *Archigram* are his social concerns, which become evident in his following statement: "Man desires and has the right to acquire a 'home' in a quiet environment, close to nature and close to his place of work and the various public services" (1973, p. 113). As Simon Sadler remarks, both "New Babylon and Plug-in City were [...] devised to prompt circulation and accelerate the city-in-flux" (2005). In the issue of *Archigram*, which was devoted to "Metropolis", featured drawings by architects

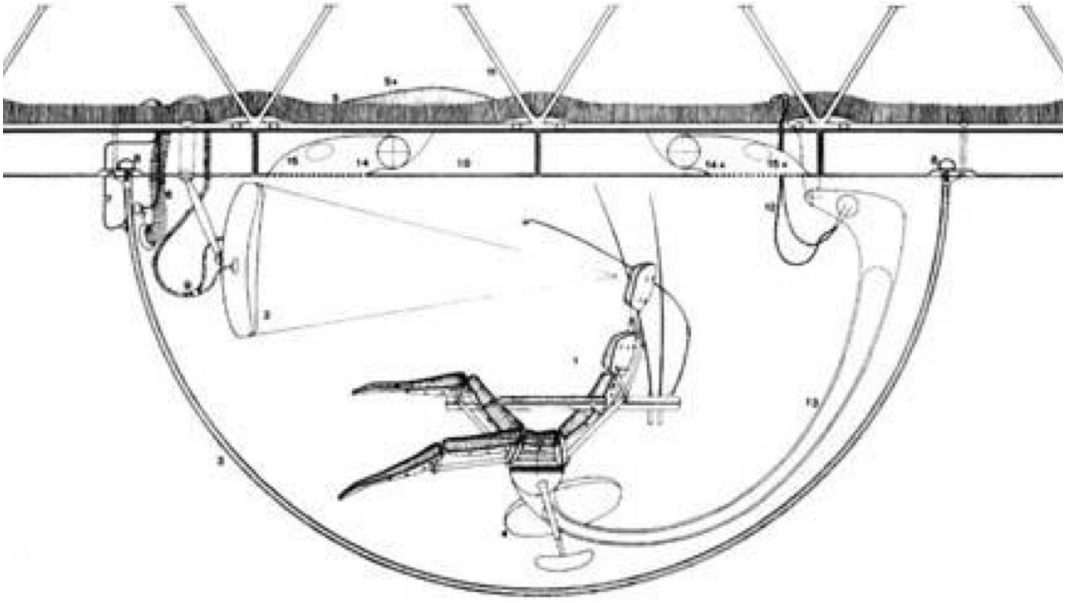

Fig. 6 Takis Zenetos's multi-purpose furniture. Credits: Archive T. CH. Zenetos.

such as Yona Friedman, Hans Hollein, Arata Isozaki, Paul Maymont, Frei Otto, Eckhard Schelze-Fielitz, Paolo Soleri and Kenzo Tange (Steiner 2008, p. 95).

In 1971, a negative review of Peter Cook's *Experimental Architecture* was published in Architectural Design. This review was authored by British medical scientist, parapsychologist and science fiction author Kit Pedler and was quite critical. According to Pedler, "[a]rchitects often seem to me to be one of the most arrogant species at liberty. Having absorbed a sprinkling of philosophy and a crude knowledge of technological concepts, they develop the ability to translate what is largely impudent dogma into concrete and metal reality, and then have the sheer nerve to justify the initial idea by post hoc rationalisation." Pedler concludes his review of *Experimental Architecture* as follows: "I wish, I could believe, that Mr. Cook had written a black comedy, a private in-joke for his colleagues. Sadly, I conclude that he is serious" (1971, p. 250).

Takis Zenetos was supportive of the stance of Archigram, as is evidenced by his response to the review of Peter Cook's *Experimental Architecture in Architectural Design*. In his response, he

claims that the solutions presented in *Experimental Architecture* "will be called in to salvage situations [...] when there will be no more soil to be taken over by buildings, no more soil for ever expanding motorways" (Zenetos, 1971, p. 655). To render explicit how these situations would be, he included, in his letter to *Architectural Design*, the cover of the September 1970 issue of *Science*. In the sixth issue of *Archigram*, published in 1965, can be found an article entitled "Urban Line and Net": "Most of the projects for large-scale urbanism that have been illustrated in this, and the previous issue of Archigram share a definitive feature: the reliance of the organisation upon strong lines of communication".

ZENETOS'S TECHNICAL RATIONALITY: BETWEEN PRAGMATISM AND UTOPIA

Zenetos was a member of the *International Association of Cybernetics* and had attended numerous congresses on the subject, such as the *International Congress of Cybernetics* held in London in 1969 (Rose, 1970). In parallel, he was also an avid reader of the writings of the American mathematician and philosopher Norbert Wiener and of *Science* magazine, often cited in *Urbanisme électronique: Structures parallèles* (1969b). Zenetos's library included several works on cybernetics. He should have been familiar with the writings of English author, inventor, educational theorist, cybernetician and psychologist Gordon Pask, especially with his article "The Architectural Relevance of Cybernetics", which was published in *Architectural Design* in 1969. Pask was in close contact with Cedric Price and Nicholas Negroponte. A year before Pask, Christopher Alexander had also published an article centred on the relationship between architectural design and cybernetics: "Systems Creating Systems" (1968). Zenetos's readings included the work of French philosopher and pioneer of political ecology Bertrand de Jouvenel, who in 1962 had published *L'art de la conjencture*. Another important source of inspiration for Zenetos was the work of American biophysicist Alfred J. Lotka, who in 1924

published *Elements of Mathematical Biology* (1924/1956). Among the references in Zenetos's article "Town Planning and Electronics" published in the seventh issue of *Architecture in Greece* is Jean Fourastié's *Idées majeures* (1966). Fourastié was a French economist, notable for having coined the expression *Trente Glorieuses* to describe the period of prosperity that France experienced from the end of World War II until the 1973 oil crisis (1945-1973).

In the part of his work on "Electronic Urbanism" that was published in the seventh issue of the annual review *Architecture in Greece*, Zenetos's analysis was focused on infrastructure, while the part of the study that was published in the eighth issue of the same annual review was centred on housing and services. Zenetos's vision about socializing through social networks seems particularly timely, as it imagines the possibility for inhabitants to "be everywhere and nowhere". What is worth mentioning is the fact that Zenetos really desired to implement "Electronic Urbanism". This is not evidenced only by his writings but also by the fact that he provided construction details for his design details. Additionally, in 1969, he suggested to implement it in Greece. Zenetos's technical rationality makes it clear that for him the principles of "Electronic Urbanism" were not utopic but pragmatic. His technical rationality is especially visible when he pays attention to the shared vocabulary surrounding patents and inventions, which also characterized the communities of scientific societies and associations of which Zenetos was an active member.

AROUND THE INTENTION TO ELIMINATE TRANSPORT IN THE CITIES

In February 1972, in an editorial of *Science* entitled "Old Cities, New Cities, No Cities" the following question was raised: "Why cannot people live wherever they wish and congregate electronically?" (Seaborg, 1972, p. 709). A year later, Zenetos introduced his article "Town Planning and Electronics" published in the seventh issue of *Architecture in Greece*, devoted to the theme "The

education of the architects", with this same question, paying special attention to the idea that "[m]an desires, and has a right to acquire, a 'home' in a quiet environment close to nature and at proximity to his place for work and the various public services" (1973a, p. 113). Taking as his point of departure the idea that "[t]echnology properly used may be the only short-term answer to the city's problems because it will take time to check population growth" (Seaborg, 1972, p. 709), Zenetos argued that "[t]he remoteness between living and working areas is increasing while the urban texture is gradually being 'disemboweled' for the improvement of the transportation system, which will lead, in the end, to nowhere" (Zenetos, 1973a, p. 112).

His intention to eliminate transportation is also evident in his provocative article entitled "The Metro Does Not Solve any Problem" in the 24 July 1973 issue of *Economy Postman*. In this article, Zenetos argued that "[t[he metro de facto alienates people from the urban environment and the complex processes of complementarity". He also sustained that the metro "eliminates the development of social relations, a basic background of [...] [the] city", claiming that it is considered to be "one of the causes of mental illness of the inhabitants of big cities" (1973, p. 24). Despite his insistence on the replacement of daily transpiration between residence and work place by a variety of teleoperations from home, he envisaged that "walking [would] [...] regain its old importance" (Zenetos, 1974, p. 123). A common point between Zenetos and Friedman's approaches is the conviction that technological and social issues are interlinked. Friedman, in "A Trend in Architecture: Analysis and Prognosis", published in *Architectural Design* in 1965, claimed that due to the technical and social transformations characterizing the situation "the historically established patterns (social organisation) have completely lost their efficiency" (1965, p. 52). As a solution towards the problems provoked because of the loss of significance of the old patterns, Friedman suggested the creation of "a new objective architecture [...], [aiming to] solve the relations implied by the patterns, e.g., the relation between social organisation and transportation" (p. 52).

TAKIS ZENETOS'S VISION OF SUSTAINABILITY AND CIRCULAR ECONOMY

Zenetos was interested in recycling materials and he believed in a circular economy. As part of his endeavour to envision living units as components of a larger project aiming to promote circular economy, he envisaged the existence of the so-called "Organisation for the Distribution of Consumer Goods" (ODCG), as well as the "Organisation for the Restitution of Raw Materials" (ORRM) (Zenetos, 1974, p. 123), and a "Laboratory for Composistion and De-composition of Products" (p. 128). Indicative of his concern about eliminating waste is his remark that "[e]conomy in raw materials and energy and reduction of discarded matter (wastes) are new considered to be an integral part of any design process" (p. 126). His guiding principle was to eliminate waste. Another concern shared by Zenetos, Friedman and Archigram was the intention to create controllable climatic conditions. Characteristically, Friedman writes in "Spatial Urbanisme" (*Urbanisme spatial*), in *L'Architecture d'Aujourd'hui*: "An additional advantage is [...] the possibility of climate control of an entire neighborhood, including public spaces: streets, squares, passages, etc. This 'climatisation' supposes a coating: thin, elastic and transparent membrane, around the construction, as the first thermal barrier. The walls of the houses themselves will only be the second small dam" (1960).

TECHNOLOGICAL INNOVATION AS SOCIO-POLITICAL TRANSFORMATION

Zenetos's chief concern was to allow users to become the most creative possible, and this is reflected in the conditions he sought to create in his living units, on the one hand, and in his efforts to reconcile humans and technological advancements with nature, on the other hand. His flexible superstructures are characterized by an integration of nature in the built environment. In parallel, he understood technological innovation as a

means permitting socio-political changes. The specific question that arises today is whether the core ideas of Zenetos's aforementioned projects could be incorporated within the design of architectural and urban projects aiming to contribute to pandemic preparedness. Examining Zenetos's suggestions for comfortable, flexible and independent home-office conditions relying on advanced technological achievements may allow a better understanding of architecture's potential responses to the emergency conditions created by pandemic breakouts. Besides his interest in the broader aspects of urban planning, Zenetos paid particular attention to the complexity of the psychological and physiological needs of citizens within such conditions, as is evidenced by his 'posture chair' design. Zenetos related humans' self-esteem to their contribution to the preservation of the natural environment, their access to the infinite capacities of technology and the satisfaction they can receive through the arts and socialisation (1974, p. 125).

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