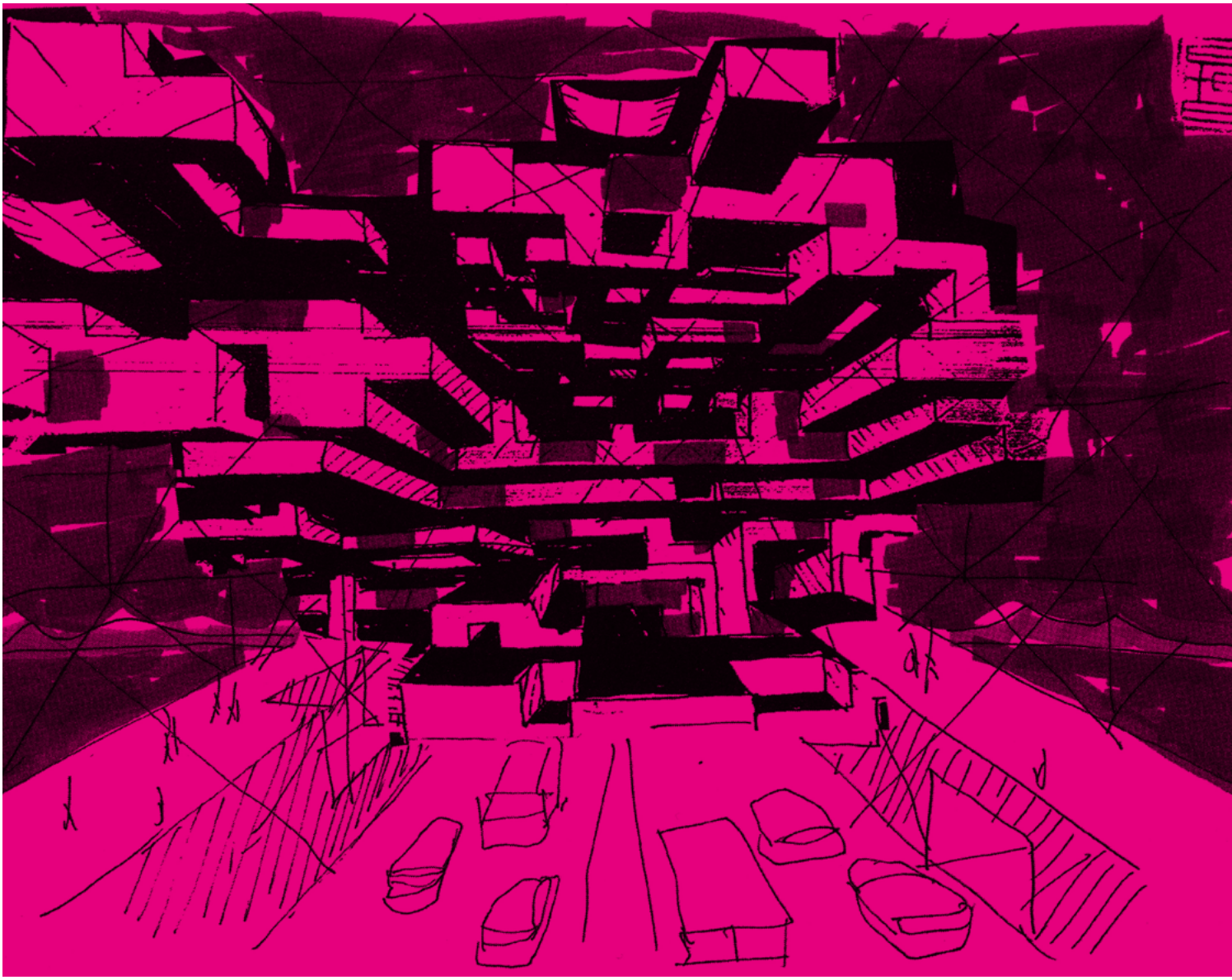

HPA

Histories of Postwar Architecture

n.**3** 20**18**
vol.**I**

Megastructures

edited by
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Anna Rosellini
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Mega*space* structure Yona Friedman and Eckhard Schulze-Fielitz[1]

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ABSTRACT

Equally fascinated by the space frame, Yona Friedman and Eckhard Schulze-Fielitz came up with one of the most powerful alternative answers to the international crisis of urbanism and architecture in the late fifties and through the sixties. Mega*space*structure will be the portmanteau forged to encompass their common and distinctive view. The blended word subsumes the overriding features of their production, which impacted the theory of architecture and still question – up until this reassessment of their work – the "future of the city" as both project and fiction.

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KEYWORDS
Megaspacestructure; Yona Friedman; Space Frame; Future; City

The exhibition of Yona Friedman and Eckhard Schulze-Fielitz's works, for the first time brought together in one show, makes us ponder on the reason for their current relevance and success, beyond architecture, to reach a large public and appeal to the artistic and media worlds. Revealingly, the exhibition is not held in a museum of architecture. Paradoxically, answering this question requires revisiting the contribution made by their projects to the theory of architecture, as they were coming up with one of the most powerful answers to the international crisis of urbanism and architecture in the late fifties and through the sixties. Their works carried a project of society, a vision of the world, in other words, a piece of utopia – and people are now once again ready to listen to their narrative of the future world, because the "Future is back."[2] Thus, today Eckhard Schulze-Fielitz, as an architect who built a lot,[3] can say that the Raum Stadt is the unique regret of his brilliant career. Yona Friedman shares that feeling, and is now more active than ever – too late for building, but not to give advice, to show "the right direction," as he has often said.

Eckhard Schulze-Fielitz still hopes that the spatial city may incarnate the dream of the future for young generations of architects. What does that mean for architecture, but also for our society in its relationship with architecture and cities, as well as with the architects themselves?

With this in mind, as an analytic exercise I propose to slice up their work (and their world) into five theorical cities in order to single out the original and main features of each. All five cities pertain to what I call the Mega*space*structure, a portmanteau combining megastructure and space frame. All the megastructures of the period borrowed something from the space frame, but Yona Friedman and Eckhard Schulze-Fielitz are the first and most talented heroes of the space frame epic[4] that saw the notion migrate from engineering to architecture.

1. This text comes from a lecture given on the occasion of the exhibition "Visionäre des Städtehaus. Yona Friedman und Eckhard Schulze-Fielitz", KUB *Arena*, Kunsthaus, Bregenz (Austria), June 30, 2011. See also Dominique Rouillard, "Megastructures: l'invention d'un monde.", in *Superarchitecture. Le futur de l'architecture* 1950-1970 (Paris: Ed de la Villette, 2004).

2. About this hypothesis, see Dominique Rouillard, "Future was back," in *Action Architecture*, (Paris: Ed de La Villette, 2011), 23-48.

3. Cfr. his interview in "Rem Koolhaas and Hans Ulrich Obrist in conversation with Eckhard Schulze-Fielitz" in Wolfang Fiel, ed., *ES-F Metasprache des Raums. / Metalanguage of Space,* (Vienna: Springer-Verlag, 2010), 25.

4. Cfr Dominique Rouillard, "L'épopée tridimensionnelle," in *Poutres et portées horizontales*, (Lausanne: éd. PPUR, 2012), 732-740.

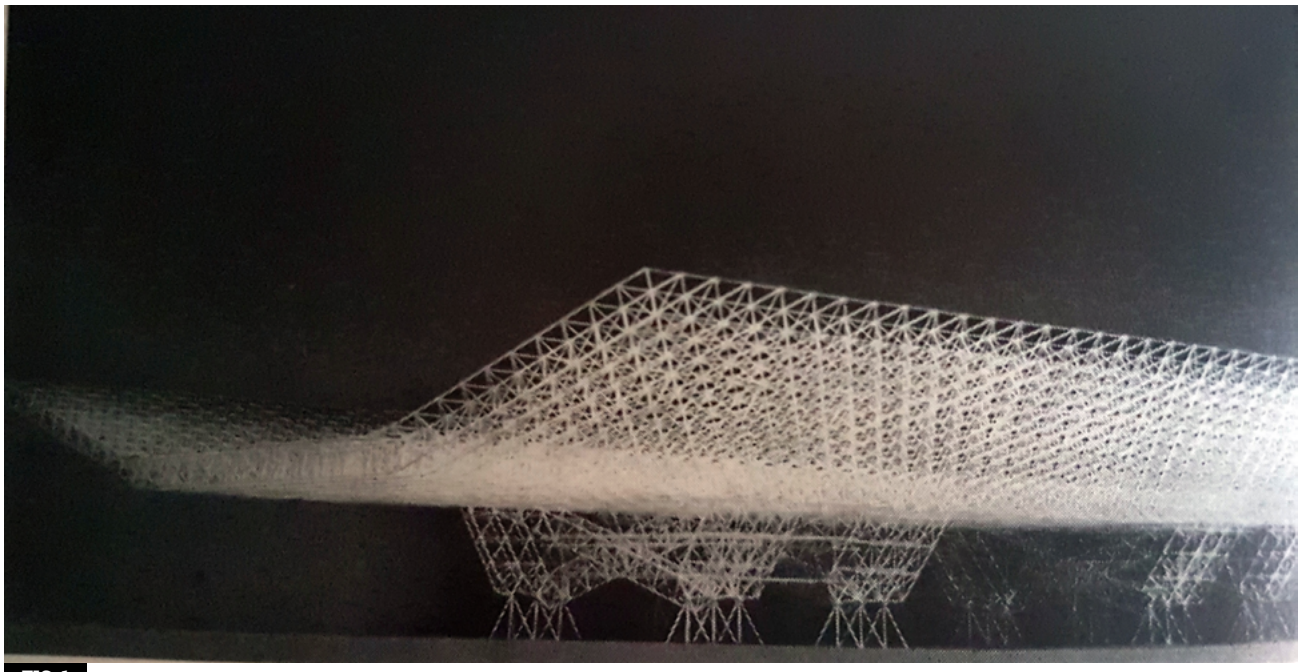

FIG. 1 Konrad Wachsmann, "The roof shell" (from *The Turning point of Building*)

FIG. 2 Graham Bell, 1900 (from *The Turning point of Building*)

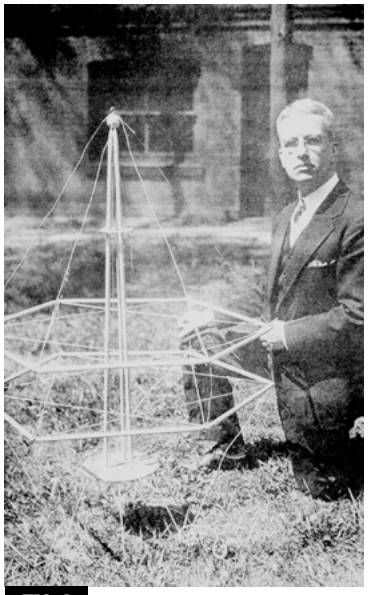

FIG. 3 Richard Buckminster Fuller, 1930

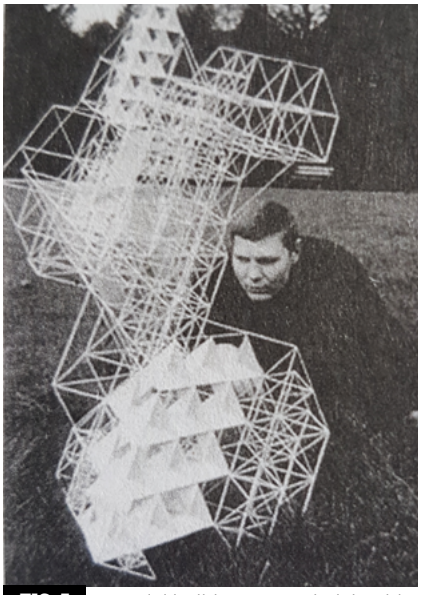

FIG. 5 Model builder G. Baschek beside Eckhard Schulze-Fielitz's Raul Stadt model, 1960. (Archives ESF)

1/ Structure / Infill in the age of the space frame.

A mutual fascination with the spatial frame was the starting point of Friedman and Schulze-Fielitz's common story.

Both have repeatedly stated their admiration for Konrad Wachsmann's work [Fig.1]. Friedman met him in Haifa in 1953, Schulze-Fielitz in 1957. They were neither the only nor the first young architects to be captivated by the infinite and spatial construction generated by Wachsmann, who soon began to publish his work in the middle of the fifties, subsequently disseminated all over the world. But Friedman and Schulze-Fielitz were unquestionably among the first to think about transforming a building system to allow for large-span construction in a living structure.

Let us keep in mind that Wachsmann, neither a licensed architect nor an engineer, was resucitating an old idea by Alexander Graham Bell dating

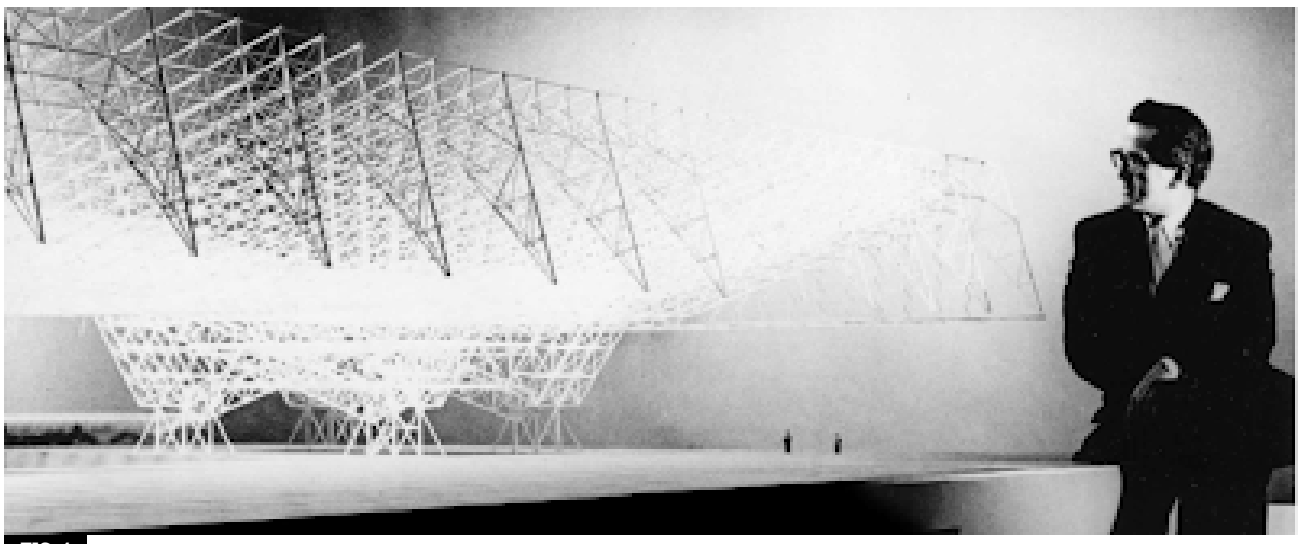

FIG. 4 Konrad Wachsmann, 1950

back to the very early 20th century, as he himself acknowledged.[5] Bell, the true inventor of the three-dimensional structure, was obsessed with the problem of flying machines. The term "three-dimensional strength," which he coined, described the property of an assemblage of cells made of four equilateral triangles: a structure made of hollow members, so light that it could fly in the air; a kite structure that could be replicated for building houses or bridges. However, Bell didn't pursue the project. Airplanes would be his next invention after the telephone.

Bell, Fuller, Wachsmann, Schulze-Fielitz. We can trace the genealogy of their fascination with light structures and diagonal trusses, exchanging compression for the tension of the structure [Figg. 2-5]. They all seemed to be captivated by their models of light structures, with a strange effect of scale and comparison with nature. We understand by these photos that there is a relationship between the economy of the structure and that of the Earth: the lightness of the former would ensure the future of the latter. The inflatable structure of the sixties shared the ambition of exploiting lightness for the benefit of the Earth and Humanity, albeit with a complete different idea in mind.

Two pictures can illustrate one of the differences between the two architects: Schulze-Fielitz revealed his concern for the lightness of the spatial by setting his Raum Stadt project and model on its toes, on the corner of triangles [Fig. 6]; Friedman, in turn, hangs his city from traditional vertical poles [Fig. 7]. No pictures exist of Friedman contemplating his structural models, the very constructive dimension of the space frame. In

5. Konrad Wachsmann, *The Turning Point of Building* (1959), (Wiesbaden, 1961).

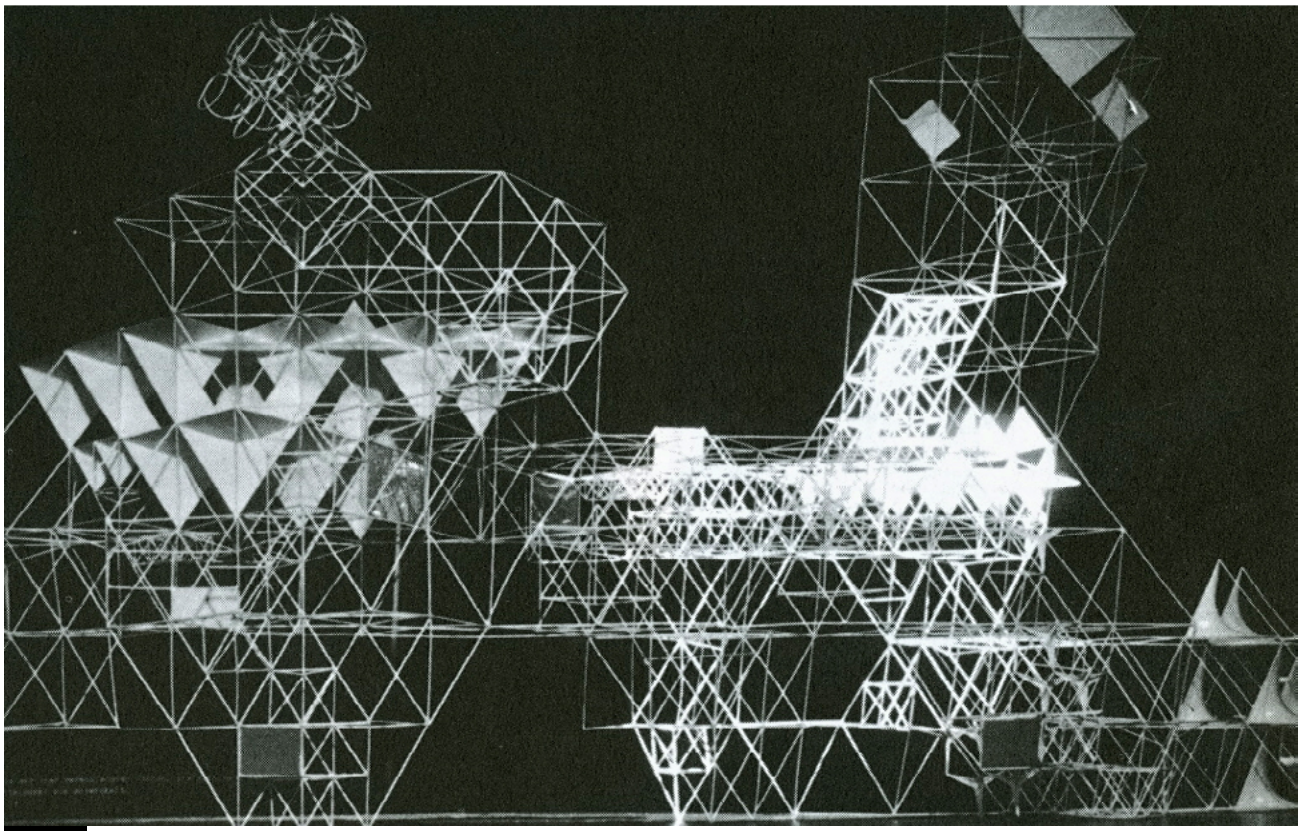

FIG. 6 Schulze-Fielitz, Raum Stadt, 1960. (Archives ESF)

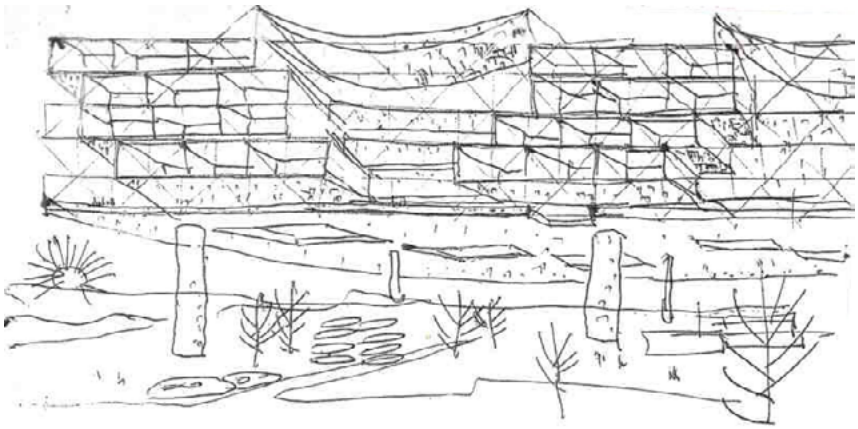

FIG. 7 Yona Friedman, Vue d'un quartier à l'enjambée spatiale, 1960 (archives YF)

fact, Friedman's cities were not real three-dimensional ones, despite some diagonals having been added just to evoke the notion. In fact, Friedman's spatial cities obeyed a traditional system of huge bi-dimentionnal trusses, of which Mies van der Rohe produced the most fantastic models, built and unbuilt, for living inside or not.

But this "false" three-dimensional structure is actually not relevant, because for Friedman the space frame is like an "objet trouvé" (a found object), something gifted by the engineer to the architect, whose mission would consist in doing something with it, in translating it from engineering to architecture. Moreover, diagonals are a big constraint with respect to the possibility of housing anything inside the structure. The space frame is in itself a myth, a utopia (By the way, on this point we could say that contrary to what has become a frequent assumption, Friedman was in fact more pragmatic than Schulze-Fielitz.) This may be one of the reasons why Schulze-Fielitz later introduced another version of the Raum Stadt in 1966, which had a quandrangular structure, as he would call it later, "A pragmatic 'Raumstadt,' a hommage to Yona"[6] **[Fig. 8]**. Quite possibly,

6. Picture caption, sent by Schulze-Fielitz to the author, October 20, 2011.

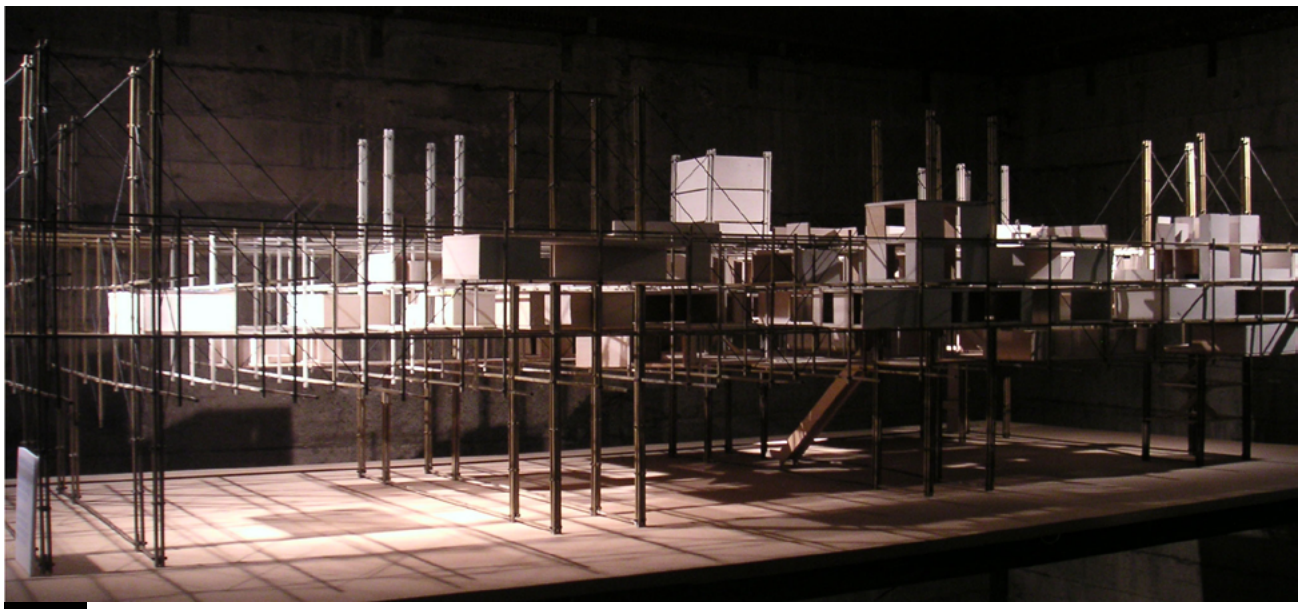

FIG. 8 Schulze-Fielitz, Raum Stadt, 1966. (Model Photo D. Rouillard).

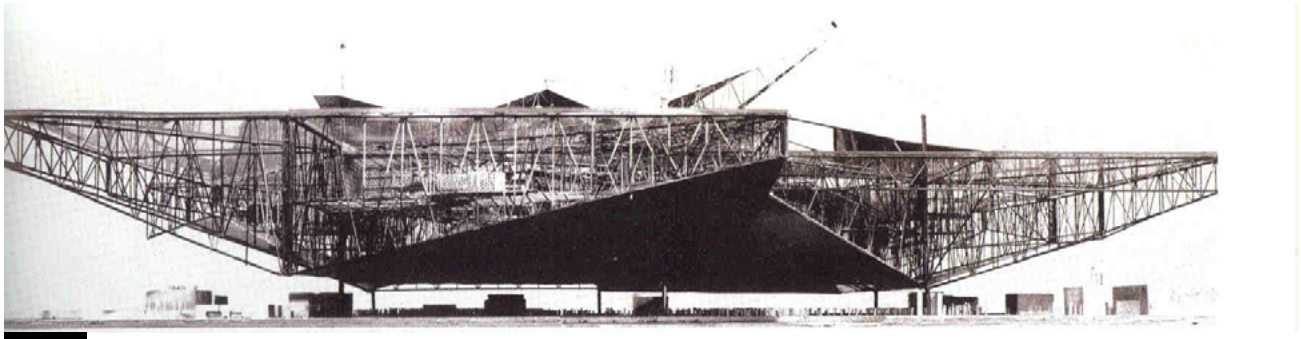

FIG. 9 Constant, New Babylon, 1959

by abandoning the diagonal as symbol of the real space frame, Schulze-Fielitz was also giving up a part of utopia. But the opposite could also be ventured: that by abandoning the diagonalization of the structure, he was seeking to achieve a definitive and so to speak "neutral" grid, one that would no longer bear any expression of the "structure." This is a question I'd very much like to ask him.

Let's go back to Wachsmann. In his fantastic hangars, the inner structure is never thought of as a place to live, and even less as a city. His goal is to span, to reduce the supports, or even eliminate them around the building, and to use standardized and transportable elements as well as hollow fixtures. For Wachsmann, the future of architecture, of cities, and of the world itself was based on the universal 20 directions of an articulated node, a magical node. He was deeply fascinated by "the texture and character of a space structure,"[7] a space never considered for living "inside." In the words of the Italian historian Carlo Argan, Wachsmann structures are "not *in* the space, they *are* space."[8]

With Friedman and Schulze-Fielitz, the structure itself evolved from being a matter of voids, nodes, weight, and space (an engineering matter) to one touching upon the question of living. That was the focus of Friedman's Spatial City and Schulze-Fielitz's Raum Stadt, as well as Constant's New Babylon where the diagonal direction of the floor recalled the spatial character of the structure **[Fig. 9]**.

The distinction between structure and filling is obviously not something completely new, Le Corbusier's Obus projet for Algiers (1930) remains the acknowledged harbinger, "the true ancestor" of megastructure, as Banham[9] pointed out. But the idea was again in the forefront in the fifties. In 1957, Alison and Peter Smithson conceived urban planning "within" the opposition between long-span time infrastructures, the *permanent*, such as motorways, and *transient* elements, architecture that can be changed as needed; or to *infill* an existing village with new elements **[Fig. 10]**. But the Smithsons didn't really come up with a new expression of that dual system. Mega*space*structure, in turn, was going to bring the permanent *and* the transient together into a total system, into a global image.

So how to infill the (spatial) structure, and with which elements?

The diversity suggested by the Corbusean structure was in fact a false

FIG. 10 A&P Smithson, Infilling village, 1957. (Architectural Design)

7. Wachsmann, *The Turning Point of Building*, 169.

8. Carlo Argan, "La sintesi spaziale di Konrad Wachsmann", *Casabella*, no.244 (1960): 36.

9. Reyner Banham, *Megastructure. Urban Structures of a Recent Past,* (London: Thames and Hudson, 1976).

one. If we look attentively at the Obus plan, we can see that the grid welcomes only two styles of architecture: the modernist, and the Arabian or, more accurately, the architecture of the Casbah, most likely doomed to be demolished in the process. The project was envisioned as a kind of a rebuilding, not as a structure meant to embrace diversity and freedom of choice.

Friedman expressed the changing ideals: inside the grid, whether in a space structure or otherwise, the infill is made of people, as in a simple collage of photos, an early representation of so-called "participation" [Fig. 11]. This infilling by human faces also symbolizes the fact that the architect is no longer necessary to achieve certain kind of jobs, such as the facade! In another collage, he brings together various styles of architectural orders and "ornamentations," suspended in the air, flying. The collage thus becomes an allegory for the diversity and mobility of people, as well as for their desires and tastes. Constant used a similar approach in a photomontage (1969), but rather for advocating a kind of a self construction or do-it yourself method, recycling existing or used pieces of facade, possibly prefiguring the collapse of existing cities.

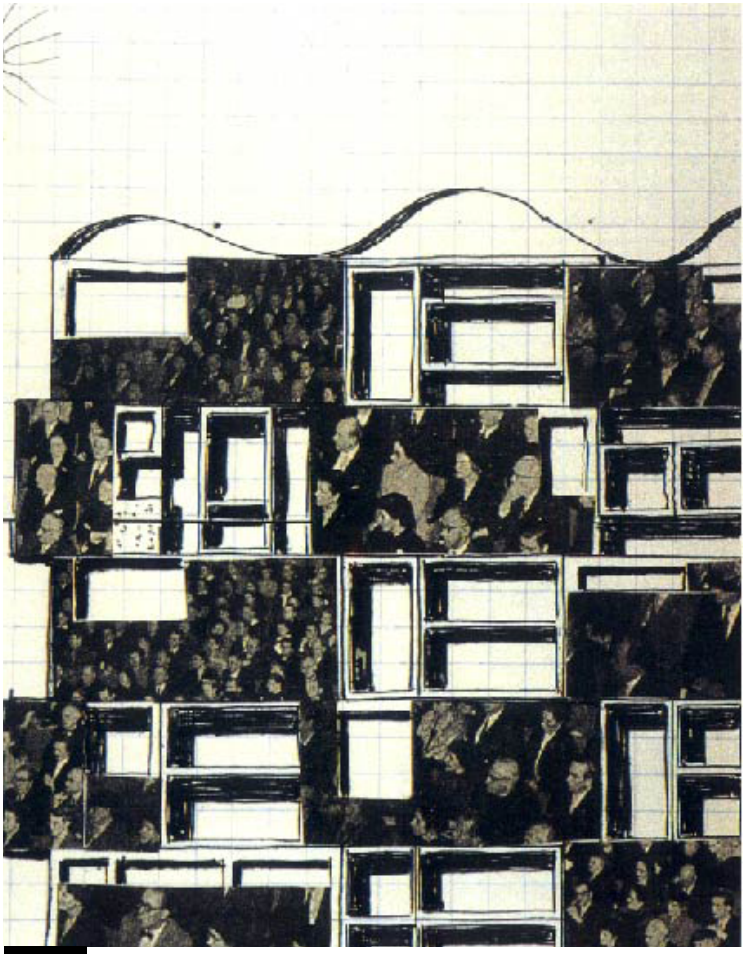

FIG. 11 Yona Friedman, L'ornamentique, 1958 (archives YF)

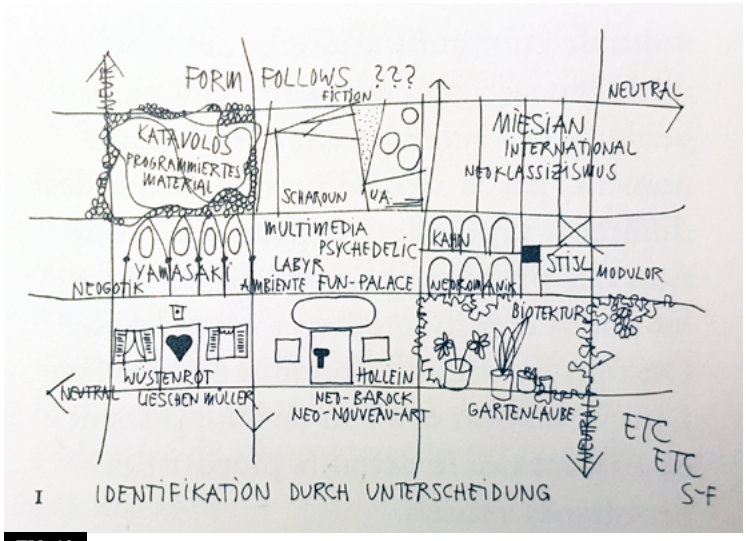

FIG. 12 Schulze-Fielitz, Identifikation durch Unterscheidung, 1971 (Archives ESF)

The neutral structure claimed by Schulze-Fielitz was based on the concept of "free infilling," which means the possibility of leaving it up to the people to fulfill the "primary system" according to their own desires and their preferred ways of life, leisure and personal expression, as well as individual tastes in materials, heating and cooling options, style, and so on. The representation of this totally open structure would find its expression in the drawing of a grid filled with elements coming from any movement or style in the history of architecture; the only way, he said, to avoid "aesthetic entropy"[10] [Fig. 12]. Schulze-Fielitz, and also Friedman when he resorted to the comparison with animals, were looking for a kind of organized anarchy, pursuing an oxymoron similar to that which Aldo van Eyck was seeking in the fifties: the quest for diversity within order, now achieved through the ideal neutral grid. A few years later,

10. Schulze-Fielitz, "Extrapollation des tendances", lecture given to the symposium organised by the Republikanischer Club in Berlin on the topic "Urbanism and Society," December 17, 1967 (ESF's personal papers, in French).

Charles Jencks would envision this plurality as a system, as a "structure" made of a temporal and thematic grid that became the foundation of his post-modern analysis ("Evolutionary Tree to the Year 2000").[11] The neutral-open megastructural grid is thus an expression of the nascent pluralism of the period, in others words, the end of the theory of architecture.[12]

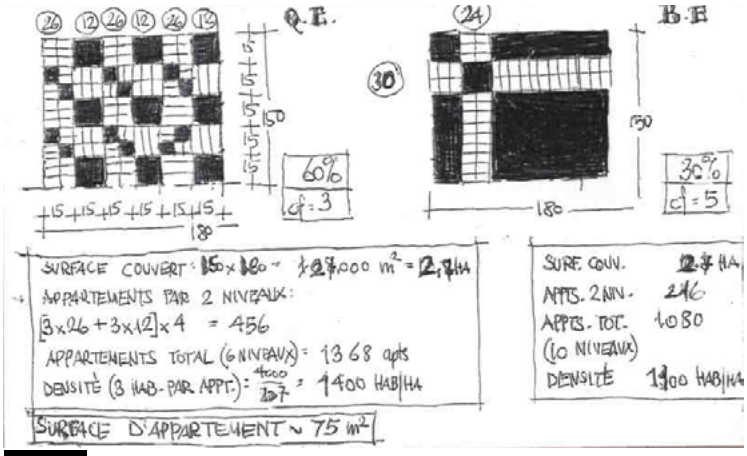

FIG. 13 Yona Friedman, Balance between voids and built spaces in the grid, 1962 (archives YF)

2/ The multi-layered city

The second idea resulting from the space structure conceived as total urbanization and as a re-organization of society is what we can translate as urban layer, urban sheet, "covered city" in Constant's words: layers of urbanization superimposed in a horizontal structural canvas with an adequate balance between empty and built spaces in the grid, to allow mobility and light underneath [Fig. 13-14]. The horizontal spatial structure deeply altered the modernist statements of functionalist architecture, which had been massively put into practice during the post-war reconstruction. Inhabited spatial structures generated or participated in three radical changes or upheavals.

11. Charles Jencks, *Architecture 2000*, (London: Studio Vista, 1971).

12. About pluralism, see Dominique Rouillard, new introduction to Ulrich Conrad's *Programs and Manifestoes of 20th Century Architecture* (Frankfurt: Veitag iHlstem GmbH, 1964), Fr. trans., Paris Ed de la Villette, 2018.

The end of the "building"

The layer pattern homogenizes the living space and departs from the fixation with the "barre" model, the profile and the narrow silhouette of the Corbusean Unité d'habitation, including the articulated Team Ten's versions. In others words, it heralds the disappearing of the *building*. For Schulze-Fielitz, more dominated than Friedman by the figure of Mies van der Rohe,[13] the aim was the same: how to back out from all the glass and the boring boxes of the fifties?

13. See Eckhard Schulze-Fielitz, "*Raumstrukturen / Die Raumstadt", Bauwelt* (March 10, 1961): 271.

With the space frame enshrined into architecture and city planning, there was no more building, no more architecture, and thus no more town, just layers. Overcoming the "barre" model was probably the most difficult task/challenge for architects deeply entrenched in the Modern Movement (let us just remember Friedman's difficulty with projecting anything without the narrow profile of the Unité in his first drawings of the fifties, before succeeding in bringing closer two models of space structures and finally substituting the layer for the "barre" [Fig. 15].

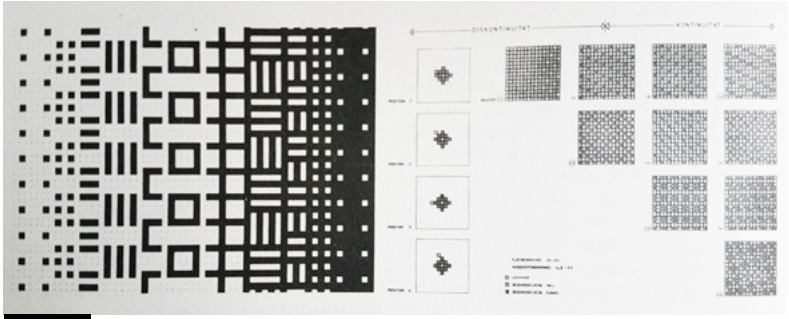

FIG. 14 Schulze-Fielitz, Raumokkupation (Space filling arrangement), 1966. (Archives ESF).

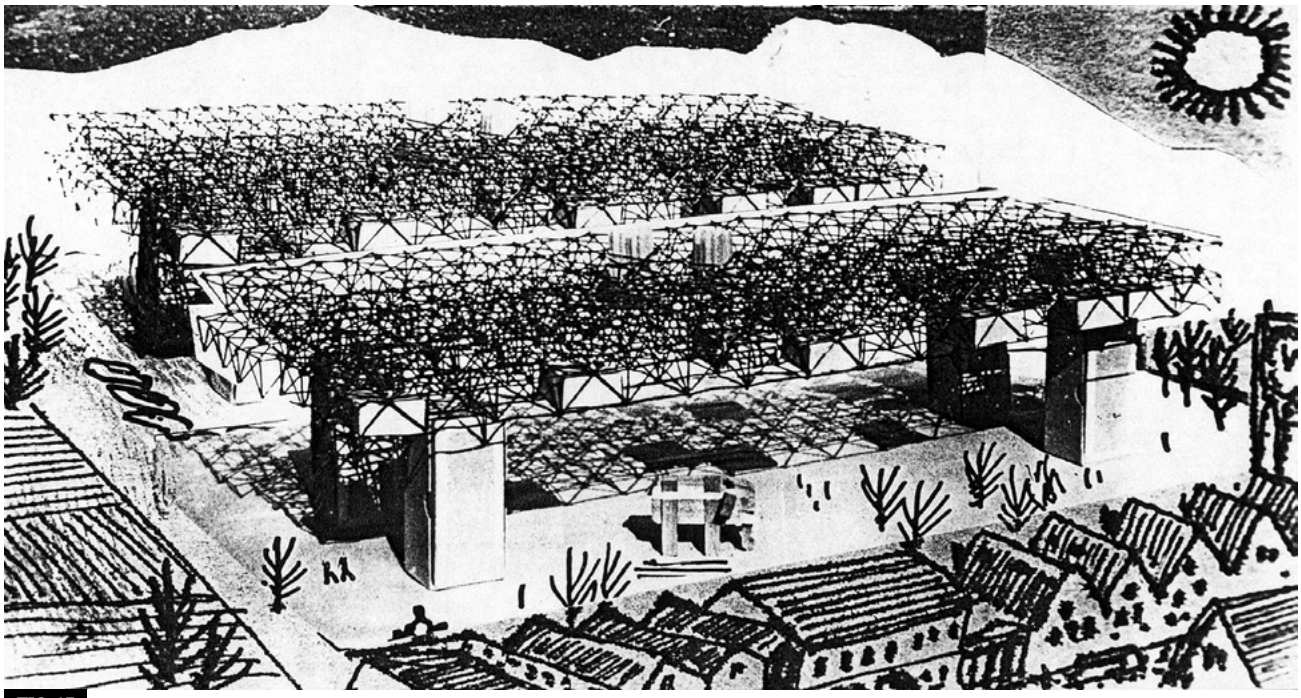

FIG. 15 Yona Friedman, From the barre to the layer, 1959 (archives YF)

The end of zoning and typological distinctions

The second effect or consequence of the multi-layer structure having homogenized the living space is the disapperance of functionalist zoning. In the mega*space*structure everything cohabits and intermingles: activities, people, housing and factory, shops and agriculture, humans and animals. Even roads and freeways are brought into the structure. One can also speak of the disappearance of typological distinctions. The mythical mixed fabric of the traditional city – if not medieval – is reinvented, recreated inside the mesh of endless horizontal plans coexisting in free and joyful diversity and proximity. This blending of functions bears no more relationship with the timid (limited) superimposition of functions proposed by the Corbusean Unité d'habitation meant to occupy a plan based on space distribution zoning.

We know how this image of inhabited spatial layers immediately inspired Kenzo Tange for his Tokyo Bay project, so different from the Kikutake's Marina towers that he presented one year earlier at Otterlo (1959). The impact on Kurokawa's projects is equally obvious (*Agricultural City*). Team Ten rehashed the idea under the name of web (at *Francfort, Berlin, Toulouse, Meudon, Fort Lamy, and so on*), and later in *mat* building (by Smithson for *Koweit*). A whole generation of architects believed in this new tool of a unique structure as the means to generate an entire city (*Le Vaudreuil*). Le Corbusier himself saw in it a way to get out of his own invention (in his hospital project for *Venice*).

Throughout the sixties, for architects from the Japanese Metabolists to Team Ten and even to Le Corbusier, the superimposing of layers, well balanced and with the appropriate density of holes and empty spaces, was

going to become the Babel Tower of urbanism, an organism spreading out and covering an entire district, a city, a territory, disregarding for a while the form and existence of buidings, streets, skyline, facades, architecture and city.

The city that never ends

With the Mega*space*structure, the growing metropolis is kept under control thanks to its open structure: a growing organic fabric in which the links themselves give shape to the city, where horizontal plans or towers are no longer isolated. The trope of growth permeates the project. Horizontal layers and vertical towers are linked together in the true manner of a metaphorical cluster: Kurokawa's Helix City looks like a waterlilly pond, in Isozaki's city his Clusters in the air city hold hands with each other 50 meters above ground level, the Babylonian layers are an endless suspended Golden Lane, and Schulze-Fielitz's spatial structure itself stands with no beginning or end. Arrows on plans point towards four directions.

In short, the model is a city that never ends, with no more formal distinction between functions, between the built and the unbuilt, rejecting composition in favour of a free infilling or occupation by people: such will be the model for the negative or counter megastructural Archizoom project [Fig. 16].

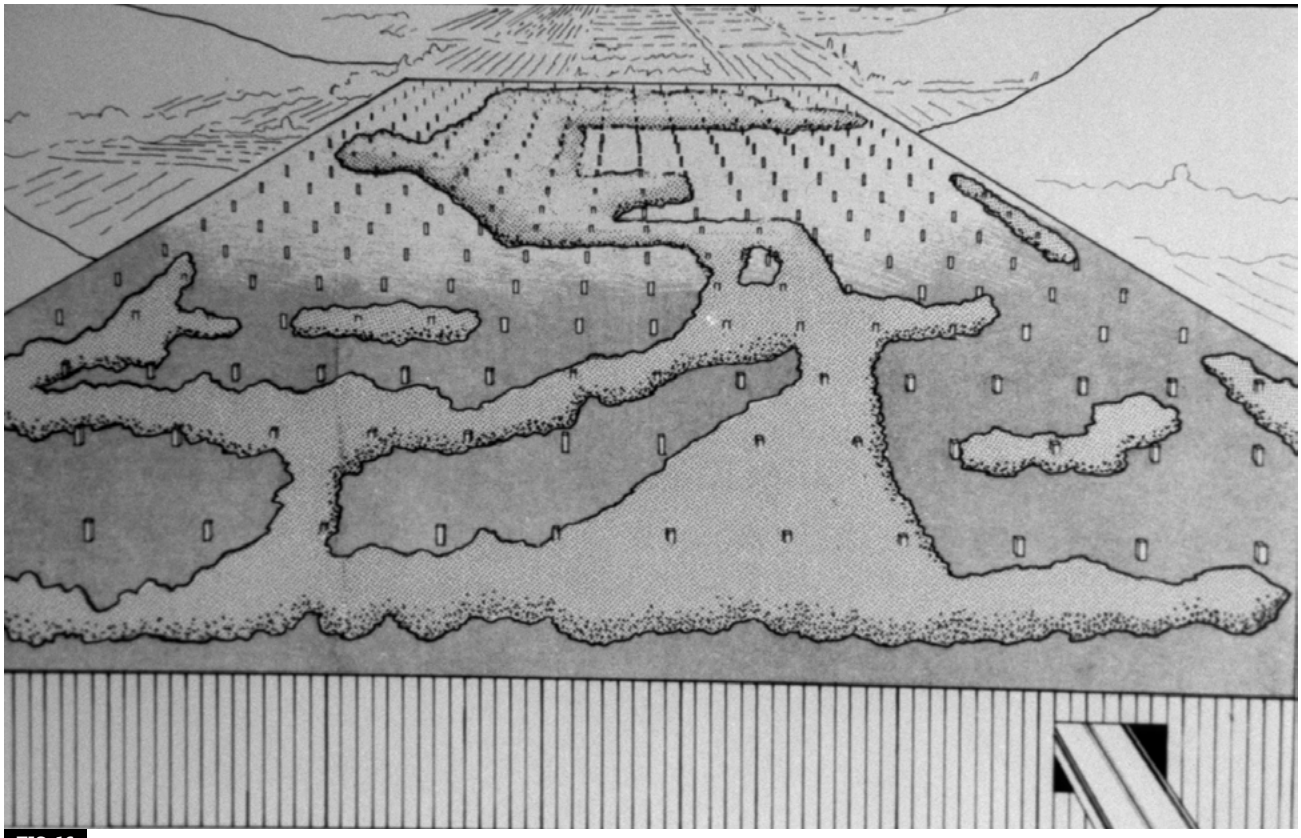

FIG. 16 Archizoom, No Stop City, 1970 (archives Archizoom)

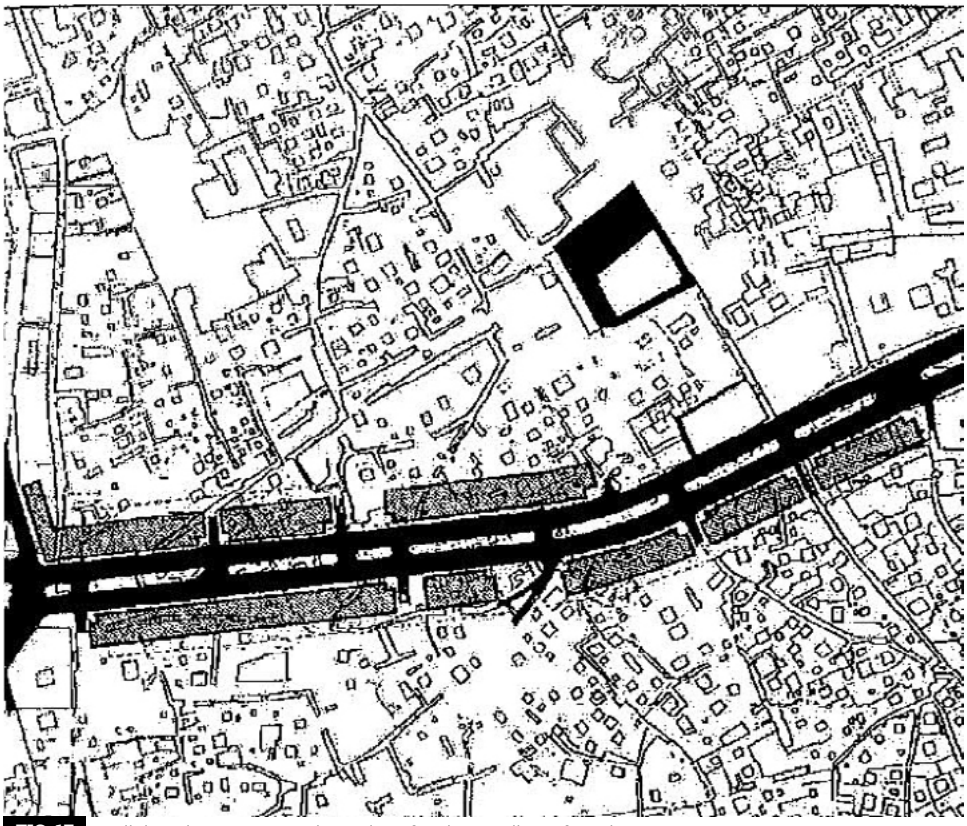

FIG. 17 Olivier Clément Cacoub, Project for the Medina of Tunis, 1958.

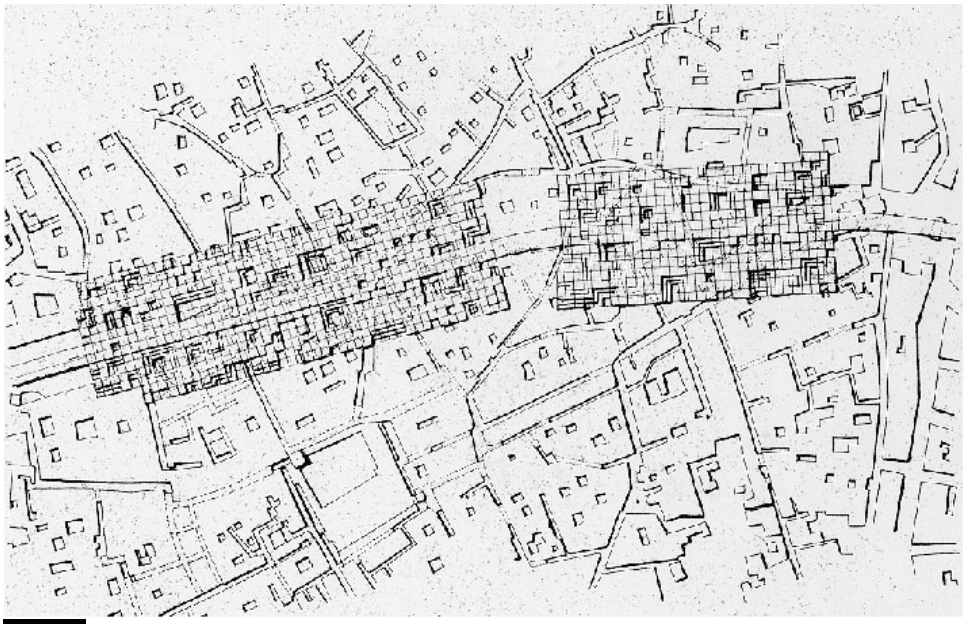

FIG. 18 Yona Friedman, counter-project for the Medina of Tunis, 1960 (archives YF).

3. The city above the city

The Mega*space*structure achieved a concentration of activities and population by the superimposition of layers. But this idea is reinforced, doubled-up by a superimposition of the existing city itself, of the buildings already there. The idea was initiated by Smithsons' plan for the Haupstadt Berlin competition. But it is with a completely different meaning and scale that the superimposition is re-used in Friedman's spectacular collages.

The structure stepping over the existing city, respecting the balance between voids and built spaces of the grid, sidestepped the constraints of land regulation and made it possible to build without waiting for new permits in existing districts that consequently no longer needed to be demolished. In this spirit, Friedman achieved for Tunis a counter-project to that of Olivier Clément Cacoub, the French Grand Prix de Rome which entailed building a motorway inside the Medina, a current approach at that time **[Fig. 17-18]**. This was also a way to build in unplanned negative space, as we would say today – places, streets, boulevards – in a manner blending a "strategy of the void" and of the immediate city, the city in its current state, even if the old urban fabric gets plunged into the dark shadow of huge structures. Essentially, Mega*space*structures ignore the existing city. But reluctantly or not, they are forced to somehow deal with what is already there (no more time lost to changing things or to restoring them either). No more substitution but simultaneity. As a matter of fact, the Mega*space*structure, at least through its photomontages, introduced the idea of "the city over the city" as a *cadavre exquis*, as a giant *collage*, the main credo of the seventies and later.

Tschumi would find a new opportunity to relaunch the idea in 2003, in China, a country where the demolition of the existing fabric is not (yet) a problem. Nonetheless, he did not succeed in convincing Chinese authorities to keep the factory that he suggested to restore **[Fig. 19]**. The city over the city is probably condemned to remain an architectural goodwill gesture towards cultural heritage, if not just a mere metaphor.

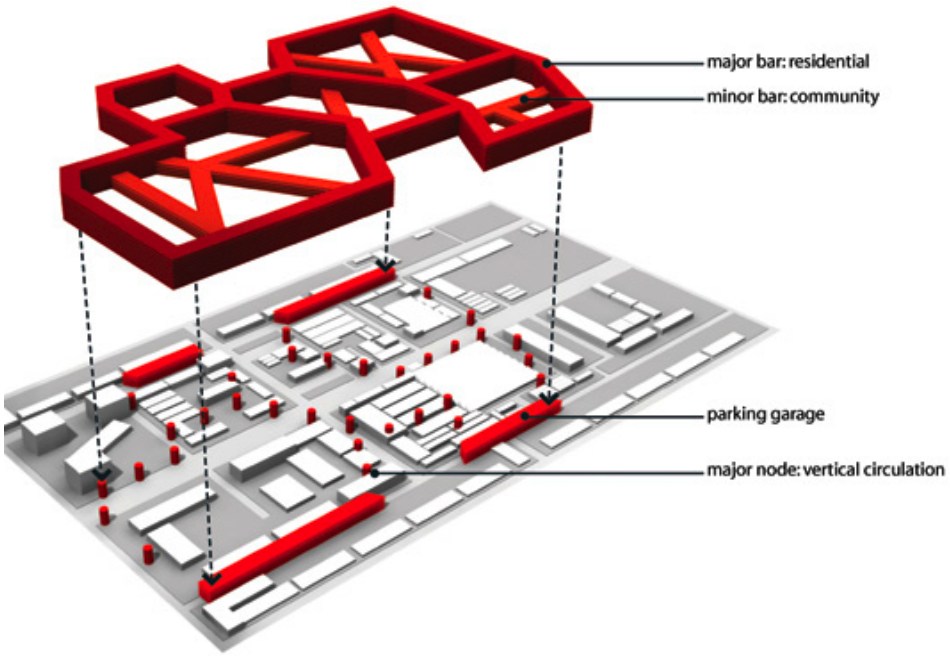

FIG. 19 Bernard Tschumi, Factory 798, Beijing, 2003 (archives B Tschumi)

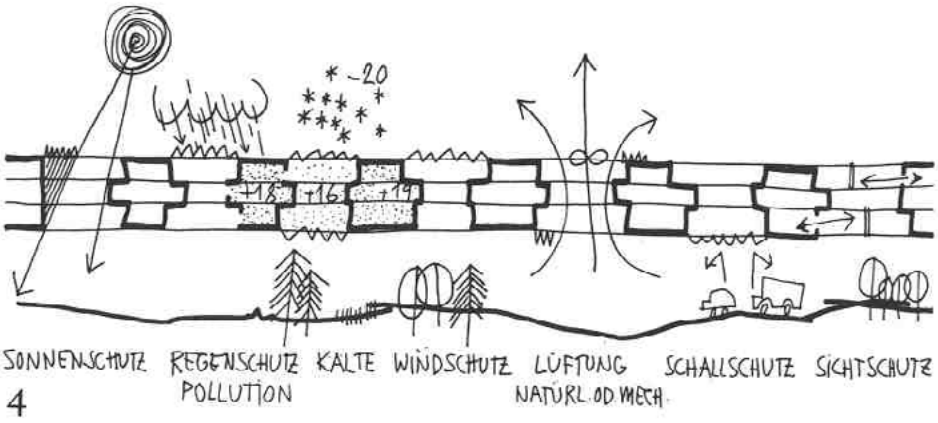

FIG. 20 Schulze-Fielitz, Policlimate, 1970 (Archives ESF)

4. The Interior City (*int friedman*)

With the Mega*space*structure there are no more buildings or streets, nor beautiful isolated architectural objects settled in a park, no more facades, no more exterior viewpoints from which to admire the city, or at least none of those is any longer the point. The question now lies elsewhere: INSIDE. Megastructure represents the first body of projects and theories for thinking of the city as an interior. It deeply modified the traditional paradigms of architecture, the relationship between outside and inside, public and private, architecture and city.

Urban layers mold the city as an environment to live in. During the sixties, "environment" was replacing "architecture," a word excessively associated with building and hard fabric, tradition, order or a modernist sense of space. The Mega*space*structure pushes the boundary of interior climate to the scale of the urban atmosphere, so, in a sense, structure has no more importance. As Friedman put it, "the planning of the city becomes the planning of furniture." Mega*space*structure offered an ambiance, no more for urban users with tabulated needs, but for liberated, uncontrolled bodies. The plan of New Babylon (Group of Sectors) perfectly embodies that idea. No stop City will be entirely made of such liquid ambiance, and, consequently, a place where we could again live naked. Artificial climate against architecture.[14]

Far more attached to the subject than Friedman, Schulze-Fielitz spent 20 years studying the air-conditioning of "urban systems." His concept of "Polyclimate" went hand in hand with Raumstadt: to each activity its space and its climate.[15] So I feel confident saying that Schulze-Fielitz invented the "Raum Klima" (there is insufficient space here to develop his later Ecotecture project) [Fig. 20]. In this context, the Mega*space*structure doesn't appear as a pretentious structure but as a first expression of what we could call today an "urban design of sensations."

14. Dominique Rouillard, "Le climat contre l'architecture," in *Climats. Conférences de Malaquais,* (Gollion: In Folio, 2012), 193-217.

15. Eckhard Schulze-Fielitz, *Stadtsysteme 1*, (Stuttgart: Karl Krämer Verlag, 1971).

The three stages of the desintegration of cities pictured by Friedman prefigure a scenario that Schulze-Fielitz, as an architect and engineer involved in construction, never envisioned. After the disappearing of the megastructure, only antennas will remain, with reception transistors scattered across a connected landscape. A similar vision was upheld by Frei Otto who once said, as in a dream (maybe a nightmare): "One day we won't need any more building materials."

The project of a technological park in an open space would be relaunched at the end of the sixties by Archigram, who year after year progressively abandoned the bulky megastructure that was in such deep conflict with ideas of mobility and change. A discrete technology of service would infiltrate the territory (L.A.W.U.N). A similar statement was made by Superstudio, advocating the flattening of the structure to achieve a Supersurface.

Considering such projects, we realize that our way of planning towns today hinges on a notion of the city as an ensemble of furnished and confortable interiors, or something like the beach, or Monte Carlo (Berlin, sols, picnic, beach/Archigram).

Our present urban design no longer ensues from architectural values of its own, but from a narrative aimed at fulfilling desires and pleasures, and the sensation-seeking drives of individuals.

5. An interactive city?

Computer technology, or at least its lexicon, was part of the mega space-mobile project. Friedman and Schulze-Fielitz, as Constant or the Metabolists, in around 1958 -1960 introduced new words into the theory of architecture, what they called at that time "*electronic computing device*", "*automation*", "*robotic*", "*calculator*" and so on. Information technology appeared as a possible tool for the control, organization and complex management promised by the endless possibilities of the space structure in terms of mobility and change. "Computer exceeds human capacity," said Friedman. For Schulze-Fielitz, it facilitates "the organization of change."

Both were very close to imagining the interactive city, but they couldn't achieve it because they were still attached to the idea of the structure, in a structuralist period. In this context, the three-dimensional structure appeared to be a sufficiently complex network. In their cities, computer technology was only a tool, whereas the revolution would have required putting it at the center of the project, making the core element of the project itself. This would have implied abandoning the structure, something that was absolutely unthinkable for Schulze-Fielitz who still believed in the timeless value of the Raumstadt ("something beyond fashion"[16]). For his part, as we suggested Friedman might have been ready to leave the structure behind, but not yet! The Flatwriter introduced at the international

16. Schulze-Fielitz, *ESF*, 429.

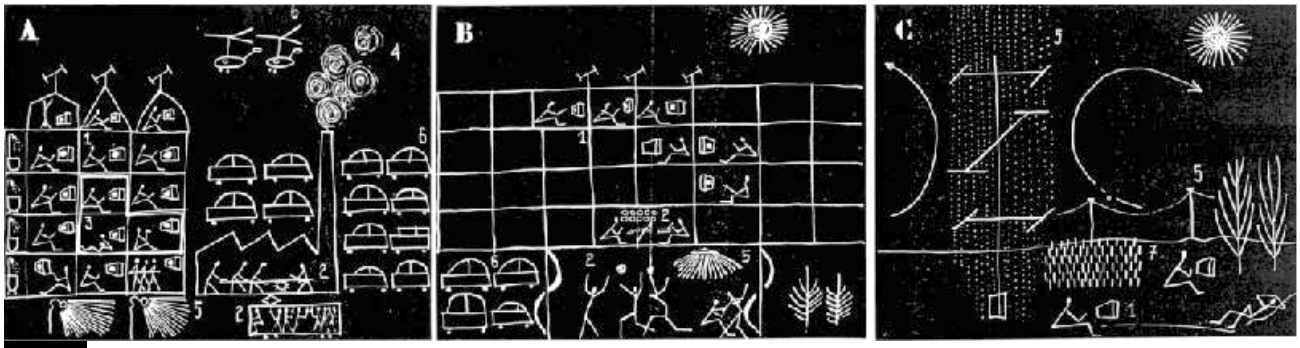

FIG. 21 Yona Friedman, « Transformation de la psychologie collective », 1961 (archives YF).

exhibition Osaka '70 resembled what might have been expected from a computer in terms of changeability and choices, but it was in fact a simple typewriter, where letter keys had been replaced by a few other criteria such as the orientation of the building, its location inside the city, or access to nearby facilites, and so on, very far from what Archigram had already foreshadowed in 1964 with Computer City: a "real" vision of the city colonized by invisible computers, where the structure, *replaced* by computers, would fade away into a landscape filled by computers imitating nature (Rok Plug).

Archigram understood that computer technology could be the best solution to meet individual requirements, despite the size of computers at the time. "Electronic changeability" was seen as a means for adjusting the city in real time to the needs and desires of the inhabitants, for allowing them to listen, receive and exchange information with each other, as well as to move from one house to another, tailor them to their needs and broadly navigate within the system. It was exactly what Friedman and Schulze-Fielitz, on the other hand, were seeking through the space structure.

TODAY

Friedman and Schulze-Fielitz are coming back after decades of oblivion or depreciation. While he himself always built a lot throughout his career, Schulze-Fielitz often wondered what Yona lived on.[17] Yona was never allowed to teach in a French school of architecture and for many years he and his wife Denise were actually making a living creating cartoon movies and thanks to allocations granted by UN programs to developing countries.

17. Ibid., 24.

Today, while Schulze-Fielitz still remains pretty unknown, publications and exhibitions dedicated to Friedman are countless, partly perhaps due to Friedman's ability to replicate his drawings in any situation, all over the world, endlessly. It is still amazing to see how people can be fascinated by listening to him explain his drawings, how his simple collages are seen as the bearers of a new message that could save the next urban civilization.

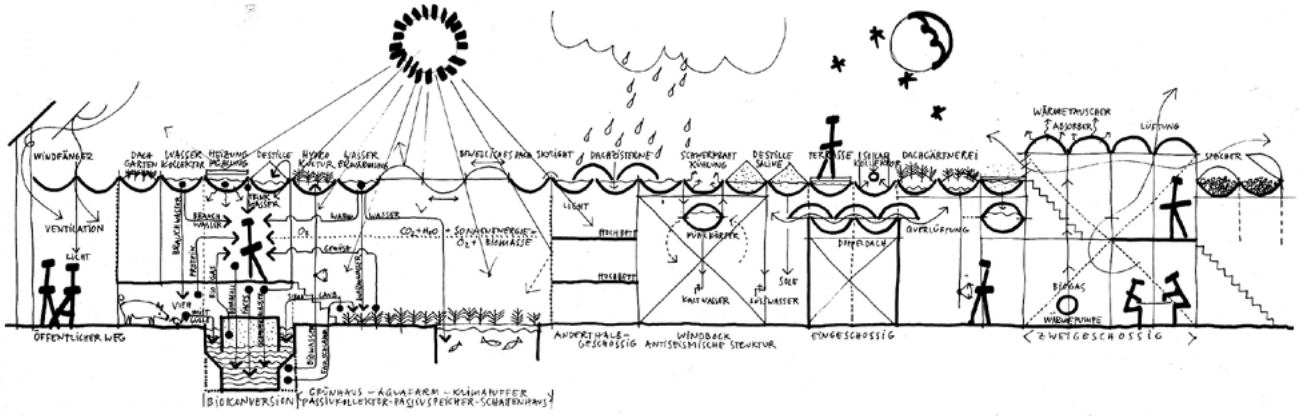

FIG. 22 Schulze-Fielitz, Ökotektur, 1980 (Archives ESF)

Two main explanations may account for this late recognition. Mainly Friedman, and to a lesser extent Schulze-Fielitz, but both much more than Constant or the Metabolists – although that Japanese generation is currently having its own retrospective – gave center stage to the participation of inhabitants in the making and transformation of the city, even though, as I tried to show, they didn't have the right instrument to achieve their goal. The notion of participation, introduced at the beginning of the 20th century by Patrick Geddes, has become a preeminent creed of our time, and people are nowadays hugely receptive to projects that promise them the possibility of making decisions about almost everything.

A second explanation concerns the shifting meaning of utopia, whichuntil the sixties was a real project of society grounded on the assumption of a positive and progressive future, and has now become a narrative and a tool of communication for promoting the future city. To some extent, this can be seen as "the fault" of Superstudio and Archizoom who transformed the seriously unconstructible megastructure into a narrative fiction, at that time for criticizing it.

In a sense, today most people understand Friedman's projects as if they had been written by Superstudio. That is, as if Friedman had designed his Spatial City at the end of the sixties, when architecture was entering the world of fiction, as did design, fashion, advertising, film making, and so on.

For Schulze-Fielitz the situation is quite different: it seems as if the reappraisal of his early research and of the period when it took place gave people the opportunity to discover, arguably, one of the most prolific architects of his time, who succeeded in managing utopia and reality through his ability to change strategy as he went along, for example by abandoning the space structure for the "ecotecture," that is to say a *high* construction for a *low* one, which probably stands as the most up-to-date vision of the future [Fig. 22]

I wish to thank Eckhard for sending me documents that I had missed when working on *Superarchitecture*, and Yona, an old friend of my research.

Don´t Look Back in Anger

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He has published and written extensively. His most recent titles include the Getting Things *Done* series published by Birkhäuser and *Emancipating the Many*: *A Practice Led Investigation into Emergent Paradigms of Immediate Political Action* published by Cambridge Scholars Publishing in 2015.

ABSTRACT

Arguably one of the most notorious movements of postwar architecture, I would like to emphasize the continued pertinence of Megastructures[1] through the lens of its main tenets: The city, technology and the human condition. Despite its persistent labelling as utopian[2] , the protagonists of the movement have committed themselves to seeking an adequate architectural response to the emerging challenges of urban settlements (the deliberate use of a seemingly old-fashioned term, highlights the discursive evolution of the field) early on, a quest that presents itself as apodictic anticipation of the *Urban Age*[3]. Covering the technological and social aspects of the movement, I would like to shed some light on the entanglement of cybernetics and the notion of creative self-determination through participation. The anticipated hybridization of natural and technological agency in pro-actively constituting the environments we inhabit, came hand in hand with the rise of cybernetic networks and corresponding modes of power, issues at the heart of contemporary critical discourse on the future of the profession.

1. Rouillard, Dominique. *Superarchitecture – Le futur de l'architecture 1950-1970*. Paris: Éditions de La Villette, 2004

2. Richter, Markus and Sabrina Van der Ley. *Megastructure Reloaded: Visionary Architecture and Urban Design of the Sixties Reflected by Contemporary Artists*. Ostfildern: Hatje Cantz, 2008.

3. Burdett, Ricky and Deyan Sudjic (eds.). *The Endless City*. London: Phaidon Press, 2008.

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KEYWORDS
Ville Spatiale/Raumstadt; Metabolism; Cybernetics; Participation

FIG. 1 Eckhard Schulze Fielitz, Cover of the magazine L´architecture d´aujourd´hui, 102, 1962

Ville Spatiale/Raumstadt [Fig. 1]

Within the larger framework of the movement, my emphasis rests on the work of Yona Friedman and Eckhard Schulze-Fielitz. Although not included in Reyner Banham´s seminal take on the movement in 1976, Schulze-Fielitz has already started to work on his "Raumstadt" in the mid 1950´s. The developmental coincidence with Yona Friedman´s "Ville Spatiale" **[Fig. 2]** has not gone unnoticed however, and made them join forces in 1960 for the inception of the "Groupe d´Études d´Architecture Mobile" or "Mobile Architecture Study Group"[1] together with David George Emmerich, Camille Frieden, Günter Günschel, Jean Pierre Pecquet and Werner Ruhnau. In 1963 they extended their collaboration with the project of an inhabitable bridge over the English Channel. **[Fig. 3]**

In the course of my research for the book on the work of Eckhard-Schulze Fielitz[2], my initial emphasis shifted from the provision of a complete catalogue of works to drawing an evolutionary line of ideas around the notion of rapid urban growth, and its ecological and socio-

1. **Escher, Cornelia.** *Zukunft entwerfen. Architektonische Konzepte des GEAM 1958 – 1963.* **Zürich: Gta-Verlag, 2017.**

2. **Fiel, Wolfgang, ed.** *Eckhard Schulze-Fielitz: Metalanguage of Space.* **Vienna: Springer Verlag, 2009.**

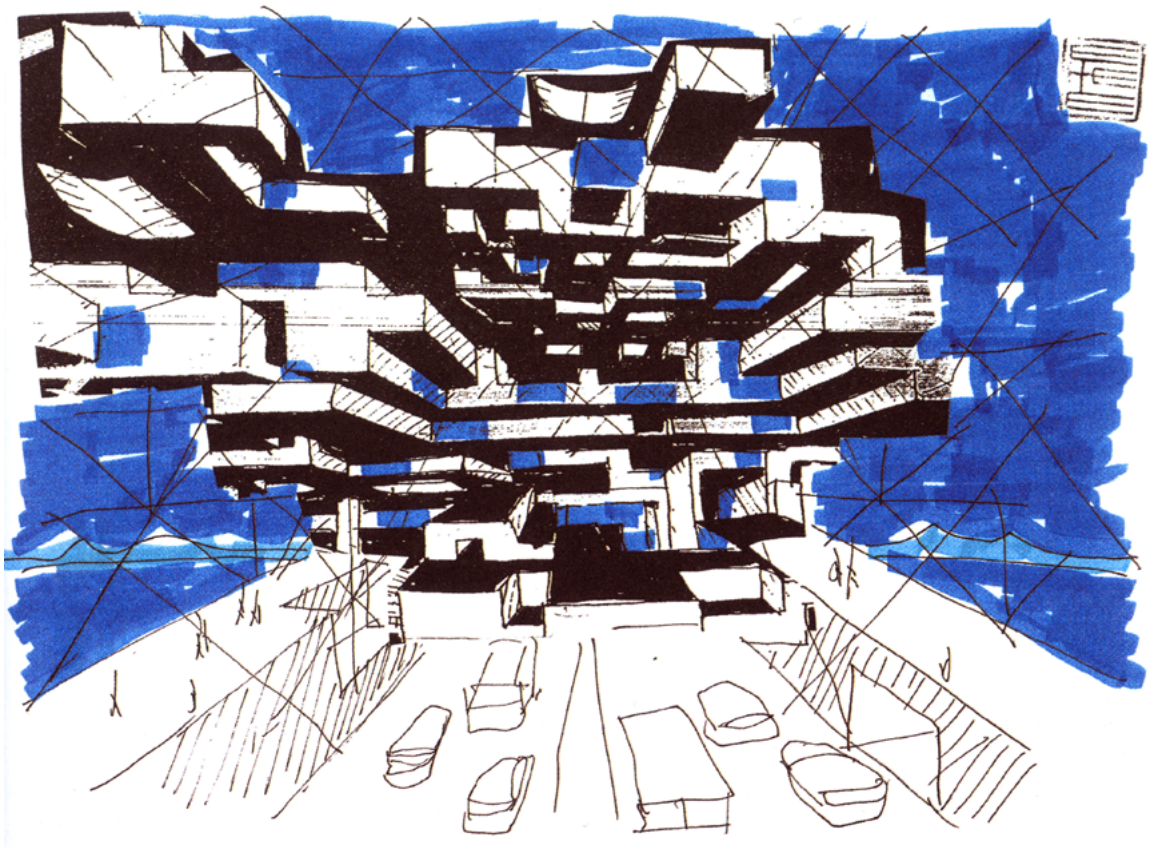

FIG. 2 Yona Friedman, Huangpu River Centre, Drawing, 2002

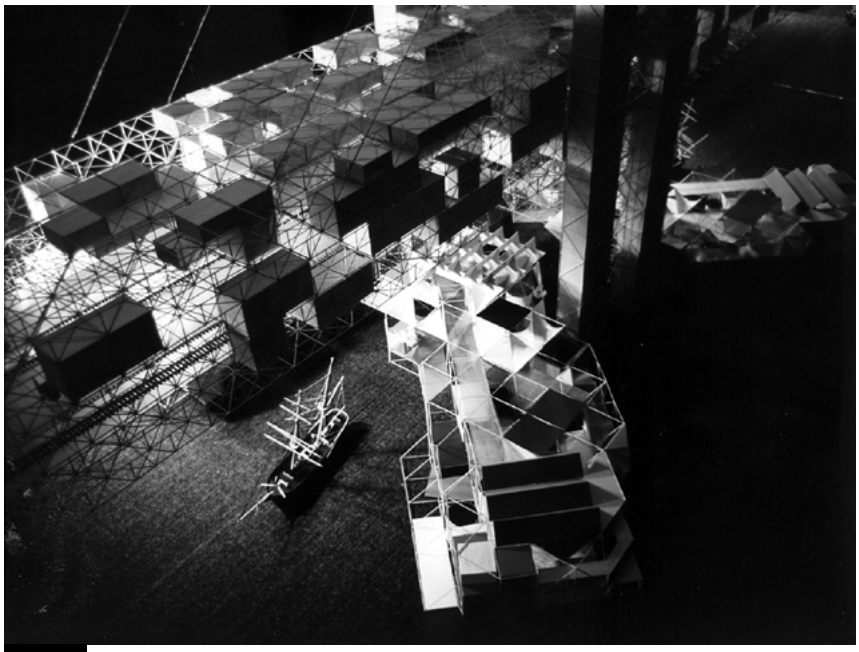

FIG. 3 Yona Friedman and Eckhard Schulze-Fielitz, Bridge over the English Channel, Physical model, 1963

political consequences. Schulze-Fielitz was keen to endow the inhabitant with the ambition and means to actively shape her or his place in the context of increasingly segregated multitudes of anonymous city dwellers[3]. While Schulze was captivated by the irresistible *Élan vital*[4] of Yona Friedman´s work, it was the literal meaning of the word that has drawn his initial attention to the Metabolist movement[5].

3. Schulze-Fielitz, Eckhard. *Stadtsysteme/ Urban Systems*. Stuttgart and Bern: Karl Krämer, 1971.

4. Bergson, Henri. *Matter and Memory*. New York: Zone Books, 1991 [1896]

5. Koolhaas, Rem and Hans Ulrich Obrist. *Project Japan. Metabolism Talks*. Köln: Taschen Verlag, 2011.

Metabolism

As it happens, metabolism and the first word of my book title "Metalanguage of Space"[6] contain the same prefix. While the Greek root of meta-bolism from *metabolē* `change´ (from *metaballein* `to change´) denotes a cyclical process of decline and growth, a symbiosis of information and ecology, the term meta-language denotes a higher or second-order form of communication. My intention however, was to use the term in a metonymical sense as correlative between the spatial and temporal aspects of space.

The notion of change as common denominator of time is central to Friedman´s and Schulze´s understanding of urban development. Their architecture is conceived to hold the capacity for continuously adapting to the needs of its users or inhabitants, an objective that was in outright contradiction to the prevailing modernistic attitude at the time and remains unachieved by and large to the present day. The empowering emphasis on the user does also contradict the orthodox paradigm of chronologically coordinated planning processes, which are supposed to start with a comprehensive brief and a known set of contextual parameters.

The most distinctive architectural feature of the *Ville Spatiale* and *Raumstadt* alike is the provision of a space-frame, an elevated canopy if you like, that – structural necessity aside – is open to potential user appropriation and adaptation in a self-governed and continued process of growth/shrinkage, alteration, and recycling. [Fig. 4] On the one hand, the openness to processes of continued change appear to sit well within the affirmative techno-utopian discourse of the late 60s and 70s, keen to promote an architecture that is driven by technological advancement, a preference for order and the totalizing control of an environment, which was perceived as increasingly hostile[7]. This, on the other hand, raises the question, whether the ethos of mending the ills of the world through

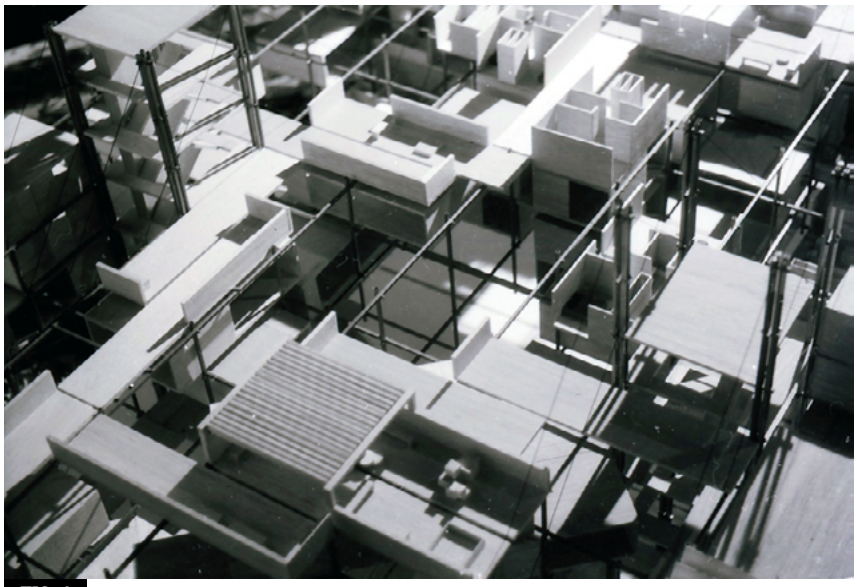

FIG. 4 Eckhard Schulze-Fielitz, Stadtsysteme, Physical model, 1968

6. Fiel, Wolfgang, ed. *Eckhard Schulze-Fielitz: Metalanguage of Space*. Vienna: Springer Verlag, 2009.

7. Scott, Felicity Dale Elliston. *Architecture or Techno-utopia: Politics after Modernism*., Cambridge, Massachusetts; MIT Press, 2007. Press, 2007.

technological advancement is a suitable model for forging the affirmative techno-utopianism and a call for social and political emancipation into the unifying mould of a single architectural prototype? Or, in other words, is it possible to reconcile the then predominant paradigm of technological determinism with ideas of potentially open ended processes of fully emancipated users?

Emancipation

If we take the work of Cedric Price[8] for example, we start to get a pretty good idea of how the notion of empowered users has started to trigger a slow but steady departure from the autonomy of the finished architectural artefact in favor of a "non-plan architecture"[9] through a permissive attitude toward change brought about by present and future inhabitants. [Figg. 5-6] The fundamental principle of the *Ville Spatiale/Raumstadt* was to foster the pragmatic necessity as well as the moral and legal legitimacy for continued re-development, thus enabling activities and spatial arrangements that are deemed to remain unrealized or unrealizable in any other regulatory environment. [Fig. 7] In this sense, the protagonists of the *Ville Spatiale/Raumstadt* were able to reconcile the seemingly contradicting features of the somewhat romantic appraisal of lively neighborhoods, livable and walkable streets, with novel housing types flexible enough to account for continued change. The playful appropriation of urban public space and built urban fabric has also been addressed by members of Archigram[10] [Fig. 8], *Team X*[11] or Constant[12] [Fig. 9], and was

8. Price, Cedric. *Re: CP.* Basel, Boston, and Berlin, Birkhäuser Verlag. 2003.
Price, Cedric. *Opera*. New York, Wiley & Son.2003.

9. Hughes, Jonathan and Simon Sadler. *Non-Plan: Essays on Freedom, Participation, and Change in Modern Architecture and Urbanism.* Oxford: Architectural Press, 2000.

10. Cook, Peter ed. *Archigram*. New York: Princeton Architectural Press, 1999.

11. Smithson, Alison. *Team 10. Primer.* Cambridge, Massachusetts; MIT Press, 1968.

12. Wigley, Mark. *Constant's New Babylon: The Hyper-Architecture of Desire*. Rotterdam: 010 Publishers, 1998.

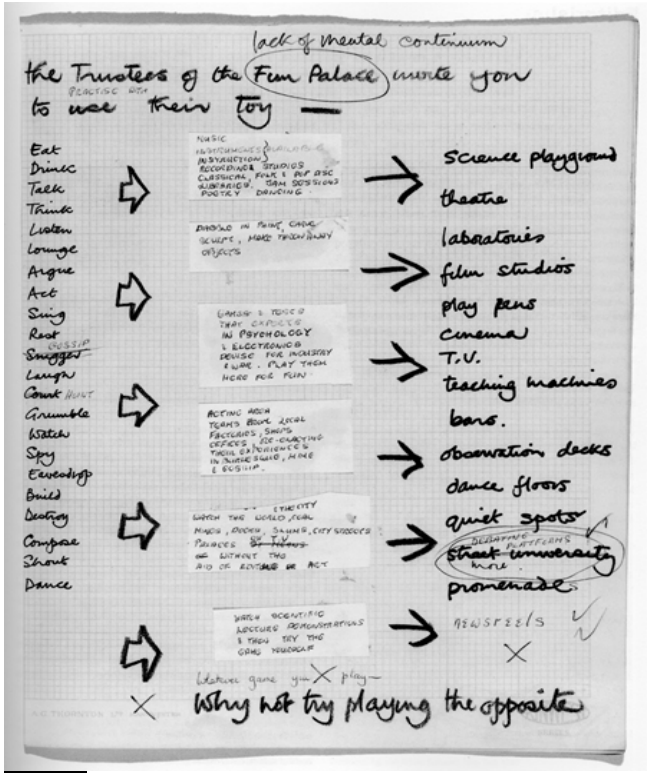

FIG. 5 Cedric Price, Leaf from a draft of a promotional pamphlet for the Fun Palace, Hand note, 1963?

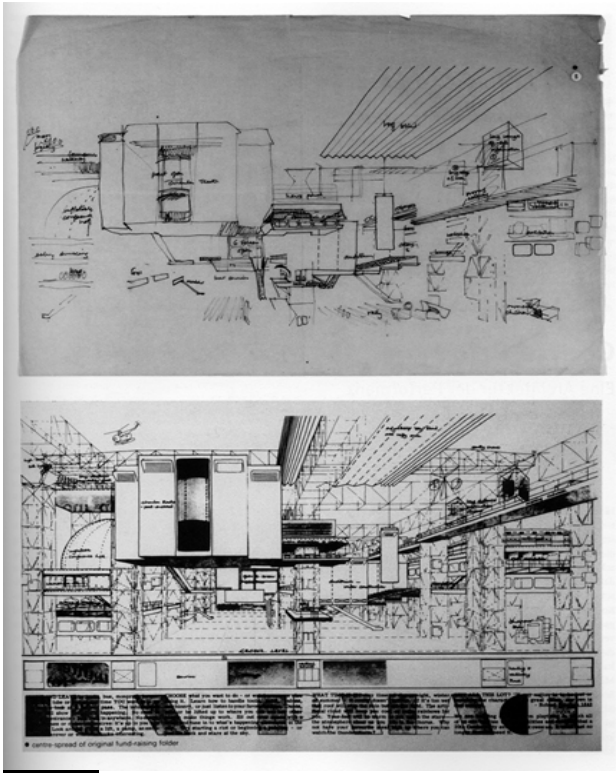

FIG. 6 Cedric Price, Fun Palace, Perspective sketch and drawing, 1964

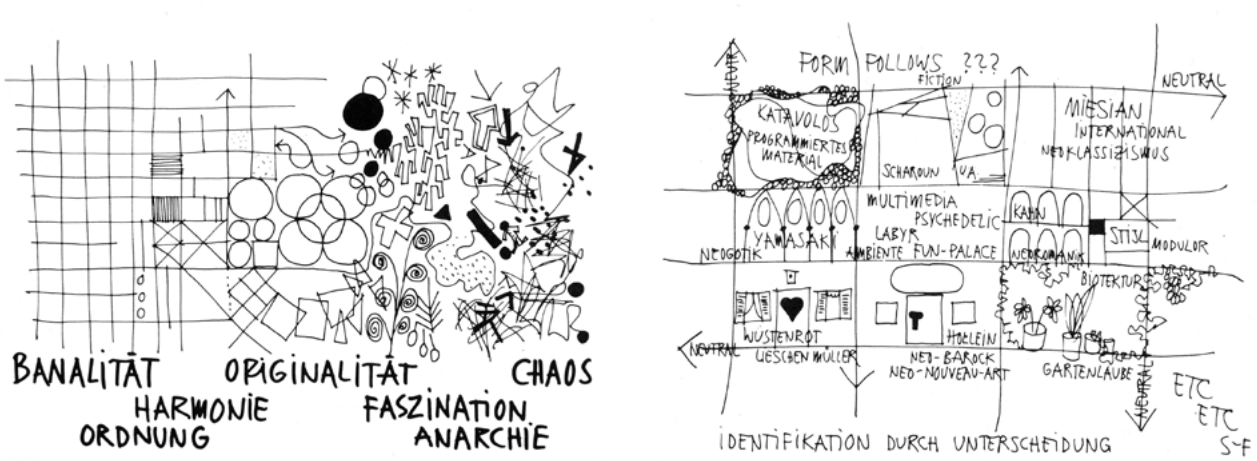

FIG. 7 Eckhard Schulze-Fielitz, Stadtsysteme, A socio-technical system, Banalität und Chaos, Illustrative drawing, 1971

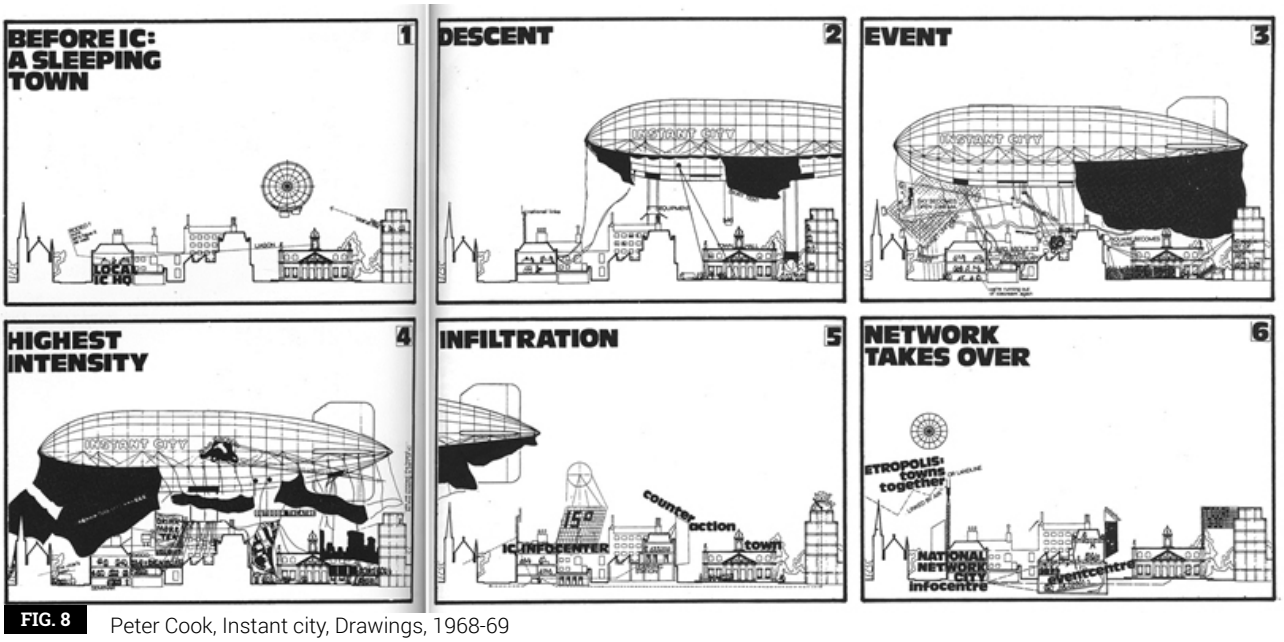

FIG. 8 Peter Cook, Instant city, Drawings, 1968-69

postulated under the term *Unitary Urbanism*[13] as collective effort toward new modes of cultural appropriation and the uninterrupted and conscious transformation of the entire material environment. To this end, one of the most distinctive conceptual features of the *Ville Spatiale/Raumstadt* was to liberalize the orthodox hermeneutic framework of architectural representation in favor of provisional notational systems in order to facilitate a lively process of continued user evaluation and feedback[14]. The underlying concept was that once a set of rules is able to establish itself, the game of life is going to unfold itself on the multiple stages of this `theatre in space´. [Fig. 10] Naturally such a play or performance is at odds with the orthodox definition of mass-tailored happiness or the assumption of meeting the requirements of generic and anonymous inhabitants by default. The strategy for triggering active forms of spatial organization is based on the creation of an operable interface between the built urban environment and its users and to promote the possibility to engage, actively change and rebuilt what cities are essentially made of: stuff and ideas, an image that is much more diversified than the sterile

13. Lefebvre, Henri. *The Production of Space*. Oxford: Blackwell1991 [1974].

14. Amelunxen, Hubertus, Dieter Appelt and Peter Weibel eds. *Notation, Kalkül und Form in den Künsten.* Berlin and Karlsruhe: Akademie der Künste Berlin and ZKM Karlsruhe, 2008.

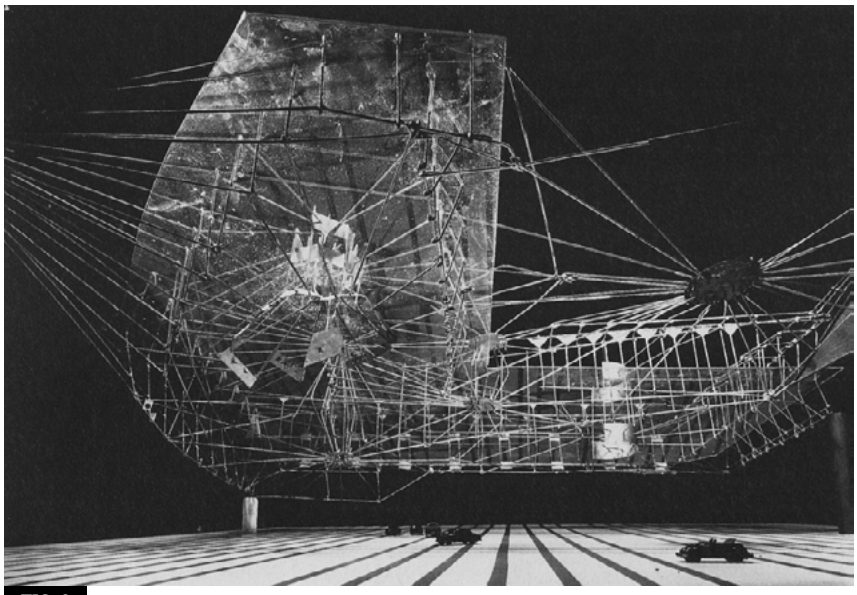

FIG. 9 Constant, New Babylon, Orange Construction, Physical model, 1958

vision of a masterplan[15]. While this might leave a bad taste in the mouth of those, who firmly believe in the paradigm of closed systems and their controllability, the reduction of aleatoric urban topologies[16] to a flat chunks of land appears to be little more but the badly disguised mantra of tabula rasa. The concept of the *Ville Spatiale/Raumstadt* is however, to respect the historicity and value of what´s already there, both, in terms of the built urban fabric as well as with respect to the socio-economic characteristics of a specific site.

15. Hill, Jonathan. *Hunting the Shadow: Immaterial Architecture*. London and New York: Routledge, 2005.

16. Althusser, Louis. *Ecrits philosophiques et politiques*, Vol.1. Paris: STOCK/IMEC, 1994.

FIG. 10 Constant, New Babylon, Der blaue Draufgänger, Painting, 1969

Ambition

To stick a horizontal structure up on legs, to elevate the housing units, individual and collective green spaces, staircases, bridges, and pedestrian walkways, hasn´t lost any of its initial appeal for those, who have not yet ceased to believe in the self-governing capacity of an open system in-between and beyond the confines of institutionalized mediation. **[Fig. 11]** Despite their outspoken appreciation for the microscopic and their encouragement of individual self-appropriation within the loose constraints of the structural framework (expressed for example by the

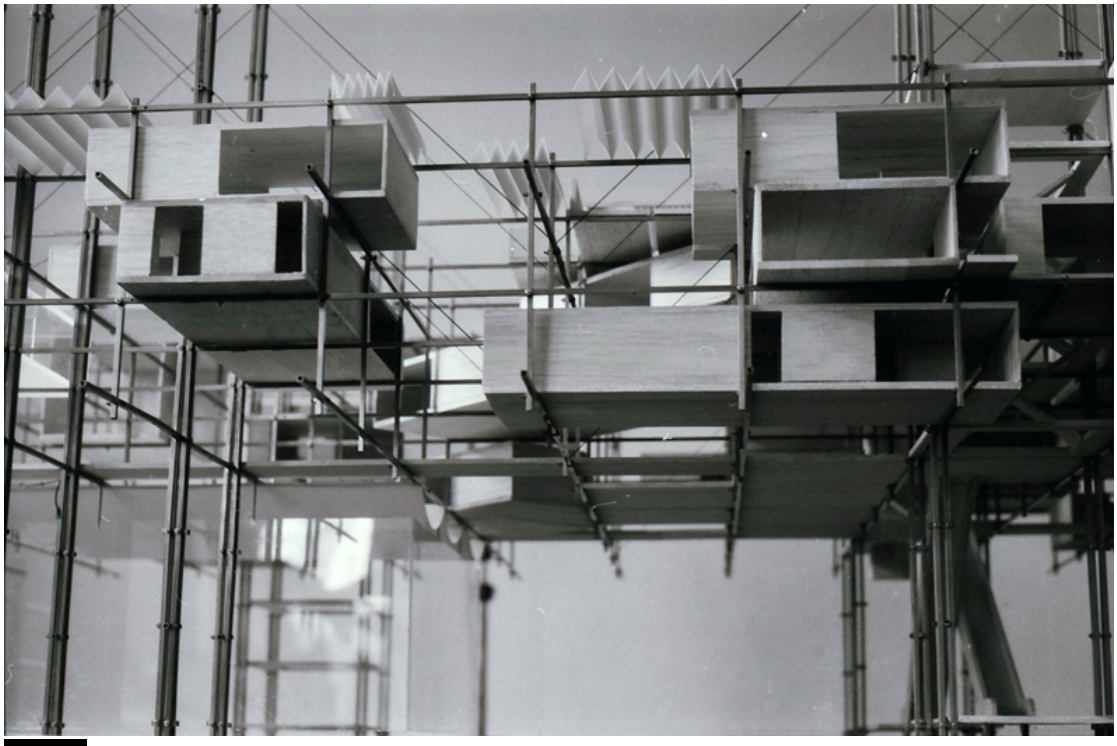

FIG. 11 Eckhard Schulze-Fielitz, Stadtsysteme, Physical model, 1968

telling title of Friedman´s "Manuals for the Self-Planner", 2006/**[Fig. 12]**), Friedman´s and Schulze´s respective agendas are imbued with a vision of truly global proportions. They expressed their early sensibility for issues of global and urban over-population, ailing transport infrastructures or the countless inequalities as a result of uneven distribution of economic and political power in various ways throughout their work as much as their appreciation and respect for the idiosyncratic expression of personal taste. That clearly discerns the two from the seductive but uncritical techno-euphoria promoted by the likes of Fuller[17]. The aesthetic dimension of his "scientific development of architecture" was susceptible for the propagandistic assimilation of its program into a political context. Dismissive towards any aesthetic dimension that would exceed the requirements of structural integrity, the *Ville Spatiale/Raumstadt* marks a transformative moment for the conception of architectural artefacts in relation to one another, their spatial, ecological and socio-economic context as well with respect to the human condition.

17. Krausse, Joachim ed. *Buckminster Fuller: Your Private Sky*. Baden: Lars Müller Publishers, 1999.

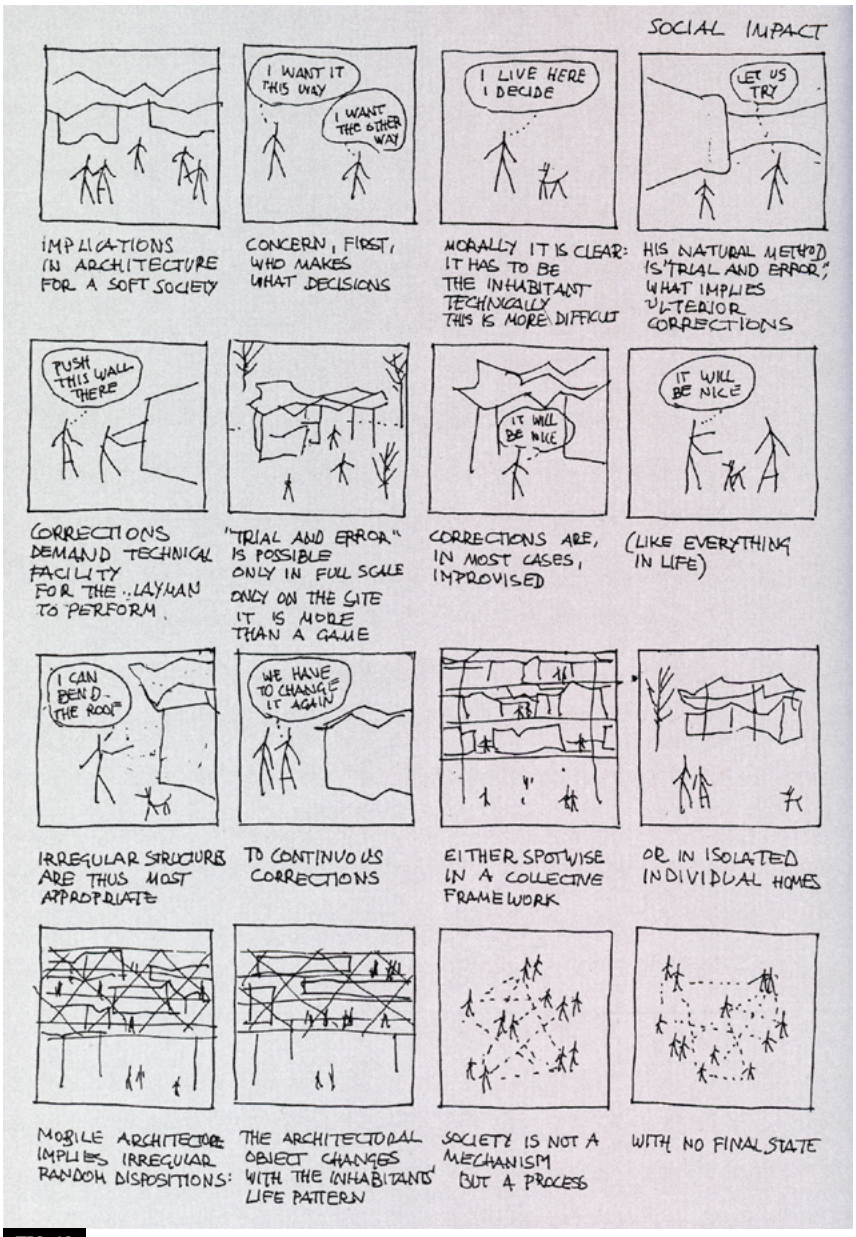

FIG. 12 Yona Friedman, Irregular structures – Social impact, Manual, 2006

Cybernetics

The modernistic separation of space and activity along with the distinction between inside and outside spaces as a result of its strict typological programming was further challenged by technological innovation and the nascent science of Cybernetics in the wake of Norbert Wiener´s work on "control and communication in the animal and the machine"[18]. [Fig. 13] Curiously, Le Corbusier[19] has made use of the analogy between biological systems or organisms and machines before. His aim of illustrating the relations between the constituent elements of urban environments is common-place in architectural discourse to the current day.

While the promise to control complex urban systems through a process of potentially infinite recursions has to be evaluated in the historic context of scientific development, it appears to be little more than wishful thinking from the current point of view.

18. Wiener, Norbert. *Cybernetics*. Cambridge, Massachusetts; London: MIT Press, 1962.

19. Le Corbusier. *Städtebau*. München: Deutsche Verlags-Anstalt, 1979 [1925].

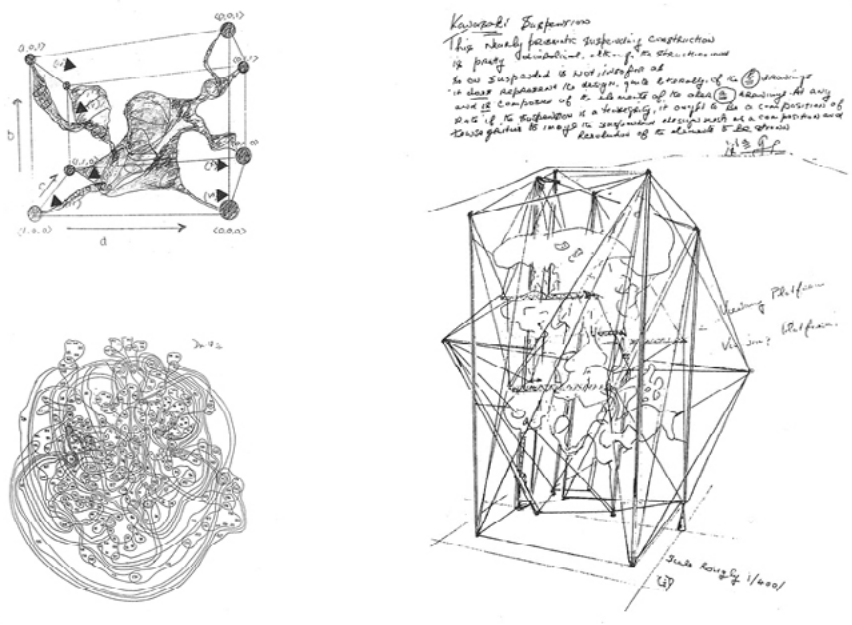

FIG. 13 Gordon Pask and Cedrice Price, Japnet, Flow of information in space, Representation of a concept and Kawasaki suspension, Drawings, 1986

Network

If we look at the contemporary developments in the Golf region, China or South-East Asia, the sheer scale of Megastructures does not seem to be the problem. Many of these developments reveal another reason for their failure: So long as developers, urban planners and architects are going to stick to their believe that a set of prescriptive objectives and seductive presentations by means of blueprints and models – physical and digital – does suffice, a meaningful process of inhabitation and appropriation will fail to materialize. Keller Easterling has put this observation into the following words: "Architecture has often adopted those cybernetic scripts that focus on recursivity and predictability in complexity, as well as those Deleuzian scripts that, drained of their politics, reinforce the preexisting attraction to geometry. As it deploys digital tools, the discipline has often not focused on the active network of which these digital tools are a part – a network that has embedded itself into our bodies and markets, and all the other places in the world where people are dying, fighting, and making money. These territories would never provide demonstrations of connectedness and synergistic feedback. [...] In a sense, the discipline has privileged the front of the computer rather than the back of the computer – the screen rather than the network."[20]

The central question is therefore, how to shift the attention to `lower´ levels of the organizational hierarchy, from the perspective of second order observation (in keeping with the terminology of Cybernetics) to the level of multiplied and networked agencies of continued urban renewal? What is at stake therefor, is the very definition of agency, previously indicated with terms such as `society´, `culture´, `structure´, `fields´, or `individuals´, all of which allude to the somewhat traditional category of the `social´ seen as homogeneous body politic[21].

20. Easterling, Keller. *Enduring Innocence: Global Architecture and its Political Masquerades*. Cambridge, Massachusetts; London: MIT Press, 2005.

21. Latour, Bruno. *Reassembling the Social*. New York: Oxford University Press, 2005.

Participation

The notion of collective participatory engagement has to be linked with an enhanced sensory awareness for one´s immediate environment, and its potential to convey a rangy network of associations among the various agencies at work, and across the limited boundaries of disciplines. The questioning of the definition and relationship between individuals, institutional stakeholders and objects can potentially lead to the re-assemblage and redistribution of existing capacities and resources. For too long the emphasis on participative processes has been obstructed by a sturdy definition of the social as determined by structural necessity, notions of assumed collective identities, and its proclivity for cohesive meaning as well as to envision the social body as a whole, a "Phantom Public"[22]. If we are able to overcome the idea that collective progress hinges upon the formation of antagonistic relations, we can start emphasizing the necessity of looking into the uncertainties of groups, action, objects and matters of facts in order to shape the process of localizing the global, and distributing the local.

22. Lippmann, Walter. *The Phantom Public*. New Brunswick and London: Transaction Publishers, 2002 [1927].

Especially from this point of view, the architectural practice or rather any creative practice in general can be understood as a thinking tool for a novel understanding of the multiple forces that shape urban processes locally and globally. In this sense these notes may be seen as Retroactive Manifesto of the *Ville Spatiale/Raumstadt*! [Fig. 14]

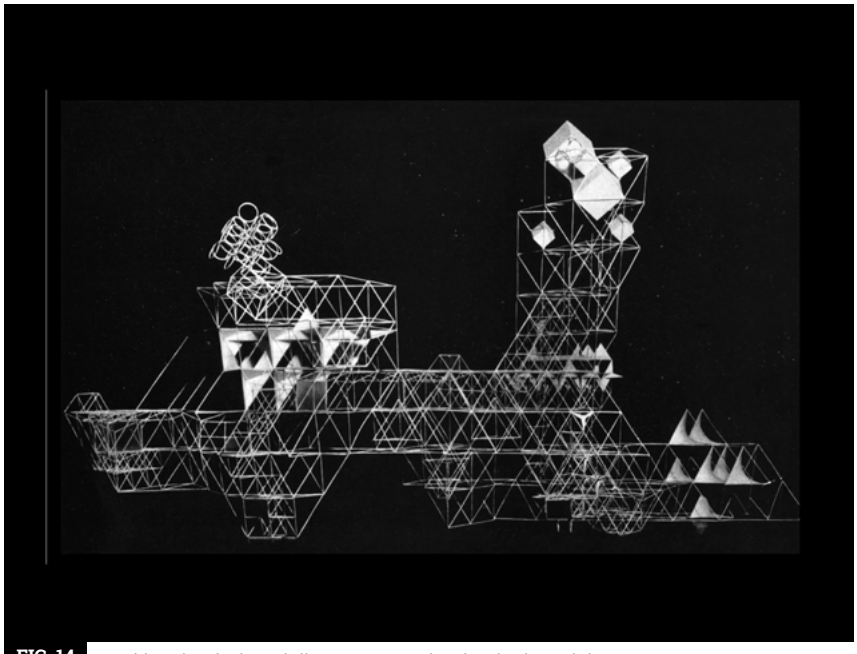

FIG. 14 Eckhard Schulze-Fielitz, Raumstadt, Physical model, 1960

Megaform versus Open Structure or the Legacy of Megastructure

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ABSTRACT

Since the financial crisis of 2008, architecture must face growing conditions of instability. This rekindles the necessity to integrate the parameter of uncertainty into architectural design much like the concerns developed by the radical architects of the 1960s. At that time, these architects associated with megastructures challenged the opposites: fix/transient, permanent/ephemeral, primary/secondary structure, indeterminate/determinate. They raised the questions of uncertainty, instability over time, and gave shape to this condition. Their predecessors inside Team X introduced concepts like the 'aesthetics of change' (Smithsons), the 'open form' (Hansen), 'open aesthetic' (Voelcker) and developed architectural theories regarding indeterminacy and fragmentation. Out of a synthesis of this theoretical background, we propose to withdraw a conceptual tool with which we review the approach of two contemporary architectural offices, particularly concerned by the question of indeterminacy, uncertainty, open aesthetics and open structure in their achievements. Doing so, we aim to provide insights of what can constitutes a legacy out of megastrucuralist theory and identifies conceptual shifts.

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KEYWORDS
Open Structure; Megaform; Bigness; Indeterminacy; Megastructure

Introduction

In recent urban and architectural developments, the phenomenon of the 'very large building', the 'Bigness' has figured as an unavoidable feature of the contemporary architectural landscape.

In order to challenge the 'hypersize', architects tracked back some conceptual developments made in the 1960's and made some explicit references to some of the megastructuralist followers of that period.

But what are exactly the theoretical texts defining the megastructure? What are the continuities and the conceptual differences between megastructure and contemporary architectural landscape? How can we read the original text of Maki and Wilcoxon in order to take a critical look at contemporary projects? What is the necessity to look back to those texts in order to understand the contemporary thoughts on indeterminacy?

The September 2011 issue of the journal OASE addressed the question of uncertainty in architecture. The editorial of this issue made the assertion that, in the context of continued economic instability since the financial crisis of 2008, the rapid variations in political, social and economic parameters had a negative effect on architectural design which is generally created over the long term. This observation rekindled the necessity to integrate the parameter of uncertainty into architectural design much like the concernsdeveloped by the radical architects of the 1960s[1].

1. Klaske Havik, Véronique Patteeuw and Hans Teerds, "Editorial, Productive Uncertainty/Indeterminacy in Spatial Design, Planning and Management", OASE, no.85 (2011): 3-5.

In this article, we propose to analyse the theoretical developments of the 50s to 70s which addressed the questions of indertermination, adaptability and evolution in architecture, while also dealing with the opposites big-small, collective-individual, artificial-spontaneous, permanent-temporary, structure-filling. From an historical point of view, relying on our archives research, we will emphasise the first use of the word 'megastructure'

From this point, we will withdraw two concepts which appear to us as a possible synthesis of the megastructuralist developments. We will then illustrate our hypothesis, using our understanding of Maki and Wilconxon's text about megastructures, the work of two contemporary architects who incorporated these issues into their concrete achievements, integrating the questions of impermanence, unpredictability, indetermination, landmark, building as a city.

The 'aesthetic of change': issues of evolution of the architectural form

In the nineteen-fifties, some architects began to question the building model defined by composition principles stable over time and instead searched for formal principles involving possibilities of evolution, growth and flexibility.

These preoccupations were initiated by the 'Constructionists' and the

'Independent Group', both based in London[2]. These two groups had in common the identification of the notion of indetermination in architecture.

In 1951, in London, the Institute of Contemporary Arts and the Independent Group presented an exhibition entitled 'Growth and Form'. The title of the exhibition deliberately echoed the book *On growth and form*, by the biologist D'Arcy Wentworth Thompson which was published in 1917[3], and the exhibition referred to drawings from Thompson's work, presenting patterns of biological growth. These patterns were interpreted as possible formal models including possibilities of evolution over time without changing nature.

In 1956 the CIAM X of Dubrovnik was organised, where the theme of evolutive and adaptable architecture was one of the main topics debated. The framework[4] was written by Alison and Peter Smithson, members of the Independent Group. In this text, they particularly highlight the concept of 'change' in architecture.

The introduction of these subjects as major preoccupations represented a break with concepts of architecture that were based on the artwork as a finality. This sequence initiated the development of theories of change in the modern movement.

In 1957, another member of the Independent Group, James Stirling, published an essay in the Architects Year Book 8, where he stipulates:

'The application of orthogonal proportion and the obvious use of basic geometrical elements appears to be diminishing, and instead something of the variability found in nature is attempted. "dynamic cellularism" is an architecture comprising several elements, repetitive or varied. The assemblage of units is more in terms of growth and change than of mere addition, more akin to patterns of crystal formations or biological divisions than to the static rigidity of the structural grid'[5]

This statement illustrates the quest for an architecture that is no longer generated by a system of simple proportions and geometries, but by more flexible processes, inspired by cellular and molecular systems of organisation.

This publication also contains an article by Peter and Alison Smithson: 'The Aesthetics of Change'[6]. In this article, drawing on the case of the university, the Smithsons tell us that the university and the city are growing and changing. Consequently, the new buildings of a university should no longer be conceived according to traditional aesthetic theory in which the part and the whole are in a finite relationship with each other, the aesthetic of each being 'close'. Their aesthetic must be an 'aesthetic of change'. Retrospectively presenting their Sheffield project, completed 4 years earlier, the Smithsons described the system of footbridges connecting the old building with the new as a 'linkage' between independent elements, an elevated street. The facade, in addition, is made up entirely of screens,

2. For further developments, see Jonathan Hughes, "The Indeterminate Building", in in Jonathan Hughes and Simon Sadler, eds., Non-Plan: Essays on Freedom, Participation and Change in Modern architecture and Urbanism, eds. Jonathan Hughes and Simon Sadler (Oxford: Architectural Press, 2000),): 90-103.

3. D'Arcy Wentworth Thompson, *On Growth and Form (2nd edition)*, (Cambridge: Cambridge University Press, 1942).

4. Alison and Peter Smithson, "Draft Framework 4, 1956, Concept Document for CIAM X", , in Max Risselada and Dirk van den Heuvel(ed.), *Team X 1953-1981, In search of a Utopia of the Present* (ed.), eds. Max Risselada and Dirk van den Heuvel (Rotterdam: NAI Publishers, 2005), 48-49.

5. James Stirling, "Regionalism and Modern Architecture", *Architects'Year Book*, no.8, (London: Elek Books, 1957),): 62-68.

6. lison et and Peter Smithson, "The Aesthetics of Change", *Architects'Year Book*, n°no. 8, (London: Elek Books, 1957),): 14-22.

allowing all the class changes inside but without changing the external aspect.

In their article, the Smithsons also presented the Santa Monica house, designed and built by Charles Eames. For the Smithsons, this project was the expression of a 'transient aesthetic'[7], composed of elements that could be easily replaced over time and therefore expressing an 'aesthetic of change'.

7. SmithsonIbid., "The Aesthetics of Change", 22.

The indeterminate building: growth and adaptation

The 'aesthetic of change' approach initiated by the Smithsons would be further developed in the project for the Northwick Park Hospital, designed by John Weeks of the Llewely Davies and Weeks firm of architects, and also a member of the Independent Group.

Before coming to this project, we should recall that Richard Llewelyn Davies, an associate of John Weeks, gave a conference to the Architectural Association in 1951 on the topic of 'Endless Architecture'[8]. Integrating other disciplines distinct of architecture, Davies referred to the writing of James Joyce as 'endless writing', as some of his works have no beginning, middle or end.

8. Richard Llewelyn Davies, "Endless Architecture", *Architectural Association Journal*, no.67 (1951),): 106-113.

These considerations on endless architecture were followed by the architects in the aforementioned project. The authors developed a strategy of indetermination, in order to construct a project subject to unpredictable modifications, integrating growth dimensions and changes due to the obsolescence of hospital departments. In order to be conceptually 'endless', Weeks indicated that the size of the hospital project was not determined because the 'growth of the different departments would be typically unequal and difficult to predict'[9].

9. John Weeks, "" Indeterminate Architecture", *The Transactions of the Bartlett Society* , Volume 2, no.193 (1-1964):, 83-106.

The team of project authors therefore suggested a 'street' on which several departments of the hospital interconnect. Only the widths of the volumes are defined, their lengths remaining undetermined. The departments are therefore free to develop independently of each other. The interior of the buildings can, thanks to their structural system, be subdivided, in a way that is not connected with the expression of the outer envelope, following the suggestion by the Smithsons for Sheffield, and concretising an 'aesthetic of change' and a system of 'linkage'[10], the backbone of the project.

10. Alison and Peter Smithson, *Ordinariness and Light. Urban Theories 1952-1960 and their application in a building project 1963-1970* (Cambridge, Mass.: Faber, 1970), 157.

Regarding this project, it is interesting to note that Weeks added that the shape of the entire building should not be closed, or 'finished': 'The ideal of unity with constant relationships cannot be attained', said Weeks. Such a building must be geometrically "a-formal""[11].

11. Ibid.Smithson, *Ordinariness and Light*., 90.

The indeterminate strategy in architecture has to be compared with the Hansen's preoccupation, opposing the couple closed form/open form at

the Otterlo congress in 1959[12].

First, Hansen introduced his conference by an open criticism of the lacks of architectural norms which had been practiced before. He denounced the inability of 'closed architecture' to adapt to the 'changes imposed by life'[13].

On the other side, the quality of the 'open form' takes into account the initiative of the resident, considering him as an actor in the formation of his environment. 'The completely new task of the architect: a communicative transmission to our psychology of the organic and bountiful chaos of events in a form received by this manner [...] The manifestation of the Open Form will be therefore the discernibleness of the individual in the multiple, and the discernibleness of the number [...] The Open Form differs from the Closed Form by recognizing concrete people—not the abstract so-called 'average"—by leaving a margin for evoking one's own latent essence'[14].

Architecture should therefore serve as a support to these unpredictable events and as an object which allows the process of appropriation. This embodies the notion of change initiated in Dubrovnik and developed in the different articles by the Smithsons.

'The Closed Form has created aesthetics for its own use. The Open Form - the art of events - will also look for its own methods of study, its own means of expression, its own aesthetics. The Open Form, being the form of the sum of events - of the sum of individualities of a given group - should in consequence lead us to the expression of a form of the "*milieu*"'[15].

The search for open form, or open-ended architecture has largely characterized the architectural discourse during the 1960's and found an echo in the megatructuralist proposals.

12. Oscar Hansen, "La Hansen, "La forme ouverte dans l'architecture – l'art du grand nombre»e", *Le Carré Bleu*, no.1 (1961),): 4-5.

13. HansenIbid., "La forme ouverte dans l'architecture", 4.

14. Ibid.Ibid., 5.

15. IbidIbid., 5. The term '*milieu*' comes from the original french French version and is preferred here to 'group', used in the first translation, which we believe narrows the meaning.

From structuralism to megastructuralism

During the first congress of Team X in Otterlo, the participants drafted a conceptual approach focusing their energy on resolving the polarities mentioned in Dubrovnik: Individual/collective, Permanent/change, Physical/ spiritual, Interior /exterior, Whole /Part[16].

This projectual strategy integrates two opposite and complementary considerations: the first one calls upon the formalisation of a long-term element and takes the shape of a primary structure and the second one refers to the contingency of ephemeral elements which evolved due to human appropriations and as such incorporates a degree of indeterminacy. These secondary system 'can be modified by individuals or group of users, enabling them to express in a creative way, their different identities'[17]. This way of designing is indubitably structuralist.

16. Alison and Peter Smithson,' *"Draft Framework 4'4"*, 1956, Concept Document for CIAM X, , in Max Risselada and Dirk van den Heuvel(ed.), *Team X 1953-1981, In search of a Utopia of the Present* (ed.), eds. Max Risselada and Dirk van den Heuvel (Rotterdam: NAI Publishers, 2005), 48-49.

17. Report of the group discussion "Growth and Change" at CIAM 9 in Dubrovnik in Oscar Newman, *CIAM'59 in Otterlo*, (Zürich: Verlag Girsberger,, Zürich, 1961, p.), 15.

The Smithson discussing the characteristics of a permanent and an ephemeral structure, in an article published in 1960, define this couple as 'fix' and 'transient'[18]. This word has many acceptable variations according to the different proposals the Smithson did. The 'fix' can take the shape of permanent structures or buildings (infrastructures, institutions) and are opposed to 'transient' which evoked small buildings or shops. These can also constitute the different elements of a program or the pre-existing situation of a site, as it was the case in the Berlin-Hauptadt proposal. Nevertheless, it is interesting to note that in Peter Smithson's text, the introduction of a difference in terms of cycle of life, between the 'fix' elements and the 'transient' ones. Following Smithson, the long-term structure has a lifespan from twenty-five to fifty years and the transient elements, such as houses, supermarkets, shops,… has the same obsolescence than cars or washing-machine. In every cases, the 'fix' appear like 'a system of permanent points of references, necessary to the stability of the individual'[19]. This conception has to be compared with Habraken's[20] definition of 'infills' and 'support' published the year after.

This primary/secondary duality is also mentioned by megastructuralist followers and theorists. But for them, the ambition is to 'surpass the sociological functionalism of Team X: not to look for architectural forms appropriated for the society which change, but to invent systems that represent and anticipate its change itself'[21]. As relayed by Dominique Rouillard, 'the megastructure goes back from the permissive urbanism of Team Ten […]. In it, it also finds its structural approach'[22]. The megastructure gives shape to the opposition of the permanent and the transient mentioned by Peter Smithson and aforementioned. The proposal takes the shape of a three-dimensional urbanism, containing ephemeral prefabricated buildings, instead of architectural buildings.

In spite of the consideration of scale in the design issue, from our point of view, what conceptually links Team X and megastructures, is the desire to give shape to indeterminacy, articulating transient and permanent design, representing or anticipating the perpetual change of the society.

Following Archigram's statements, indeterminacy is not the result of the different life cycles of the fix and transient of a megastructure, but rather due to a certain programmatic indeterminacy that can support all appropriation scenarios, open-ended, and thus constitutes what we can consider as a legacy of megastructuralist theories, since indeterminacy continues today, to occupy a part of the contemporary architectural production. In this regard, Archigram told us:

18. lison and Peter Smithson, "Fix : permanence and transcience", *Architectural Review* (december December 1960),): 437-439.

19. Peter Smithson, "Letter to America", *AD*, (mars Mars 1958).

20. N.John. Habraken, *Supports : an Alternative to Mass Housing*, (London, New York : The Architectural Press Praeger, 1972) ; originally published in dutchDutch, *De dragersen de mensen : het einde van de massawoningbouw* (Amsterdam : scheltemaScheltema&Holkema, 1961).

21. Dominique Rouillard, *Superarchitecture. Le futur de l'architecture 1950-1970*, (Paris : Editions de la Vilette, 2004), 14.

22. Dominique Rouillard, *Superarchitecture. Le futur de l'architecture 1950-1970*,Ibid ibidem, 83.

'INDETERMINACY – RELAXED SCENE

Oxford Dictionary definition : Indeterminacy : "Not of fixed extent or character, vague, left doubtful". Archigram usage : Of varying evaluation. Not one answer. Open-endedness.

Archigram propositions worry the mainstream deep down because they threaten the propriety of Architectural values. 'Good' architecture, as most architects regard it, involves preferred forms, arrangements or formulae. Most often these have a moralistic "rightness" in the argument somewhere. To be seen to be doing the right thing is regarded if not always admitted to. If we fly directly in the face of this, we fall into a trap. If we purposely do the opposite we simply mirror the close-endedness of 'good'….buttoned-up architecture.

Indeterminacy is not immoral….it is a-moral.[…]The real indeterminate is a relaxed, easy going scene'[23].

23. Peter Cook, "Indetermincay Indeterminacy – Relaxed Scene", *Archigram*, no.8 (1968).

Theoretical origins of megastructure

In his book *Superarchitecture*, Dominique Rouillard pinpointed the first use written use of the word 'megastructure'[24] in 1962 in an article written by Peter Smithson, describing Kenzo Tange's project for Tokyo Bay. Fumihiko Maki and Raplph Wilcoxon give us respectively a definition of the megastructuralist issue in 1964 and 1968, which will then be relayed in Banham's book in 1976.

24. Rouillard, *Superarchitecture*., 14.

As part of our research, we have been able to find a precedent for the use of the term "megastructure". In our archive research, we discovered a correspondence sent by Fumihiko Maki himself, to a printed edition of the Post Box for Habitat edited by Jaap Bakema. It was actually composed of correspondences sent by architects who proposed to share their thinking about the issue of housing for the Great Number. In the ninth edition, containing correspondences from December 31, 1961 to May 5th, 1962, Maki proposes a text, dated from April 1962, on collective forms in which he details us the three types of form: compositional, megastructural and group-form. This text is therefore a precedent in the use of the term 'megastructure[25]'.

25. Fumihiko Maki and Jerry Goldbderg, "'Linkage in collective form. Collective form Report 2'2", in Jaap Bakema, " ' Post Box for the Development of the Habitat'", *Newsletter*, #no.9, (June 1st, 1962).

In this article and in the 1964 publication, Maki theorizes the concept of megastructure or megaform.

For Maki, also relying on a reading of Tange's project, as Peter Smithson did, 'the megastructure is a large structure in which all the functions of the city or parts of the city are contained. [...] In a sense, it is a man-made feature of the landscape'[26]. The Japanese architect also opposes the idea of a macro-structure capable of lasting according to a longer

26. Fumihiko Maki and Masato Ohtaka, "'Collective Form. Three paradigms'paradigms", in ed. Fumihiko Maki (ed.) Fumihiko Maki,, *Investigations in Collective Form* (Saint Louis, 1964), 8.

life cycle, and a micro-structure, or secondary system, which corresponds to smaller units that can be plugged into the structure and be modified according to a shorter life cycle.

Four years later, Wilcoxon drew up the preface of his book Megastructure Bibliography, including a definition in four points of the megastructure. This last one is 'not only as a structure of great size, but… also a structure which is frequently:

1. *constructed of modular units;*
2. *capable of great or even "unlimited" extension*
3. *a structural framework into which smaller structural units (for example, rooms, houses, or small buildings of other sorts) can be built – or even "plugged-in" or "clipped-on" after having been prefabricated elsewhere ;*
4. *a structural framework expected to have a useful life much longer than that of the smaller units which it might supports.'*[27]

27. Ralph Wilcoxon, *Council of Planning Librarians Exchange Bibliography* (*Monticello*, III), (Charlottesville: University of Virginia, 1968), 266, 1968, 2.

As mentioned by Banham[28], in his book on megastructures, Wilcoxon's definition includes a multitude of considerations that are not present in Maki's one, but have in common the distinction of the fix / transient pair, a primary / secondary structure, joining the Smithson's that we have previously mentioned. This conception of what we can mention as an 'open structure' is what we identified as the first conceptual legacy of megastructuralist theories. The second one is according to our reading, the capacity of the building to contain the functions related to the city, because of its formal strength and size, and in so doing, becomes a landmark.

28. Reyner Banham, *Megastructure. Urban Futures of the Recent Past*, (London, Icon Editions, 1976), 9.

In 1966, the German architect O.M.Ungers published an essay 'Grossformen im Wohnungbau'[29]. Through this text, Ungers gives us a defintion of architecture as a figure capable of having a morphological impact on the city. Although *Grossform* literally means 'large form', the definition of 'large' focuses on the strength of a form rather than its size. The architect's concerns are about an expression of formal coherence.

29. Oswald. Mathias. Ungers and, Erika Mühithaler, (eds.), 'Grossformen im Wohnungsbau', published as #no.5 of *Veröffentlichungen zur Architektur* (Berlin : TU Berlin), december December 1966). It was later published in *Aujourd'hui* : Art et Architectures,s #no.57-58, (October 1967,): 108-113.

"Only when a new quality arises from beyond the mere sum of individual parts, and a higher level is achieved, does a *Grossform* arise. The primary characteristic is not numerical size. A small house can just as well be a *Grossform* as a housing block, a city district or en entire city".

To illustrate his idea of *Grossform*, Ungers relies, among other things, on projects of his Team ten colleagues. Based on these projects, Ungers shares his definition of *Grossform* with four formal categories:

1. 'The existence of an over-accentuated elment
2. The existence of an additional binding element
3. The existence of figure and theme
4. The existence of a system or an ordering principle'.[30]

30. Oswald. M.athias Ungers, '«Notes ont Megaform', », in O.M.Ungers, Erika Mühithaler (eds.), *'Grossformen im Wohnungsbau'*„ eds. Oswald Mathias Ungers and Erika Mühithaler, (Berlin, TU Berlin, 1966), 6.

The German architect tells us of four categories of *Grossform*: 'Street,' 'Plateau,' 'Wall," and 'Tower'. The first two categories are labeled 'functional' while the latter are described as formal and express an interest in form as visual impact. This last grouping, the wall and the tower, highlights the interest of Ungers in typologies. Through these affirmations, Ungers shows the tendancy towards architectural autonomy which distinguish his approach from Team Ten principles.

At the end of his manifesto, Ungers shares an important point, announcing the prelude to the "archipelago city" when he answers: 'Why *Grossform*?'

'Grossform creates the framework, the order and the planned space for an unpredictable, unplanned for, spontaneous process – for a parasitic architecture. Without this component any planning remains rigid and lifeless.'[31]

To illustrate his point, Ungers appeals to the imagination of the medieval city of Arles. The capacity of the formal framework is here disconnected from social connotation and ideology.

The explicit emphasis is made on the typical strong forms of architecture, able to integrate interchangeability.

In 1969, Superstudio, in an article in Domus, "Discorsi per immagini", evokes similar concerns to the formal power of architecture approached by Ungers. The Italian architects will explain their concerns in a series of collages and a text about the "Continuous Monument".

Although Superstudio's proposals are based on the language of megastructures, representing a 'total urbanization model', its formalization is made of a continuous three-dimensional structure. The pattern of the grid spreads across the territory, impassive, "neutralizing", with the aim of returning to the eternal monument. The imaginary conjured up in the collages made by the Italian radicals, undeniably appeal to the power of architecture, as an act of creation "appearing as the only alternative to nature"[32]. Superstudio imagine a future 'in which all architecture will be created with a single act, from a single design capable of clarifying once and for all the motives which have induced man to build dolmens, pyramids, and lastly to trace (ultima ratio) a white line in the desert. The Great Wall of China, Adrian's Wall, motorways, like parallels and meridians, are the tangible signs of our understanding of the earth'[33].

It is interesting to note that the imaginary here is also typological, as are the 'Wall' and the 'Tower' of Ungers. The power of these artefacts, these *objets trouvés*, to act on the territory, to become a landmark, and therefore by extension, to become a *Grossform*, are for us a second legacy of the megastructure discourse also put forward by Banham.

31. Oswald Mathias.M. Ungers, and Erika Mühithaler, (eds.),*'Grossformen im Wohnungsbau'Wohnungsbau*, not numbered (translation by the author), original quote: 'Warum Grossform?... Die Antwort: Die Grossform schafft der Rahmen, die Ordnung und den geplanten Raum für einen unvorhersehbaren, nicht planbaren lebendigen Prozess, für einen parasitäre Architektur. Ohne diese Komponente bleibt jede Planung starr and leblos'.

32. Superstudio, "Discorsi per immagini", Domus, no.481 (1961). It was later published and translated in English in Peter Lang and William Menking, *Supersudio, Life Without Objects*, (Milan, Strika editore, 2003), 122.

33. Peter Lang, and William Menking, Supersudio, *Life Without Objects*, (Milan, Strika editore, 2003), 122.

In 1976, in his book about megastructures, Reyner Banham speaking of the Atomium building designed for Brussels Expo '58,Reyner Banham tells us that this project 'has something of the overscale and landmark qualities that many megastructures were later intended to present'[34].

34. Banham, *Megastructure. Urban Futures of the Recent Past*, 40.

At this stage, we wish to synthesise from our reading of the megastructuralist defintions, theoretical contributions by distinguishing two key concepts both of which are linked to the understanding of architecture as a dynamic and evolutionary process: the open structure and the megaform. These two concepts are essentials and both represent two variations in the contemporary developments of the megastructuralist discourse.

The 'Open Structure'

The 'open structure' results from an application of the principles of 'growing form' and 'aesthetic of change' as previously described. It represents a way of understanding architecture not as a finished object, but as a perennial support enabling temporary appropriations that are sustainable to a greater or lesser degree. The concept of an 'open structure' also presupposes a capacity for growth and transformation in time, without change of nature. Following the biological and molecular structures put forward by the Independent Group in the exhibition *Growth and Form*, it is organised around principles of spatial arrangements, 'patterns', offering supports and facilities for the implementation of functional programmes that are partially or totally indeterminate.

This principle supposes a possibility for evolution of architecture over time, considering that the programmes which take place in the structure as defined can be added, withdrawn or modified without changing it. The structure, whether or not it is seen as perennial, possesses a greater sustainability than the programmes it welcomes.

An architecture incorporating the 'open structure' principle can also be designed in such a way as to expand over time, extending the principles of arrangement from which it was organised in the first place, like the 'endless architecture' theorised by Llewelyn Davies and Weeks, and whose principles are applied to the Northwick Park Hospital project.

Applying the 'open structure' principles involves defining the minimal spatial characteristics necessary for the viability and quality of an architecture intended to develop over time and/or to receive variable programmes over time.

In addition to the theoretical origins mentioned above, this principle of the 'open structure' was largely applied in the neo avant-garde projects developed during the 1960s by the members of Team X, their successors, such as Yona Friedman and his *Ubranisme Spatial* and, in its more recent

developments, by some contemporary architects who specifically refers to Friedman, such as Lacaton and Vassal[35].

35. Cristina Diaz Moreno and Efren Garcia Grinda, "'Everyday Delights. A conversation with Anne Lacaton and Jean Philippe Vassal'Vassal", *El Croquis*, no.177/178 (2015),): 27.

Megaform as architectural permanence

In order to maintain a reciprocal relationship with the territory, the context, the theoretical conception of the megastructure gives us to read an inherent potential: that of becoming a landmark. In 2009, Kenneth Frampton conceptualizes this potential to be a 'powerful landscape 'and refers to it as' megaform'[36], referring to Maki's text and hinting connections with Ungers's *Grossform* preoccupations. For Frampton, the architects

36. Kenneth Frampton, *Megaform as Urban Landscape*, (Michigan, University of Michigan, 1999), 28.

'*can only intervene urbanistically in an increasingly remedial manner and that one effective instrument for this is the large building program that may be rendered as a megaform – as an element which is due to its size, content and direction has the capacity to inflect the surrounding landscape and give it a particular orientation and identity. I believe that such forms are capable of returning us to a time when the prime object was not the proliferation of freestanding object but rather the marking of ground*[37]'.

37. Kenneth Frampton, *Megaform as Urban Landscapelbid*., 40.

The English critic opposes the term 'megaform' to that of 'megastructure', returning to the original text of Maki dating from 1964. For him, a differentiation must be made between the two terms. In the 1960s, the two words were synonymous, but here a nuance is introduced: 'Thus, while a megaform may include a megastructure, a megastructure is not necessarily a megaform'[38]. To support his remarks, Kenneth Frampton gives us a proposition of definition in 5 points:

38. Ibid.Ibidem, 16.

1. *'A large form extanding horizontally rather than vertically*
2. *A complex form which, unlike megastructure, is not nesserally articulated into a series of structural and mechanical bubsets as we find for example in the Centre Pompidou*
3. *A form capable of inlfecting the existing urban landscape as found because of its strongtopographical character*
4. *A form that is not freestanding but rather insinuates itself as a continuation of the surrounding topography, and last but not least*
5. *A form that is oriented towards a densification of the urban fabric*'[39]

39. Ibid.Ibidem, 20.

To illustrate his point, the historian of Columbia University reminds us of some projects of Botta and Snozzi, including the project of 'viaduct' block for an administration center in Peruggia in 1977. This artifact or megaforms *objet trouvé*, the viaduct, joined the considerations of the 'Continuous Monument', and its demiurgic impact on the territory. It also reminds us of the Ponte Vecchio, evoked by Wilcoxon as the 'purest example'[40] of a

40. Banham, *Megastructure. Urban Futures of the Recent Past*ibidem, 13.

megastructure. The infrastructural character of the bridge, the viaduct, are references to *objets trouvés* evoking the universe of the megastructure and constitutes the second living heritage of megastructures.

Nevertheless, just as Banham announced the death of Megastructure, the model of megastructure did not last as a universalizing model of urbanization, but what constitutes its legacy, namely the concepts of open structure and megaform has known a major conceptual change: their formalization took the shape of fragments of cities and no longer the one of a totalizing urban model.

However, some contemporary practices still looks for the desire to give shape to landmark and indeterminacy, articulating transient and permanent design, representing or anticipating the perpetual change of the society and in so doing constitutes a legacy of megastructure to urban theory and history.

From massification to fragmentation: a shift towards a post-universal context

If the theoretical developments operated in Dubrovnik and Otterlo had the objective of a deep critical redefinition of modernist theories, they shared with itthe ambition of a radical and global transformation of living conditions, without any limits of scale through time and space. As above-mentioned, the megastructure shared the same ambitions.

At the beginning of the 70s, in the context of deep questioning of these global models, the Smithson, members of the Independent Group, like Reyner Banahm, wrote a series of articles in which they reconsidered the notion of the collective and suggested a change of point of view. Starting from an architectural theory based on massification (the greater number), they suggested reorienting towards a fragmentation, offering more individual freedom, an 'increased model of diversity'[41]. The most striking article indicating this reorientation was published in *The Violent Consumer, or Waiting for the Goodies*, written in 1974 after abandonment of the collective housing project of Robin Hood Gardens:

'The idea of fragmenting the mass movements, compartmenting in free choice, is worth trying [...] Fragmentation, so that the pieces each become the size that mends minds, responding to those demands in society that are poles apart at the moment : the wish for anonymity - or identity; the desire for patterns of association – or disassociation; a turn away from the solution to be universally consumed towards solutions personally made or chosen; a return to different quality of life to be enjoyed in built places…

We must move on to that next level where the underlying belief in brotherhood is rooted in a sufficiently strong trust that we are all Greeks [...] to allow society to freely fragment, become compartmented, group in its own loose way, seek difference in quality through effort in work- or not, as the case may be.'[42]

41. Dirk van den Heuvel, "Team Ten Diagrams", *Daidalos*, no.74 (2000),): 50.

42. Alison Smithson, "The Violent Consumer, or waiting for the goodies", *Architectural Design*, no.5, (1974),: 274-279.

The question of the multiplicity of singularities was already present in the conference on the open form by the Hansens and the considerations of Archigram on indeterminancy. But here it reaches a supplementary degree of impregnation. It is no longer a case of only considering the individual, but also groups at all scales ('fragmenting the mass movements', 'patterns of association', these being left to their free association, not determined by patterns or predetermined structures.

In 1978, Rem Koolhaas published *New York Delire*[43]. He described there the town as an 'archipelago' as 'cities within cities'. The more each island celebrates different values, different identities, and the more the unity of the archipelago as a system is reinforced. In this model, 'change' is contained in the components of the islands, which freely develop in relation to each other while also interacting with each other. These considerations on fragmentation appeared barely four years after the article by Alison Smithson and two years after Banham's publication on megastructures. It initiated the idea of the town in the town, later developed in the work of the OMA. The idea of 'cities within cities' also reminds us Maki's consideration on megastructure and 'The megastructure is a large structure in which all the functions of the city or parts of the city are contained'[44]. In his work, Koolhaas, referring to the 'self-monument'[45] identifies in its capacity to gather the functions of the city, in the indeterminacy represented by its typical plan, in the landmark that it symbolizes, the true theoretical model of the big building.

43. Rem Koolhaas, *New York Délire*, (Marseille: Editions Parenthèses, 2002), 294.

44. Ibid.,Ibidem, 8.

45. Rem Koolhaas, *New York Délire* Ibid., 100.

Bigness as a contextualized Megaform

First of all, to understand this project strategy, it seems important to us to identify in Rem Koolhaas' remarks, an interest in the speech of the Team X architects and their criticism of the closed form. In an article published in *El Croquis*,Koolhaas tells us that he will understand 'retrospectively' the Smithson's investigations into the dis-order, the indeterminacy and will say about his plans for La Villette and the Hague City Hall. that they 'were to some extent one-sided dialogues with the Smitshons'[46]. To this he adds that he has tried to find, to solve, by telling us about indeterminacy, 'what the Smithson - or the Team X - have always left unresolved, namely'[47], 'how it is possible to combine a real indeterminacy with an architectural specificity'[48]. This change of scale of consideration, from an urban reflection to architecture, is made explicit by Koolhaas and crystallizes in his conception of Bigness.

46. Alejandro Zaera Polo, "'Finding Freedoms : Conversations with Rem Koolhaas'Koolhaas", *El Croquis*, no.53 (1992),): 16.

47. Alejandro Zaera Polo, 'Finding Freedoms : Conversations with Rem Koolhaas'Ibid., 16.

48. IbidIbidem.

This preoccupation where the city is perceived from the perspective of architecture also recalls Ungers' essay on *Grossform*. The essential difference between O.M. Ungers, in particular, and Rem Koolhaas, is that *Grossform* is mainly defined by its formal qualities, whereas Bigness defines himself from its scale which transcends the form entirely. According to the Dutch architect, a new type of building, the "very large

building" demanded by contemporary programs is announced by the skyscraper and corresponds to the first truly metropolitan building of the twentieth century. The enumeration of the principles of Bigness published in the book *S, M, L, XL*, states a clear principle of indeterminacy: 'In Bigness, the distance between the heart and the envelope increases to the point that the facade can no longer reveal what is happening inside. The humanist expectation of "honesty" is doomed; interior architecture and exterior architecture become separate projects, one being linked to the instability of programmatic and iconographic demands, the other - agent of disinformation - offering the city the apparent stability of an object'[49]. This analogy emphasizing the dichotomy between form and function has already been put forward by Ungers when he evoked the city of Arles[50]. The relations between the founder of OMA and the German architect have been established since 1977, especially during the participation of Koolhaas in a 1977 studio.

In short, Koolhaas "combines architectural specificity and programmatic instability"[51]

The project to meet this objective can work by assembly, as that was the case with the proposal for the extension of the Dutch Parliament to The Hague in 1978. This project proceeds by stacking programs designed by three different architects: Hadid, Zenghelis and Koolhaas, the latter ensuring the connections between the different parts, all taking the form of a "guitar". It is for this project to design a small skyscraper without spatial articulation between the levels. Vertical circulation is provided by an elevator. This project is presented by the OMA as a questioning of three considerations: the fragmentation of a set into smaller components, the aporia of contextualism and finally, the traditional typology.

Programmatic instability represents a new kind of 'open' form and goes beyond composition because it calls for strategies. It seeks to respond operationally to the development of a contextualized architecture, responding to a metropolitan condition, which is no longer satisfied with being like the megastructure, 'criticism as decoration'[52]. Koolhaas applies also in a processual way, the observations of 'determined elements' and 'indetermined'[53] one that Candilis mentionned as a model of design for housings. Koolhaas applies it to all programs as 'generic' and 'specific'. The first theoretical considerations of this approach have been tested in the Hague City Hall project and exposed in a publication 'Indetermination and specificity'[54].

According to him, a new type of building, the "very large building" demanded by contemporary programs is announced by the skyscraper and corresponds to the first truly metropolitan building of the twentieth century. The enumeration of Bigness principles is first published in OMA-Rem Koolhaas. For a culture of congestion. The principles or theorems will be taken up in S, M, L, XL and are here entirely quoted:

49. Rem Koolhaas, "« Bigness or the Problem of Large "», dans in O.M.A. Rem Koolhaas et and Bruce Mau, S,M,L,XL, (New York, The Monacelli Press, 1995), 499-502.

50. O.M.Ungers, and Erika Mühithaler (eds.), 'Grossformen im Wohnungsbau', 6 ibidem.

51. Rem Koolhaas, "I combine Architectural Specificity with Programmatic Instability", conversation with Jaime Yatsuka, in *Telescope*, Tokyo, no.3, (1989,): 7.

52. Rem Koolhaas, "Bigness or the Problem of Large", in O.M.A. Rem Koolhaas et Bruce Mau, *S,M,L,XL,* (New York, The Monacelli Press, 1995), 499.

53. Georges Candilis, «, ' Proposition pour un habitat évolutif' évolutif», in *Le Carré Bleu*, no.2 (1959),): 4-5.

54. Dans Patrice Goulet, (éded..), *Six Projects*, (Paris-Rome, Ed. Carte Segrete, 1990), 181-223. Le projet est publié dansThe project is published in O.M.A. Rem Koolhaas et and Bruce Mau, *S,M,L,XL*, op.cit., 544-569.

1. *Beyond a certain critical mass, a building becomes a Big Building. Such a mass can no longer be controlled by a single architectural gesture, or even by any combination of architectural gestures. This impossibility triggers the autonomy of its parts, but that is not the same as fragmentation: the parts remain commited to the whole*
2. *The elevator – with its potential to establish mechanical rather than architectural connections – and its family or related inventions render null and void the classical repertoire of architecture. Issues of composition, scale, proportion, detail are now moot. The 'art' of architecture is useless in Bigness.*
3. *In Bigness, the distance between core and envelope increases to the point where the facade can no longer reveal what happens inside. The humanist expectation of "honesty" is doomed: interior and exterior architecture become separate projects, one dealing with the instability of programmatic and iconographic needs, the other – agent of disinformation – offering the city the apparent stability of an object. Where architecture reveals, Bigness perplexes; Bigness transforms the city from a summation of certainties into an accumulation of mysteries. What you see is no longer what you get.*
4. *Through size alone, such buildings enter an amoral domain, beyond good or bad. Their impact is independent of their quality.*
5. *Together, all these breaks – with scale, with architectural composition, with tradition, with transparency, with ethics – imply the final, most radical break: Bigness is no longer part of any urban tissue.*
   It exists; at most, it coexists.
   Its subtext is fuck context[55]".

In Koolhaas' vision, the idea of indeterminacy remains ubiquitous, but is understood as a world in perpetual change, where areas are left free to allow future modifications. These concerns allow us to hang this design on an open order and an open aesthetic. Unlike the megastructure, for which Koolhaas tells us that Friedman's *Urbanisme Spatial* is a 'criticism as decoration', because it is not located, universal, the work of the OMA is again focused on the architectural specificity and so project a fragment that 'represents the city; or better still it is the city'[56], reminding again Maki's definition of what a megaform is.

55. Rem Koolhaas, "Bigness or the Problem of Large", 499-502.

56. Koolhas, "Bigness or the Problem of Large"Ibidem, 515.

Typical Plan

To focus again on the notion of indeterminacy and non-plan, Adrien Besson[57] shares with us a research on the issue of 'open planning', as discussed by the Quickborner Team in Germany in the 1960's planning means 'a way of designing office spaces without using partitions'[58]. The resulting spaces are neutral spaces, and therefore indeterminate. All the elements are movable and thus of 'plug-in' type, according to Lefaivre's research for the facilities of Mies van der Rohe. The other elements not having an indeterminate, provisional nature, being able to be modified at any time, and which are of the order of permanence, are the core of circulation and services. These concerns are reminiscent, on a different scale, of the notions of fix and transient of Smithson as well as the 'determined' and 'indetermined' elements of Candilis. This opposition between the determined and the determined, the fix and the transient, the permanent and the ephemeral, appears thematically in the project for the headquarters of Universal in Los Angeles and designed by OMA. About it, Koolhaas says: 'The neutrality of each floor is given by the presence of four cardinal points: towers that interpenetrate office spaces to provide the specific requirements and needs of the generic floors. Where office spaces are indefinite, the identity of each tower is singular'[59]. This approach integrates the idea of indeterminacy of the Typical Plan as Rem Koolhaas speaks of it in *S, M, L, XL*: 'Typical Plan implies repetition - it is the umpteenth and there must be many - and the indetermination. To be typical; he [the plan] must be sufficiently indefinite'[60].

In a later presentation of the project, Rem Koolhaas adds: "The organization of the building becomes a literal diagram of the particular and the generic: specificity in the vertical dimension, generic space of offices in the horizontal. As tumultuous as the composition of society becomes, the office floors provide the necessary flexibility, while the towers ensure that a single unit is preserved"[61].

The 'Typical Plan' combined with 'Bigness' as a strategy of design integrates the indeterminacy of a 'relaxed, easy-going scene' where everything can happen and the physical presence of a big building, represens a megaform, a landmark, forming as such, from our point a view, one conceptual rapprochement of megastructures issues. These considerations find a clear expression in OMA's project for Rue de la Loi in Brussels

57. Adrien Besson, Stratégies versus composition, PhD presented in 2009, l'EPFL, 79.

58. John Pile, *Open office planning*, (London: The architectural Press, London, 1978,), 11.

59. Rem Koolhaas, "Introduction", *a+u*,, n0no.. 1(, 2001,): 7.

60. Rem Koolhaas, "Typical Plan", O.M.A. Rem Koolhaas et and Bruce Mau, *S,M,L,XL*, op.cit.,, 333-351.

61. Description of the project in *El Corquis*,, no. 131-132 ("AMOMA Rem Koolhaas (I) 1996-2006")), (2006,): 108.

OMA –The Megaform of Rue de la Loi

The proposal of the Office for Metropolitan Architecture tries to answer two contradictions inherent to the program:

'- to improve the urban qualities of the already congested Rue de la Loi by doubling its density;

- to create a new European quarter on a site which is already occupied by a traditional example of the European city. The first issue is morphological, the second symbolic. To answer his stakes, Rem Koolhaas and his team propose the use of a *objet trouvé*, the 'portico', the classic emblem of the 'public'[62].

To respond to these challenges, Rem Koolhaasuses a '*structure à l'enjambée*'[63] to reduce the footprint of the proposed building, and frees up the street. The project borrows from Superstudio the use of a three-dimensional neutral grid, leaving nothing to perceive of what is happening inside. It is important to remind that Koolhaas was close to Natlini, since 1970, and has borrowed heavily from the universe of representation of the Italian radicals[64].

62. Description of the project on www.oma.eu.

63. Expression borrowed from Yona Friedman, "'Urbanisme Mobile"', *l'Architecture d'Aujourd'hui*, , no.102, (1962):, 76.

64. For further developments on Rem Koolhaas's relationship with Natline, see Dominique Rouillard, *Superarchitecture. Le futur de l'architecture 1950-1970*, (Paris : Editions de la Vilette, 2004), 511-526 and Roberto Gargiani, *Rem Koolhaas-The Construction of Merveille*s, (Lausanne, PPUR, 2011), 5-6.

The whole passes over the neighborhood, imposing itself as a landmark.

About that; the OMA will tell us:

'As a skyline, the contrast between the' European 'and the' private 'orientation, represents a prototype of retroactive planning that is not based on the power of the Tabula Rasa, but that accepts the givens of Conferences of Political Space from Washington 's Mall to the Forbidden City.

The project is made up of several fragments, which 'Together, this chain of fragments offers an exemplary demonstration of the combination of the modernity and history that is the essence of the European project'[65].

65. Description of the project on www.oma.eu.

This example of design illustrated here by a proposal for the city of Brussels, relies on representations and vocabulary of the megastructure: the three-dimensional grid and programmatic indetermination. The proposal is also monumental, borrowing the repertoire of *objetstrouvés*, while wanting to mark the skyline of the European capital. This proposal is a legacy of megastructuralist theory and contemporary development

Lacaton and Vassal: extra space and 'open structure'

On their return from Africa, Anne Lacaton and Jean-Philippe Vassal worked on the project of the Latapie house. For these architects, it was important to think of housing in an alternative way. This project was an occasion for them to think about the type of housing an ordinary family could afford. According to building standards, they could consider a house that was 80m2 in size. The objective followed by the architects was to produce a bigger house, 'not an extra 10m2, but perhaps twice as big if possible, because we are intimately convinced that you'd live better in a big house and that also offers an opportunity to have different sorts of spaces and atmospheres'[66]. The architects responded to this equation by designing the accomodation inside an agricultural greenhouse, an

66. Rem Koolhaas, *New York Délire*, (Marseilles: Editions Parenthèses, 2002), 294.

industrial device making it possible to provide an inner space with a controlled climate and with very low construction costs.

This 'extra space' is also mentioned by the architects as 'double space'[67] depending on the project. Their quest for a complementary space changes architecture by offering a better quality of life to the residents, and freedom of appropriation by the fact that the available surface is not totally invested by a determined program.

For the authors of the project, 'You don't have to conceive everything; you just have to give [the inhabitant] the potential space to be used and appropriated. If you give enough qualities and a range of capacity, then you provide maximum opportunities for everybody and the project will assume to be changed, transformed and re-appropriated'[68].

For Lacaton and Vassal, this possible degree of appropriation and freedom is a definition of 'luxury': 'luxury is linked to freedom of use and a high level of possibility and minor constraints, in order not to set limits to your imagination and desires and is not linked to the cost[69] of a construction. By the way, the architects humorously adopted a famous advertising slogan from a car brand, "What if real luxury was space"[70].

In a text published in 2014[71], the architects claimed principles that were very close to the definition of the open structure mentioned above. Besides, the term 'open structure' is cited in this text:

'We always aim to make [the structure] independent of what it contains, so as to let this content emerge. The structure should be free, very roomy, in order to create a new rapport with climate and the ambience, a new rapport with activity so as to produce the conditions for mobility and enjoyment. A structure that generates urbanism through its capacity to interfere with existing structures and activate the urge to continue the city. We always approach this concept of an open structure through the imaginary aspect of the fabric, the imaginary aspect of the expanse [...]'[72]

In this short extract we find the two general principles of the open structure: programmatic indetermination ('the structure independent of what it contains') and the possibility of growth ('activate the urge to continue the city', 'imaginary aspect of the expanse').

Later, Lacaton & Vassal spoke about the possibilities offered by the use of agricultural greenhouses as a basic structure for creating housing or other programmes, as 'an open structure for inventing climate and ambiance'[73]. They indicate that, contrary to the usual 'defensive'[74] approaches concerning the insulation of buildings, agricultural greenhouses are envelopes that 'play and react with the outside'[75].

The architects also claim to have conceived the architecture 'from the interior. […] We do not think of the exterior project as an act of distanciation in itself, but we try to construct a multitude of situations of uses that are linked and connected to each other'[76]. This approach to space 'from the

67. Cristina Diaz moreno Moreno and Efren Garcia Grinda, "Everyday Delights.", . A conversation with Anne Lacaton and Jean Philippe Vassal", *El Croquis* no.177/178 (2015), 9.

68. Ibid.Ibid.„ 11.

69. Ibid.,Ibid., 17.

70. Anne Lacaton, *Conférence in BOZAR*, Bruxelles, 4/12/2008.

71. Anne Lacaton and Jean-Philippe Vassal, "Structural freedom, a precondition for the miracle", in *Lacaton & Vassal. Recent work*, 2G, no.60 (2012),): 162-175.

72. Ibid.Ibid., 162.

73. Ibid., 166.

74. Ibid.Ibidem.

75. Ibid.Ibidem.

76. Diaz Moreno and Garcia Grinda, "Everyday Delights.", 25.

interior' resonates with the suggestions of Mereau-Ponty, cited by Lucan when he evokes architecture as a 'milieu'[77] : 'I do not see it [space] in terms of its external envelope, I live it from within, I am included in it. After all, the world is around me and not in front of me'[78].

Mostly, Lacaton and Vassal tries to build an 'open structure' made of a three-dimensional structure containing transient functions. Lacaton and Vassal, by referring explicitly to Friedman and Frei Otto[79], by shaping the dual primary/secondary structure, try to pay tribute to megastructure even if their scale of project represents a 'fragment'[80] of a city and not a total model of urbanization.

77. Jacques (Lausanne, EPFL-PPUR, 2016)

78. Maurice Merleau-Ponty, *L'Œil et l'esprit* [1964] (Paris: Gallimard, 2002), 59.

79. Diaz Moreno and Garcia Grinda, "Everyday Delights."„ 27.

80. Ibid.,Ibidem, 25.

The open structure of the School of Architecture in Nantes - Lacaton and Vassal

For Lacaton and Vassal, the notion of 'extra space' is decisive in the conceptualization of their project. It is a complementary space, indeterminate, free of appropriation, considering various scenarios, not imagined in the initial programs given to the architects. In the case of the Nantes School of Architecture, the addition of an indeterminate space, similar in size to the initial program, is obtained not by a duplication of the budget, but by a reflection on the subject, on the constructive system and by conviction in an open-ended approach, allowing the created places to reinvent themselves, putting the user as an actor, able to invest this space without programming. Here, the process used to reduce construction costs, allowing a multiplication of the requested program, is obtained by a process of 'cross-typologisation'[81]. This process aims to import for a different program, a foreign construction to the original program. The system adopted as part of this school takes the form of a multi-level car parking building. This 'cross-typologisation' makes it possible to generate a spatial experience in connection with that of a warehouse, a shed, offering an increased flexibility sought. It is not a question of composing a space, but rather of generating an environment offering 'the imaginary of a huge shed, like the big industrial halls Alstom [located] near the site'[82].

81. Ilka et and Andreas Ruby, "Extra Space, Extra Large: On the Recent Work of Lacaton& Vassal", in *2G Books* , (2007,): 7.

82. Anne Lacaton and Jean-Philippe Vassal, ""La libertad structural, condicion del milagro – Structural Freedom, a Precondition for the Miracle", *2G*, no. 60 ("Lacaton & Vassal"), (2012):, 162.

Regarding the *tracé*, defining in this case, the structural aspect, it breaks down into two systems:

- The primary structure of the three main levels, is made of reinforced concrete and consists of a square grid of 10x10m poles. Its load capacity allows trucks to arrive inside the project, and allows students to build on a 1:1 scale. It offers the advantage of longer durability than the secondary structure

- The secondary structure, lighter is made of steel, and offers unscheduled trays, creating a system suitable for its extension and its future development. These 'infillls' are similar in their plastic expression, to an 'aesthetics of change', as the Smithson had approached from the

case of the Eames and forms a programmatic indeterminacy.

The main floors have a double height configuration, allowing secondary subdivision. They are connected by an external ramp and gradually bring the ground surface into contact with the sky in a continuous movement. The project offers promontories, points of view, making possible an architectural walk offering in its realization, a view on the Loire.

From a systemic point of view, the structural grid adapts to the layout of the plot. It is deformed where the plot folds. The overall shape is thus obtained by extrusion of the permissible surface.

Conclusion

In our article we have highlightened the first use of the word 'megastructure' by Fumihiko Maki in a letter sent to Jaap Bakema in April 1962.

Through our reading of the definition of megastructure by Maki and Wilcoxon, the concepts of 'open structure', 'indeterminacy' and 'megaform' were put forward.

Firstly, 'Bigness' offers a convincing model of hypersize building trying to combine 'indeterminacy and specificity', 'fix and transient', permanent and ephemeral. It also represents a 'megaform' which 'is a city' that inflects its surroundings becoming as such a landmark. The repertoire is the one of megastructures, offering a three-dimensional structure, exploring the realm of *objets trouvés*.

Secondly, the 'Open structure' shapes the opposite primary/secondary structure, offering a neutral plan, able to welcome undetermined programs. In the work of Lacaton and Vassal, this duality is also accentuated by an 'aesthetic of change' representing the capacity of a building to change.

We also highlighted the main conceptual change, which occurs in the scale of consideration: the universalizing model becomes a fragment. Nevertheless, this fragment is the expression of the public as well as the individual and can express further developments of open-ended design, relying on 'Open Form' issues.

These potential legacies suggests that megastructure theories are still relevant in the contemporary urban and architectural discourse and can be explored in order to address the question of uncertainty in architecture and to enliven the way we experienced buildings.

The eccentric outsider: Or, why Reyner Banham dismissed Giuseppe Samonà's mega-project for the University of Cagliari

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ABSTRACT

In 1976, Reyner Banham summarised megastructure as a mixture of pragmatism and lack of ideology, and he attributed the origin of such qualities to British architects – from Cedric Price to Archigram and their celebration of technology for a nomadic *homo ludens*. On this point, he contrasted the Italian mega-architecture of the same period, dismissing it for its political collusions and figurative anxiety. While it is a truism that postwar Italian architectural discourse was imbued with political ideology, Banham's dismissal purposely ignores the intricacies of a period still awaiting thorough international reconsideration, besides a few widely recognised seminal texts by the likes of Manfredo Tafuri, Aldo Rossi and Leonardo Benevolo. By reviewing a neglected project – Giuseppe Samonà's University of Cagliari – whose gigantism compares to any of Banham's examples, this essay digs into a chapter of postwar architecture that ultimately escapes an easy classification in the history of megastructure as narrated by the British historian.

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Reyner Banham; Giuseppe Samonà; Città Territorio; Tertiary Society; Italian Postwar Architecture

Introduction: Banham's hasty dismissal

Running through the history of 1960s architectural megalomania is an Anglo-American-Japanese axis that bears the label of pragmatism as a counter to the collusion of architecture with political ideology. More than Fumihiko Maki's first elaborations on the topic in 1964,[1] it was Reyner Banham's book, *Megastructure: urban futures of the recent past* (1976), that essentially contributed to such codification.[2] After opening his narrative with Le Corbusier's scheme for Fort l'Empereur in Algiers (1931) – 'a true ancestor of megastructure because of its seemingly unlimited length and the clear distinction between the main permanent structure and the infill housing adapted to individual needs'[3] – and reviewing some older antecedents – from Florence's Ponte Vecchio to the George Washington Bridge in New York – Banham adopted a decisively celebratory tone towards the contribution of 1960s British architectural culture to the ultimate definition of megastructure.

According to Banham, it was in Britain that three fundamental aspects came together to define a climax for the concept, after which the road could only descend towards sterile, scholastic repetition. The first was of a technological nature, which he supported by the claim that Cedric Price's Fun Palace was, first and foremost, an adventure in structural detailing. Notwithstanding its contrast to the first aspect, the second was related to the *enfants terribles* of British megastructuralism, namely Archigram and their apparent 'sheer manic pleasure in proliferating drawings'[4] regardless of their feasibility in the real world. Finally, and most importantly for Banham, the British confirmed that megastructure needed an ideal inhabitant and that, as first formulated by Constant Nieuwenhuys, this would be *homo ludens* – the subject of a leisure-based society.[5]

Banham summarised the climax of megastructure as the celebration of 'the absence of any explicit ideology [that] was found disturbing, or at least baffling, outside Britain'.[6] It was on this point that he could contrast what he considered to be proper megastructure to the megalomania of much Italian architectural production of the same period. Banham's argument characterised some of the Italian production as mere academic mimicry of the likes of Archigram (with particular reference to the teaching of Leonardo Savioli in Florence), while also emphasising the collusions with politics that, in Banham's view, deprived the Italian

1. Fumihiko Maki, *Investigations in collective form* (St Louis: Washington University, 1964).

2. Reyner Banham, *Megastructure: urban futures of the recent past* (London: Thames and Hudson, 1976).

3. Ibid., 8.

4. Ibid., 84.

5. Ibid., 81.

6. Ibid., 84.

FIG. 1 Vittorio Gregotti et al. Competition project for the University of Florence (1970–71). Preparatory sketch of general plan. (Archivio Gregotti)

architectural responses of any value other than that of political ideology.

The latter argument was most clearly stated in the comments to the competition scheme for the University of Florence designed by Vittorio Gregotti, one of the Italian projects selected for 'Megastructure in Academe' **[Fig. 1]**, the seventh chapter of Banham's book and one devoted to mega-projects for university spaces:

> It became clear that, behind an overt intention to unify the town-planning futures of the entire territory between Florence and Pistoia, there was a less clearly articulated one to give left-wing municipalities along this line dominion over the pockets of Christian Democratic territory in between.
>
> […] Without knowing of this background of radical quasi-political intentions, one might easily suspect that projects such as these were merely expressions of a desire to impose a regular formal order, above all a monumental order of heroic scale, on the unruly countryside and the sprawling town. Even allowing that these political ambitions are there, however, the dominance of formal interests seems overwhelmingly strong, arousing the suspicion […] that for these Italian megastructuralists the main function of social revolution would be to enable them to realize purely aesthetic ambitions that were thwarted under existing regimes.[7]

As a baseline, Banham's diagnosis makes perfect sense. If anything, it is largely a truism that postwar Italian architectural discourse was imbued with political ideology from across the leftist spectrum. Moreover, little sympathy for Italian architectural culture could be expected from someone who accused it of a retreat from modernism, igniting a notorious architectural dispute between the UK and Italy in the late 1950s.[8] In fact, the generous number of pages that Banham devoted to Italian mega-architecture fully intended to contrast it to pragmatism – a pragmatism understood by Banham as one that affirmed appreciation of the opportunities that would enable a technological society to be finally free from adherence to one place and to enjoy the pleasures of nomadism.

Regardless of the correctness of Banham's argument, his hasty dismissal of Italian mega-production as located on the ambiguous dividing line of form and politics ignores a considerable amount of complexity. And in general, architectural historiography still awaits the full reconsideration of a fertile period in Italian architectural theorisation of which only a few products are internationally known – products, moreover, that provide a very partial reading of a much wider discourse that developed between the late 1950s and the early 1970s.[9]

This essay aims to start filling the gap by elaborating more deeply on a chapter of mega-architectural thinking that was left outside Banham's reading and that constitutes a blank spot in the international reception of the work and debate developed by the Italian city-territorialists, as Banham called them in his book.[10]

7. Ibid., 148.

8. Reyner Banham, 'Neoliberty: The Italian retreat from modern architecture', *The Architectural Review* 125 (1959): 230–35; Ernesto Nathan Rogers, 'L'evoluzione dell'architettura: risposta al custode dei frigidaires', *Casabella-Continuità*, no. 228 (1959): 2–4.

9. Among the most popular written products were, for example: Leonardo Benevolo, *Le origini dell'urbanistica moderna* (Rome and Bari: Laterza, 1963), English translation *The origins of modern town planning* (Cambridge, MA: MIT. Press, 1967); Aldo Rossi, *L'architettura della città* (Padua: Marsilio, 1966), English translation *The architecture of the city* (Cambridge, MA: MIT Press, 1982); Manfredo Tafuri, *Progetto e utopia: architettura e sviluppo* capitalistico (Rome and Bari: Laterza, 1973), English translation *Architecture and utopia: design and capitalist development* (Cambridge, MA: MIT Press, 1976).

10. An exception that offers a good way into the Italian postwar architectural debate on city-territories that centred on the work of Aldo Rossi is Mary Louise Lobsinger, 'The new urban scale in Italy: On Aldo Rossi's L'architettura della città', *Journal of Architectural Education 59*, no. 3 (February 2006), 28–38.

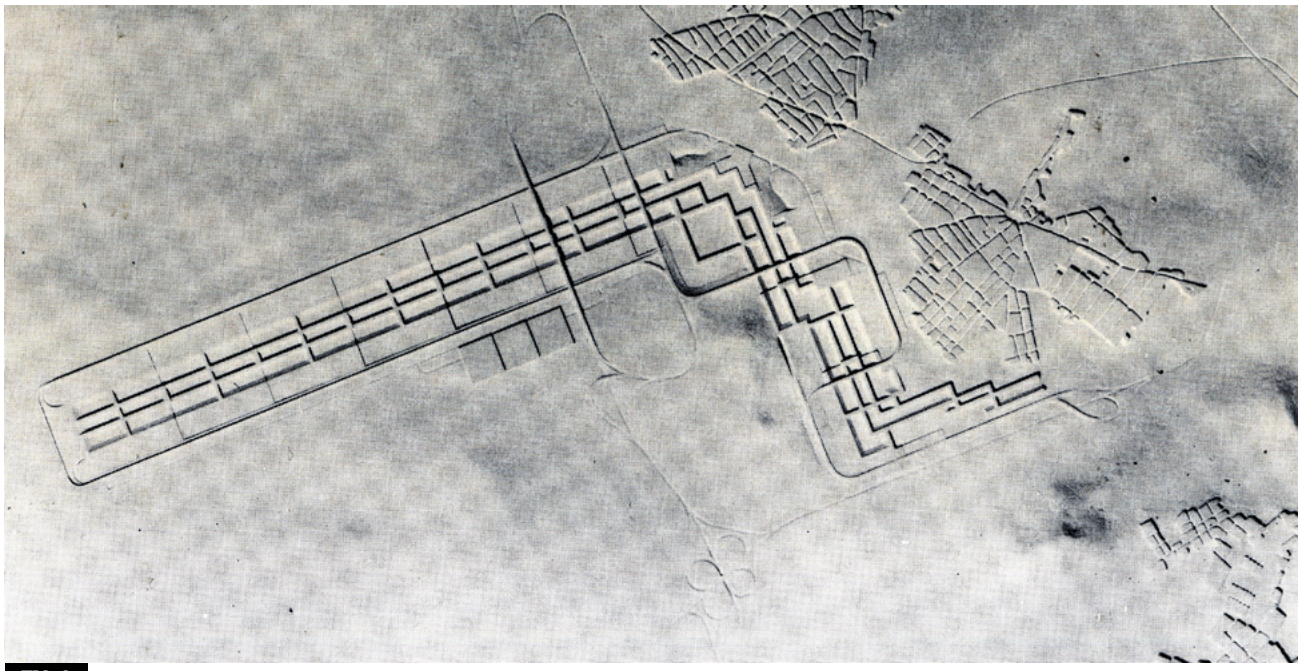

FIG. 2 Giuseppe Samonà et al. Competition project for the University of Cagliari (1971–72). General model. (CSAC Parma, Archivio Samonà)

An inverted monument. Giuseppe Samonà's competition project for the University of Cagliari

Rescuing a project from oblivion offers a useful way into grasping some of the complexities and contradictions of the Italian approach to mega-architecture. If there is a single project that is notably absent in Banham's Italian selection – and, more generally, in the mentioned 'Megastructure in Academe' chapter – it is indubitably the 1971–72 competition scheme for the University of Cagliari designed by Giuseppe Samonà and his associates [Fig. 2].[11]

In terms of gigantism Samonà's project is largely unsurpassed among its peers. Compared to it, even the heroism of Erikson and Massey's 1963 Simon Fraser University, or, to stay within the Italian selection, of Gregotti's three-kilometre-long bridge-like University of Calabria,[12] appear almost timid gestures [Fig. 3].

In response to a brief that asked for the university to be relocated from being a scattered presence inside the city fabric to a dense complex on a peripheral 400-hectare area, Samonà proposed to fill up the entire site with an 'inverted monument' – as described by Carlo Doglio, the sociologist-urbanist who collaborated on the project.[13]

The university was designed as an excavation in the ground, with roofs

11. The team included comprised Giuseppe Samonà (team leader), Cesare Airoldi, Cristiana Bedoni, Mariella Di Falco, Gheta Farfaglio, Reiana Lucci, Alberto Samonà, Livia Toccafondi, Egle Tricanato, M. Alberto Chiolino, Carlo Doglio, and Francesco Frattini. The project received the second prize in the competition and was published alongside other entries in *Controspazio* 3 (1973), 20–29.

12. Francesco Zuddas, 'The idea of the università', *AA Files*, no. 75 (2017): 119–131.

13. Carlo Doglio, 'L'essenza sarda e l'università come fenomeno', in Giuseppe Samonà et al, 'Concorso nazionale per il piano urbanistico di sistemazione della sede dell'Università di Cagliari: relazione illustrativa dei concetti informatori della proposta, con le fasi e i metodi di realizzazione e il piano finanziario di massima', 1972, Samonà 1 pro/1/069, Università IUAV – Archivio Progetti, Fondo Giuseppe e Alberto Samonà.

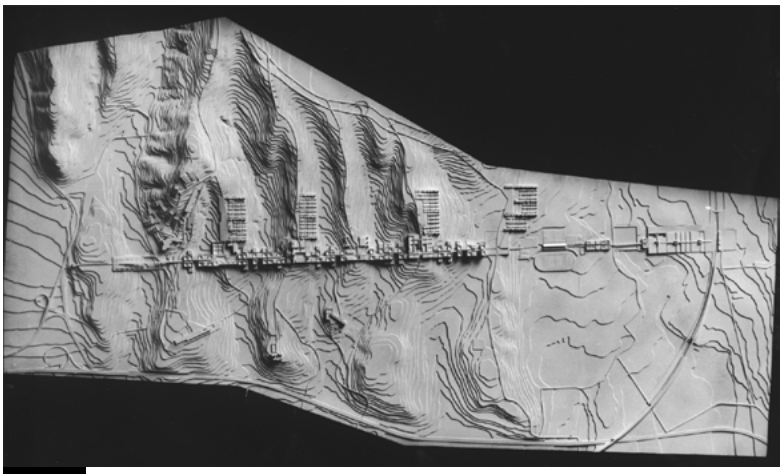

FIG. 3 Vittorio Gregotti et al. Competition project for the University of Calabria (1972–74). Model. (Archivio Gregotti)

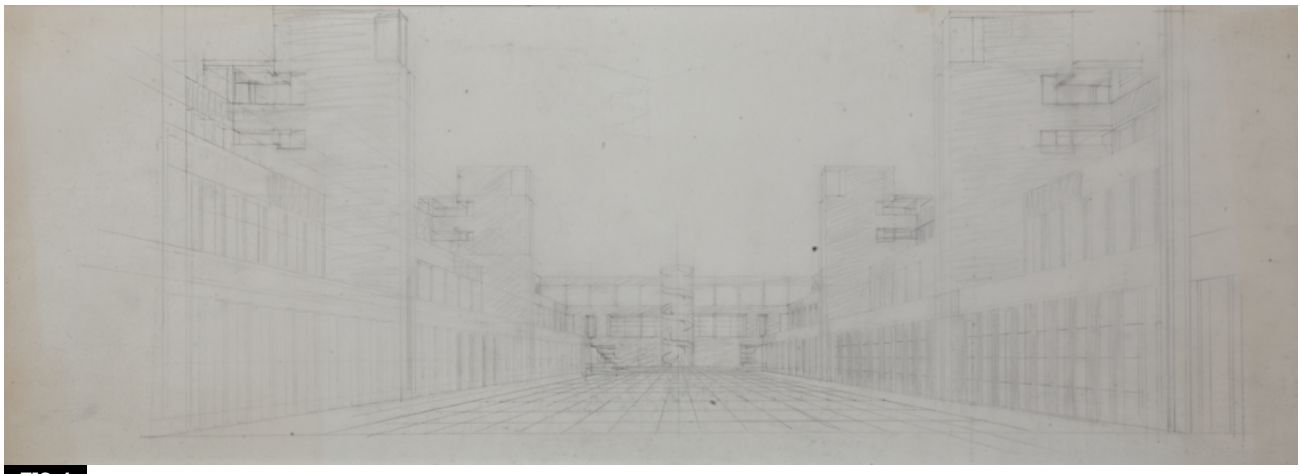

FIG. 4 Giuseppe Samonà et al. Competition project for the University of Cagliari (1971–72). Preparatory sketch of interior courtyard. (CSAC Parma, Archivio Samonà)

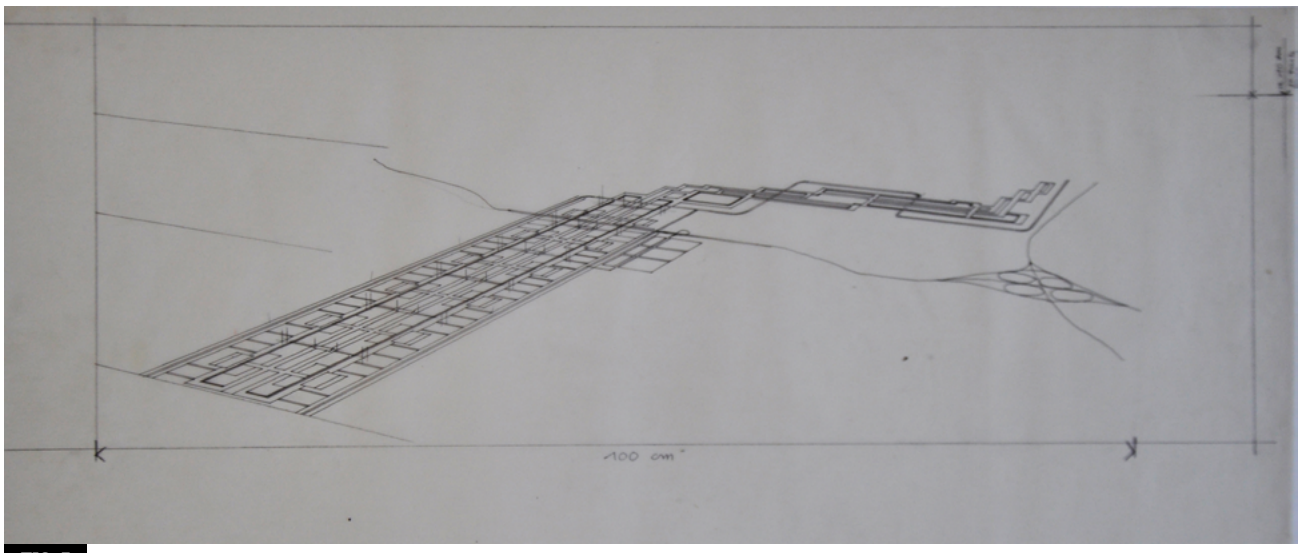

FIG. 5 Giuseppe Samonà et al. Competition project for the University of Cagliari (1971–72). Preparatory sketch of bird's eye view. (CSAC Parma, Archivio Samonà)

being a continuation of the surrounding rural landscape. It defined an unmistakable pocket of formal order extending over five kilometres in length and kept within a fixed, staggered section of 300 metres in width. A repetitive sequence of courtyards disrupted the monotony of this linear settlement, breaking down a figure that was clearly intended to be seen from the air into a sequencing of spaces to be experienced at eye level – or humanistically, so to speak [Figg. 4-5]. The dialogue of views from above and from eye level characterised the competition drawings, rendering a piece of perfect order that apparently responded to Banham's diagnosis of an Italian fixation with formal interests which aimed to 'realize purely aesthetic ambitions that were thwarted under existing regimes'.[14]

Yet, of the three cornerstones of megastructure listed by Banham, Samonà's project at most aligned with the second – the sheer pleasure of drawing as an autonomous reality – although the charge of enjoyment lying behind a Plug-in City is hardly comparable to the black-and-white, more traditional drawings for Cagliari. What is certain is that the project did not respond to either of the other two points indicated by the British historian, for neither was it an essay in technological detailing nor did it

14. Banham, *Megastructure*, 148.

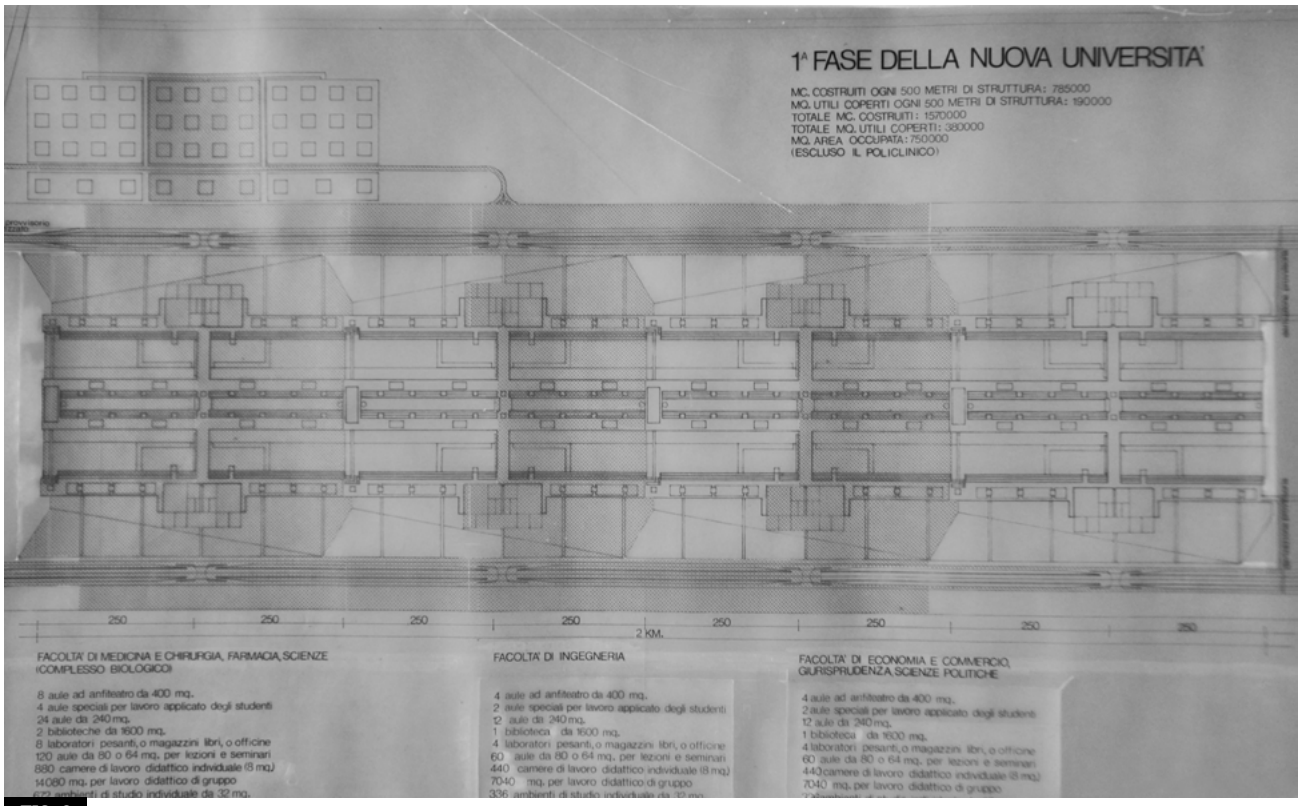

FIG. 6 Giuseppe Samonà et al. Competition project for the University of Cagliari (1971–72). Plan of first phase of development. (CSAC Parma, Archivio Samonà)

aim to produce a city for 'man at play'. In relation to the latter, Archigram's dream of a walking city was an ultimate declaration of willingness to escape from the city as it existed. Samonà's response could not be more different, and his decision to dig a new piece of city from its ground was a metaphorical statement about not aiming to go anywhere. Moreover, his ideal inhabitant was a much less playful one: not *homo ludens*, but tertiary man – a prototypical office worker likely to be subsumed under a daily routine.

This last point emerges from the written pages submitted by Samonà alongside the competition panels, where he described a settlement only temporarily associated with educational functions.[15] The long-term intention of the project was, in fact, to give new orderly premises to a whole range of tertiary activities that would be relocated over time from the city centre into a large service complex. The linear logic of the scheme tied into this objective, with stretches of varying length associated with different activities – from specific academic disciplines to regional offices, banks, and other administrative functions. In Samonà's vision, this linear organisation would eventually see the university 'disappear, absorbing and being absorbed by renovated services within which it will play a propulsive, enlivening role'.[16] University students would thus find themselves as workers among other workers, their learning depending as much on traditional taught curricula as on the professional and professionalising environment in which they operated each day [Fig. 6].

15. Giuseppe Samonà et al., 'Concorso nazionale per il piano urbanistico di sistemazione della sede dell'Università di Cagliari. Relazione illustrativa dei concetti informatori della proposta, con le fasi e i metodi di realizzazione e il piano finanziario di massima', 1972. Samonà 1.pro/1/069, Università Iuav – Archivio Progetti, Fondo Giuseppe e Alberto Samonà.

16. Samonà et al., 'Concorso nazionale per il piano urbanistico di sistemazione della sede dell'Università di Cagliari', 16.

To understand the project as an argument about tertiary society, it is necessary to take an excursus into the context from which it emerged as a different take on megastructure. Before focusing on Samonà's own theses on urbanism, I will first review some key ideas about a tertiary society from the 1960s Italian postwar debate on the city, since they revolved around a few central notions of which Samonà himself was a fundamental initiator: *nuova dimensione urbana*, *città regione*, and *città territorio*. These linked to some important applicative test beds – quartieri, *centri direzionali*, and *centri universitari*[17] – that succeeded one another between the early 1950s and early 1970s. These test beds were the spatial products through which the Italian architectural community aimed to prove a thesis that can be summarised thus: the expanding urban condition of the postwar years required the cultivation of a critical conscience, and this could be reached by means of exemplary, public, large-scale architectural interventions set against the prospect of private-led urban growth. Postulates to the thesis were that architects could play a central role and, relatedly, that architecture and urbanism had to be considered as one and the same thing.

17. Mario Ferrari, *Il progetto urbano in Italia: 1940–1990* (Florence: Alinea, 2005).

Italy, 1960s: A new urban dimension

The story of the Italian postwar architectural debate has been narrated many times, mostly for an exclusively Italian audience.[18] Almost all historical accounts agree that pivotal for the formulation of an Italian architectural approach to urban growth were three events in 1959: a congress, a competition, and a book. Covering the whole spectrum of the architectural profession, from diagnosis and theorisation to proposal, the seventh Congress of the Italian Institute of Urbanism (INU), the competition for the neighbourhood Barene di San Giuliano, and Giuseppe Samonà's book *L'urbanistica e l'avvenire della città negli stati europei* concurred to solidify the figure of the architect as a critical antagonist to a growing cohort of technocratic planners. Already in an essay of 1964, Manfredo Tafuri signalled these three events as emblems of the crucial intellectual switch within Italian architectural discourse on the city during the passage from the 1950s to the 1960s.[19]

18. Among the numerous references, three useful titles are: Manfredo Tafuri, *Storia dell'architettura Italiana, 1944–1985* (Turin: Einaudi, 1986); Cina Conforto et al., *Il dibattito architettonico in Italia*, 1945–1975 (Rome: Bulzoni, 1977); Mario Ferrari, *Il progetto urbano in Italia: 1940–1990* (Florence: Alinea, 2005).

19. Manfredo Tafuri, 'Teoria e critica nella cultura urbanistica italiana del dopoguerra', in *La città territorio: un esperimento didattico sul centro direzionale di Centocelle in Roma*, ed. Carlo Aymonino (Bari: Leonardo da Vinci editrice, 1964), 39–45.

Resisting an urbanistic approach based on numbers, codes and protocols became, in fact, a key concern for many Italian architects in the early 1960s who advocated continuity with early modernist architecture's capacity to move across scales from the building to the city – a capacity they believed had been lost after the war. The urgency of reconstruction, coupled with demographic changes and increasing migrations from the countryside to the urban areas,[20] made multi-scalar thinking in the postwar period an imperative to cope with the exhausted ideas of the 'city'.

20. Paul Ginsborg, *Storia d'Italia dal dopoguerra a oggi* (Turin: Einaudi, 1989).

This urgency was first highlighted at a roundtable discussion held during the seventh urbanists congress in Lecce,[21] at which Ludovico Quaroni and Giancarlo De Carlo conversed about a 'changed scale of human life and of the urban scene'[22] and declared the inappropriateness of the dichotomist thinking that traditionally opposed city and countryside. Unlike other advanced industrial economies, Italy was still at an early stage in its path towards massive urbanisation. Therefore, while a posteriori remedial practices were necessary elsewhere – such as in the megalopolis of the 'northeastern seaboard of the United States' that had been famously observed by Jean Gottman in 1961,[23] or in the large European metropolises of London and Paris – Italy could count on the benefit of time to develop solutions ahead of catastrophe. Quaroni and De Carlo were among the first to claim that architecture was capable of directing a process of urbanisation in which city and countryside merged in an orderly way through the guidance of public authorities.

The congress was also an important occasion for self-criticism, which particularly involved Quaroni on a personal level. A leading figure in Italian architecture since the 1940s, and around whom many younger architects clustered in the postwar years,[24] Quaroni had been among the designers of new housing complexes that proliferated in the 1950s across the urban peripheries widely depicted in Italian neo-realist movies and novels from the period. His own Quartiere Tiburtino in Rome, designed with Mario Ridolfi in 1949, became the urbanistic equivalent of neo-realism and demonstrated a willingness to apply the rationalising power of modernism to a renovation of popular and vernacular architecture and its associated traditional social bond. Among the most publicised products of what came to be baptised the 'politics of the neighbourhood' (*politica del quartiere*), the philosophy that grounded Tiburtino and many other satellite neighbourhoods built throughout Italian cities under the auspices of a national housing programme (INA Casa[25]) came under attack from its own creator by the late 1950s. In 1957, Quaroni criticised the ideology behind the new complexes, which handled the city through finite elements that pretentiously promoted social self-sufficiency.[26] 'On the way to the city, we stopped in the village',[27] he claimed, providing a written description of the desolate images of new housing complexes that constituted the background for much of the *oeuvre* of Pier Paolo Pasolini, Vittorio De Sica, and Federico Fellini. A major factor triggering Quaroni's critique was that the isolation of the new complexes was not neutral; rather, acting as magnets of private development they destructively impacted on the processes of urbanisation. Reassessing the ideology of these *quartieri* thus implied a more general reconsideration of the role of public authority planning in the face of rampant private speculation.

At the 1959 roundtable, Quaroni reiterated this criticism and sketched the main outlines of a different approach to urbanisation. In the new urban dimension, he maintained, architecture was called on to develop

21. The proceedings of the congress were published in *Urbanistica*, no. 32 (1960).

22. Ludovico Quaroni et al., 'Tavola rotonda', *Urbanistica*, no. 32 (1960): 7. Translated by the author.

23. Jean Gottmann, *Megalopolis: the urbanized northeastern seaboard of the United States* (New York: Twentieth Century Fund, 1961).

24. Manfredo Tafuri, Ludovico *Quaroni e lo sviluppo dell'architettura moderna in Italia* (Milan: Edizioni di Comunita, 1946); *Ludovico Quaroni: architetture per cinquant'anni* (Rome: Gangemi, 1985).

25. Pier Giovanni Bardelli, Rinaldo Capomolla, and Rosalia Vittorini, eds., *L'architettura INA Casa (1949–1963): aspetti e problemi di conservazione e recupero* (Rome: Gangemi, 2003). For a recent reading of the Italian postwar housing projects, see Carlo Melograni, *Architetture nell'Italia della ricostruzione: modernità versus modernizzazione 1945–1960* (Macerata: Quodlibet, 2015).

26. Ludovico Quaroni, 'Politica del quartiere', *La Casa* 4 (1957).

27. Ludovico Quaroni, 'Il paese dei barocchi', *Casabella*, no. 215 (1957): 24. Translated by the author

a cultural project still grounded in a humanistic approach but not one that should intend anachronistic ideal communities. The reason for this was that the main subject of planning had changed from the village peasant – part of a tight community network – to an urban human being who had been 'left alone'.[28] This change required the creation of environments capable of guaranteeing 'maximum sociability, solitude, freedom, and individual responsibility',[29] giving reason to file away the self-contained *quartiere* and switch instead towards novel ideas. Quaroni thus started talking of *piano processo* (plan-process) and *opera aperta* (open work) as more vaguely defined formal statements that could interpret the ultimate instability of a new urban society.[30]

28. Ludovico Quaroni et al., 'Tavola rotonda', 7. Translated by the author.

29. Ibid. Translated by the author.

30. Tafuri, *Storia dell'architettura Italiana*, 96.

Not surprisingly, Quaroni himself authored the project that first envisaged the switch from the formal stability of the earlier *quartieri* to an 'aesthetics of indeterminism' – as Manfredo Tafuri described his competition winning entry for the new neighbourhood at Barene di San Giuliano, on the mainland facing Venice.[31] The project depicted large crescent structures between which a thinner fabric was sketched with an intentional lack of peculiarity and definition. With Quaroni's project, Tafuri observed, urban design switched from the demarcation of definitive spatial configurations to the design of relations. The normative role of the architectural drawing was relatedly changed from one of complete formal definition to one of specification of selected relations between main components within an overall system that was ultimately left open to successive ad hoc detailing [Fig. 7].

FIG. 7 Ludovico Quaroni et al. Competition project for Barene di San Giuliano (1959). Bird's eye view. (From Casabella 242 [1960])

Inherent to Quaroni's drawings was the intention of smoothing the edges between humanism and visionary modernism. Therefore, the door was potentially still open for the vernacular to dwell between the monuments of a new urban dimension that elected as its main cultural reference the famous geographical visions imagined by Le Corbusier for North Africa and South America in the late 1920s and early 1930s – the very images that Banham selected to open his book on megastructure. Yet, Banham's emphasis on the dyad of permanent structure and temporary infill was not the main preoccupation of the Italian architects who looked at that specific stage of Le Corbusier's *oeuvre* and made it a

31. Ibid. My translation. The competition projects were published in *Casabella*, no. 242 (1960) and *Urbanistica*, no. 31 (1960).

constant presence in the Italian debate on the new urban condition. Either in words or drawings, the geographical visions of Le Corbusier populated the pages of early 1960s issues of *Casabella*, as well as the writings of Carlo Aymonino, Manfredo Tafuri, Vittorio Gregotti and Giuseppe Samonà, among others. Samonà, in particular, used them as the counter images to the mainstream attitude of coping with urban growth by dreaming of harmonious communities set in peaceful continuity with the countryside, which constituted the main target of attack in his book *L'urbanistica e l'avvenire della città negli stati europei* – the third and final milestone of 1959.[32]

32. Giuseppe Samonà, *L'urbanistica e l'avvenire della città negli stati europei* (Bari: Laterza, 1959).

From Carlo Doglio to Giuseppe Samonà: Setting the Italy/UK divide

The director of the Institute of Architecture in Venice (IUAV) since 1945, Samonà might be credited with inventing the term 'new urban dimension', which he used in the title of one of his articles – also written in 1959[33] – and became the general topic of his book, hailed by Quaroni as 'the first Italian book on urbanism'.[34] Centred on a critique of the idea of the garden city, Samonà's book owed an important debt to the work of Carlo Doglio, a sociologist with anarchist tendencies whom Samonà had appointed professor at IUAV. In 1953, Doglio had published the essay 'L'equivoco della città giardino'[35] (The garden city's misunderstanding), in which he criticised the garden city movement as a technocratic act that merely 'worked' but was not fired by the socialist charge that had moved the likes of William Morris, Charles Fourier and Robert Owen – notwithstanding the enthusiastic appraisal of the movement by his fellow sociologist Lewis Mumford. Doglio's essay thus played an important role in setting the intellectual distance between an Anglo-American way of coping with the nexus of industrialisation and urbanisation and what eventually emerged as a reclaimed original Italian position on the same topic.

33. Giuseppe Samonà, 'La nuova dimensione della città', *Urbanistica Conversazioni* , (1959).

34. Ludovico Quaroni, review of Giuseppe Samonà, *L'urbanistica e l'avvenire della città negli stati europei*, in *Casabella*, no. 236 (1960). Translated by the author.

35. Carlo Doglio, *L'equivoco della città giardino* (Naples: RL, 1953). Doglio's essay was published in part in *Urbanistica*, no. 13 (1953). It was republished as Carlo Doglio, *La città giardino* (Rome: Gangemi, 1985).

In Ebenezer Howard's idea of the garden city and its American application – the work of Clarence Stein and Henry Wright – Mumford, hailing Howard as 'the first modern thinker about cities who has a sound sociological conception of the dynamics of rational urban growth',[36] had found the antidote to the uncontrolled megalopolis. Conversely, Doglio claimed that the garden city merely remained at the level of a financial scheme with no real social ideology.[37] Its success was because it was a perfect technical formula, but societally it could only reinforce an affluent middle class rather than propose a more equitable society.[38] The 'misunderstanding' that Doglio pointed out in the reception of the garden city idea had long-lasting consequences, for its impact was not limited to the work of Stein and Wright or its British predecessors Parker and Unwin, but went on to become the core of mid-twentieth-century planning ideology, finding in the British new towns its main formulation. Following Doglio, Samonà similarly condemned the garden city/new towns ideology

36. Lewis Mumford, *The culture of cities* (New York: Harcourt, Brace & World, 1966; c.1938), 397–98.

37. Doglio, *L'equivoco della città giardino*, 32.

38. Ibid., 34.

as technocracy hidden under a cloak of socialism. He reworded Doglio by claiming that this ideology approached the city from the outside rather than from within the urban problematic. As such, it promoted only an exile from the city as the logical response to the problems of congestion and falling living standards that were afflicting metropolises under the pressures of industrialisation. Samonà condemned Howard's proposal as an expression of bourgeois culture that found a way of adapting to the exploding processes of urbanisation by defining an ideal form of settlement that deceitfully promised the harmonious balancing of dwelling and workplace.[39] A middle class of professional workers thus started shaping a new city that merely resulted in the delocalisation of residential and industrial areas to outlying sites.

Samonà went on to discuss how this process had accelerated during the postwar years when an 'exceeding population' and 'non-homogeneous activities' became the basic tropes of an urbanistic discourse that revealed itself as trapped within an overall inability to deal with a pervasive urban condition. This inability was demonstrated by the decentralisation that continued to be conceived as a remedial practice for urban congestion based on the anachronistic distinction between the interior of what was traditionally called the city and its exterior, the countryside. Claiming that 'the urbanistic problems of the city cannot be solved within its walls', Samonà warned that a different understanding of decentralisation was needed, and that the urban had to be discussed in terms of 'relationships between large structures'.[40] It was on this claim that the alternative ideas of *città regione* and *città territorio* were elaborated in the early 1960s as the intellectual categories to design Italy's urban future.

39. Samonà, *L'urbanistica e l'avvenire*, 12.

40. Ibid., 91. Translated by the author.

Città regione or città territorio?

Initially used synonymously, *città regione* and *città territorio* were gradually absorbed within two opposing forces that increasingly became distanced from one another in a common search for approaches to the new urban dimension. Whereas the former remained the flag of Italian planners, the latter became associated with a response to the new urban dimension sustained by architects who emphasised physical form over regulations and codes.

Città regione tied into the wider ideas of regional planning that were internationally debated in the 1950s and had, again, a main proponent in Lewis Mumford. Since the 1940s, Mumford had been claiming that 'what the clotted metropolis did in the past, the region will have to do in the future', defining the regional city as 'a congeries of cities, big and small, including hamlets, villages, and townships'.[41] Mumford's ideas were popularised in Italy via Adriano Olivetti's magazine *Comunità* that, in 1957, published Mumford's article 'La nascita della città regionale'.[42] They were echoed in the work of a group of planners who constituted the Centro di Studi e

41. Lewis Mumford, 'A new regional plan to arrest megalopolis', *Architectural Record* 137, no. 3 (1965), 153.

42. Mumford's ideas were popularised in articles published in *Comunità*: 'L'unità di quartiere (*Comunità* 24 [1954]), 'La nascita della città regionale' (*Comunità* 55 [1957]), and 'La via d'uscita umana' (*Comunità* 83 [1960]).

Piani Economici (from here on abbreviated as Centro Piani), a research centre based in Rome. In the 1960s, Centro Piani produced the first and second National Economic Plans, early instances of strategic planning that sketched a large-scale restructuring of the Italian territory according to a scenario of linear cities set within vast expanses of parkland that was as ambitious as it was generic.[43] Centro Piani aligned with Samonà's claim that the problems of cities could no longer be resolved from their interior. Yet, they ignored the possibility of formal experimentation, which was an inextricable part of Samonà's argument in defence of a unity between architecture and urbanism. Against it, they borrowed from the French to categorically state that 'Le style viendrà par sucroit'[44] – style will come later.

This assumption created a wall that divided the technocrats – as the members of Centro Piani came to be regarded with scorn – and the architect–urbanists who argued for the centrality of architectural form in the definition of a new urban dimension. Among the latter was Aldo Rossi, whose article 'Nuovi problemi' (New problems), published in *Casabella* in 1962, clearly opposed the views of Centro Piani and reclaimed for the architect the role of 'defining spatial order for a changing reality, and creating forms capable of interpreting the new condition'.[45] Diagnosing the city as an entity made of parts – an idea that would be central to his most famous theoretical contribution, *The architecture of the city* (1966) – Rossi joined Quaroni's criticism against the 1950s practice of dislocating and dispersing discreet residential compounds. He argued instead for a massive scalar leap:

> Shopping centres, universities, cultural centres and public buildings will all regain their formal importance: they will be the monuments of a vast metropolitan territory marked by an impressive public transport network capable of augmenting and multiplying movement, contacts, and participation of every man according to the spirit of the new city.46

Rossi's list of new monuments hinted at the growing importance of service infrastructure for an urban civilisation. His article preceded by a few months the launch of a competition in Turin in 1963, when Italian architects (Rossi included) first confronted one another on the possible architectural formats for a

43. Centro Piani was a not-for-profit association comprising planners, engineers, economists, sociologists, geographers and other professional figures whose aim was to develop an 'integrated approach' to planning. See Franco Archibugi, ed., *La città regione in Italia* (Turin: Boringhieri, 1966); and Cristina Renzoni, *Il Progetto '80: un'idea di paese nell'Italia degli anni sessanta* (Florence: Alinea, 2012).

44. A. Massé, *Prevision et prospective*, quoted in Francesco Sirugo, 'Città e regione nello sviluppo storico della città industriale', in *La città regione in Italia*, ed. Franco Archibugi (Turin: Boringhieri, 1966), 113.

45. Aldo Rossi, 'Nuovi problemi', *Casabella*, no. 264 (1962), 4. Translated by the author.

46. Ibid., 6. Translated by the author.

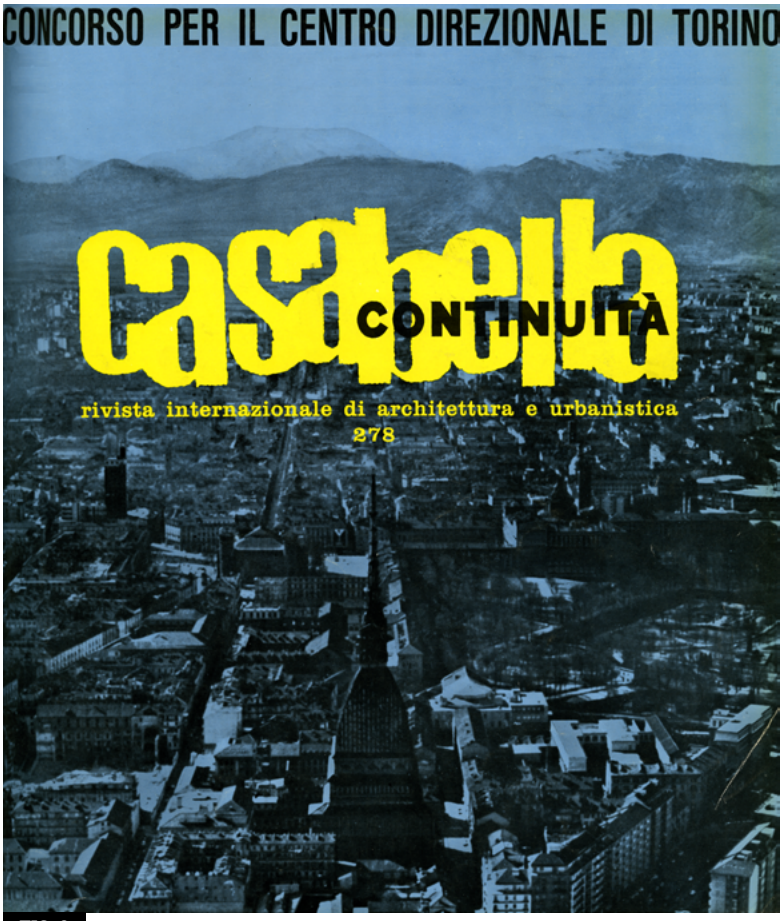

FIG. 8 Competition for a Centro Direzionale in Turin, 1963. Cover page and inner pages of the projects by Ludovico Quaroni, Giuseppe Samonà, Carlo Aymonino, AUA. (From Casabella 278 [1963])

service infrastructure catered to an expanded urban territory [Fig. 8].

Such infrastructure took the name of *centro direzionale*, which came to be conceived as the hinge between the space of dwelling and reproduction – the traditional city – and the space of production – the countryside – with the objective of abolishing this dichotomy. In turn, it was the apparatus that allowed an architectural definition of city territory opposed to the one proposed by planners – 'the starting node of *città territorio*' as Carlo Aymonino summarised it.[47] In other words, the architects' idea of a city territory posited a physical condition that could be enabled through the initial rational reorganisation and concentration of all service activities necessary to serve both city and countryside, to eventually abolish their opposition by the creation of a vast urbanised territory.

The programmatic brief of the Turin competition required mixing on a 70-hectare site on the periphery of the city the headquarters of banks and corporations, the administration offices of national institutes, commercial and leisure activities, hotels and other complexes for collective living. The leading Italian architects confronted one another with operative solutions for this starting node of a possible city territory. Projects encompassed the towers-on-a-plinth presented in Quaroni's winning entry to give a new 'acropolis' to Turin; Samonà's indeterminate layering of horizontal slabs; Aymonino's silos-like monuments, discussed by their author as a 'living organism';[48] Guido Canella's earliest formulation of *fuori scala* that interpreted the *centro direzionale* as a continuation of the metropolitan infrastructural system;[49] the proposal by Architetti e Urbanisti Associati (AUA, which included a young Manfredo Tafuri) that more faithfully adhered to the 1960s international ideology of megastructure, as evidenced by the use of the A-section typical of many large-scale architectural visions of the time (something that did not elude Banham's radar, since the project was included in his 1976 book[50]); and the abstract gigantic cube of Aldo Rossi, Gianugo Polesello, and Luca Meda, 'a project of architecture on a metropolitan scale, a radically urbanised architecture'[51] that refused the complex articulations of the other entries and proposed instead an elementary form as a clear counterforce to the disorder of the urban periphery [Figg. 9-12].[52]

In an article published alongside Rossi's 'Nuovi problemi', and later reproduced in the book *La città territorio* (1964),[53] Aymonino elaborated on the term *centro direzionale*. Focusing on the adjective *direzionale*, he hinted at the existence of an objective wider than a mere functional mix in one location or under one roof. A *centro direzionale*, he argued, was a way of giving a new direction to a large-scale arrangement of the city, 'an urban landscape that is different, freer, and more complex than the one produced by the brutal indifference of real estate speculation'.[54] In order to achieve this goal, it had to be placed within the realm of architectural

47. Carlo Aymonino, 'Il sistema dei centri direzionali nella capitale', *Casabella*, no. 264 (1962), 24. My translation. See also Carlo Aymonino, *I centri direzionali* (Bari: De Donato, 1967).

48. *Casabella*, no. 278 (1963), 28. Translated by the author.

49. Giorgio Ciucci, 'L'architettura del fuoriscala in Canella e Rossi', in *Guido Canella*, 1931–2009, ed. Enrico Bordogna, Gentucca Canella, and Elvio Manganaro (Milano: Angeli, 2014), 69–73.

50. Banham, *Megastructure*, 68.

51. *Casabella*, no. 278 (1963): 48. Translated by the author.

52. Pier Vittorio Aureli, *The project of autonomy: politics and architecture within and against capitalism* (New York: Princeton Architectural Press, 2008), 66–69.

53. Carlo Aymonino et al., eds., *La città territorio: un esperimento didattico sul centro direzionale di Centocelle in Roma* (Bari: Leonardo da Vinci editrice, 1964).

54. Aymonino, 'Il sistema dei centri direzionali nella capitale', 24. Translated by the author.

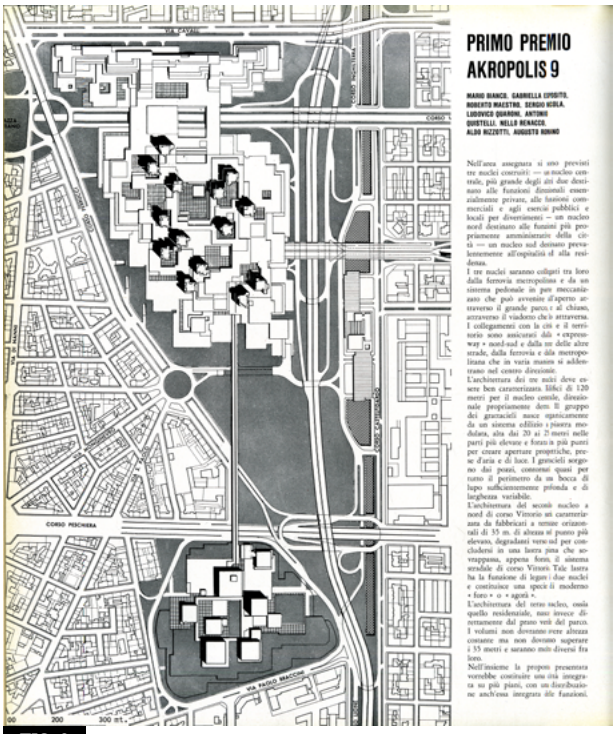

FIG. 9

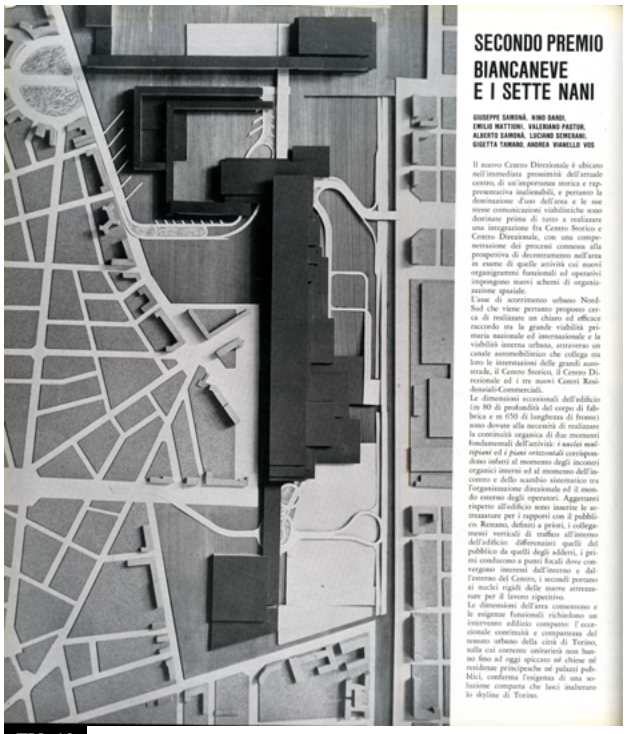

FIG. 10

FIG. 11

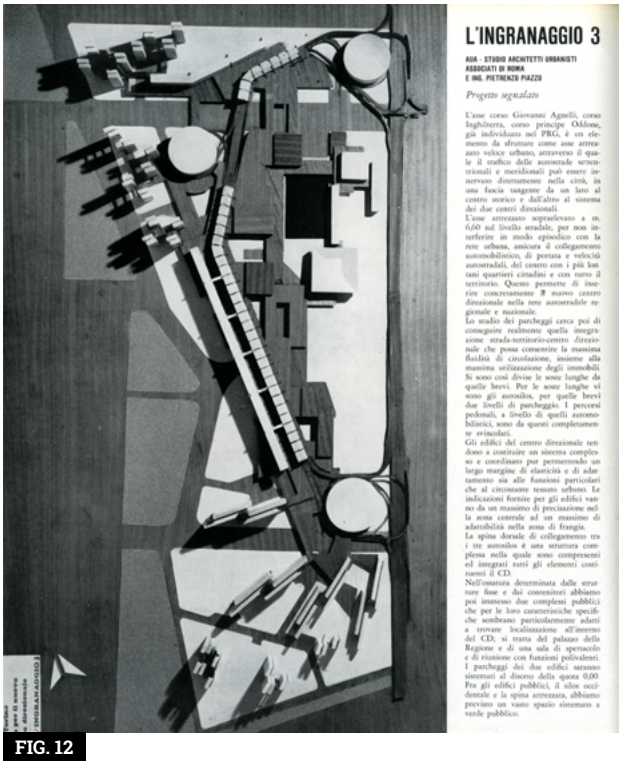

FIG. 12

experimentation, because what was needed were, as Rossi put it in clearly modernist tones, new forms that suited the new condition.[55] As such, a *centro direzionale* was a physical entity that could be comprehensively handled only by the architect and not by the urban strategist, the city administrator, the planner, or any of the other professional figures who competed for authorship in urban planning.[56]

Another exposition of the idea of a city territory saw Tafuri speak of a 'need of deploying completeness for a society that is increasingly incapable of carving its own space [while at the same time] offering

55. Rossi, 'Nuovi problemi'.

56. Ibid.

possibilities for freedom within such completeness'.[57] In yet another text – 'La città territorio: verso una nuova dimensione', authored with his office associates Giorgio Piccinato and Vieri Quilici – Tafuri elaborated on the idea of a possible dialogue between freedom and formal completeness. Illustrated with images of the components of a new urban dimension taken from around the Italian landscape – highways, airports, housing and industrial complexes – the article diagnosed the urban territory as the interplay of large 'containers' and communication infrastructures [Figg. 13-16].[58]

A contradictory entity located between determinacy and indeterminacy, this città territorio required the type of thinking that Quaroni had anticipated in his scheme for Barene di San Giuliano. But whereas Quaroni's project still focused on the theme of housing, città territorio required widening the gaze and considering the multiple dimensions of an affluent society and the processes of tertiarisation that were the motive force behind much of the new international architectural production popularised in magazines in the early 1960s.

FIG. 13 Cover page and inner pages from Casabella 270 (1972), 'City and Region'.

57. Manfredo Tafuri, 'Studi e ipotesi di lavoro per il sistema direzionale di Roma', *Casabella*, no. 264 (1962): 32. Translated by the author.

58. Luigi Piccinato, Vieri Quilici and Manfredo Tafuri, 'La città-territorio: verso una nuova dimensione', *Casabella*, no. 270 (1962): 16–25.

Tertiary city: Structure-and-infill or territorial dykes?

The definition of a form for a city whose population was increasingly composed of an expanded middle class of tertiary workers was at the core of some large-scale proposals that became popular in Italy in the early 1960s and which Banham later enlisted among the precursors of megastructure. Two in particular, Kenzo Tange's Tokyo Bay Plan, and Louis Kahn's Plan for the Centre of Philadelphia, found wide circulation in the pages of *Casabella* and other magazines.[59] Despite equal celebration of the two architects in Italy, which was marked by honorary degrees granted to both by the Politecnico di Milano in 1964, Tange's influence ultimately remained limited, as the organic metaphors associated with its metabolist follow-ups did not find as many supporters in Italy as Kahn's more abstract new monumentality. The gigantic park-and-ride silos structures that he drew around the edge of central Philadelphia

59. Marcello Pazzaglini, 'Il dibattito sulla città e sul territorio', in *Il dibattito architettonico in Italia*, 1945–1975, ed. Cina Conforto (Rome: Bulzoni, 1977), 59–62.


LA
CITTÀ
TERRITORIO
VERSO UNA NUOVA DIMENSIONE
GIORGIO PICCINATO
VIERI QUILICI
MANFREDO TAFURI

FIG. 14

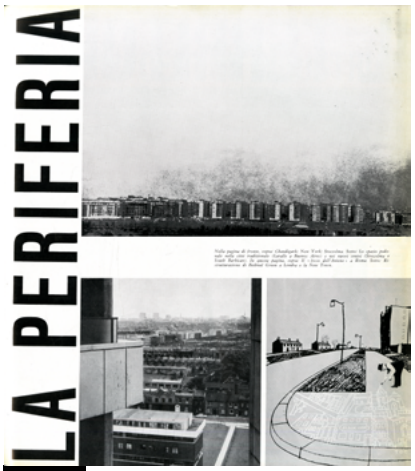

FIG. 15

FIG. 16

to mediate between the compact city and the city territory were more in tune with the theses of Rossi, Aymonino and Tafuri than was Tange's insistence on plug-in logics.

More generally, the victory of Kahn over Tange locates the Italian large-scale architectural proposals of the 1960s in a different intellectual zone to that of much megastructural production of that time – at least, as far as Banham's codification of megastructure is concerned. The augmented construction technologies and fixation with technical detailing, which resulted in the principle of a permanent structure with more temporary attachments that were manifest in the follow-ups to Tange by the Japanese metabolists, did not find fertile ground within an Italian architectural community that was already struggling to maintain a role in the face of a growing cohort of technocratic planners. Their retreat to formal investigation thus acted as a twofold antidote both to generic planning made of codes and schematic diagrams and to a mere celebration of the technological society. Focus was therefore put on the exemplary character of large-scale interventions – in particular public ones – in relation to a general reordering of territories and on their role as contrasting forces to private speculation. A gigantic *centro direzionale* was thus legitimised for its action as a territorial dyke capable both of controlling the chaotic spilling out of the city into the countryside and of reclaiming a directional role for the public authority (perhaps also for its capacity to allow for partnerships with private urban actors, but always in such a way as to subordinate the private to the public).

Given this widely shared objective, whether formal finiteness was to be the final answer remained an issue of debate among Italian architects. One of the initiators of the debate, Giuseppe Samonà, opposed the prospect of universal formal recipes. Speaking at a roundtable in Rome in 1962, he insisted that no model solutions existed and that the worst possible choice would be a reduction of a *centro direzionale* to a codified building type.[60] His son, Alberto, elaborated on the related risk of importing solutions from abroad. In another *Casabella* article – 'Alla ricerca di un metodo per la nuova dimensione' – he distanced himself from the expositions of *città territorio* provided by Tafuri and Aymonino, warning that it was too early to verify them because they excessively relied on the definition of some fixed cardinal elements. What such elements could be still needed wide discussion, and Samonà insisted that simply importing some from other contexts – such as the shopping centres and corporate office complexes of North America – was risky.[61] Pure formal experimentation was, therefore, required.

However, the inconsequential fate of the Turin competition, whose projects remained on paper, contributed to a growing sense of disillusionment about public authorities' actual ability to implement such heroic visions, and the euphoria with *città territorio* was put on hold only

60. Giuseppe Samonà, 'Relazione e conclusione al seminario su città-territorio', in *La città territorio*, ed. Carlo Aymonino et al., 91.

61. Alberto Samonà, 'Alla ricerca di un metodo per la nuova dimensione', *Casabella*, no. 277 (1963): 53. Translated by the author.

a few years after its first formulations. Alberto Samonà's article in 1963 was the last piece of writing that still positively framed the new urban dimension as a possible object of design. Importantly, his article played the role of a hinge between a first phase of discussion that had centred on the reordering of tertiary activities and an upcoming new stage that would focus on education and the design of universities. It embedded an argument that *città territorio* meant more than mere tertiary functions and, instead, also required rethinking the country's educational infrastructure. In a crucial passage he lamented the inadequacy with which the growing masses of tertiary workers were being handled as the subjects of education. While the industrial worker had been shaped through the creation of specific schooling – secondary technical schools in particular – similar educational pathways for the creation of a service worker were still to be defined. Alberto Samonà thus charged *centri direzionali* with an educational role, as the possible environments for the cultivation of tertiary man – a professional figure who was not so much a highly specialised worker but an individual capable of more general problem-solving. Temporarily pausing the first phase of the city territory discussion, his article hinted at a following chapter in the Italian architectural debate.

This new chapter was opened around 1967, when Italian architects joined the political debate to reform the national higher education system.[62] The implicit pedagogical charge of *centri direzionali* was thus unleashed in what became their heirs: *centri universitari*, as Giancarlo De Carlo named them in 1968.[63] Among the latter, the project for the University of Cagliari by father and son Samonà became the most paradigmatic example, one that summarised over ten years of reflections on the new urban dimension and, in turn, on the Italian approach to mega-architecture.

62. Zuddas, 'The idea of the università'; and Zuddas, 'L'università come principio insediativo', in Sabrina Puddu, Martino Tattara and Francesco Zuddas, *Territori della conoscenza: un progetto per Cagliari e la sua università* (Macerata: Quodlibet, 2017), 10–49.

63. Giancarlo De Carlo, ed., *Pianificazione e disegno delle università* (Rome: Edizioni universitarie italiane, 1968).

The Apollonian and the Dionysian

In an introductory essay to *L'unità architettura urbanistica* – a collection of his main writings published in 1971 – Samonà summarised his lifetime's intellectual mission.[64] Together with the coeval text that accompanied the competition entry for the University of Cagliari, it offers the key to reading the project's megastructural rationale as an ideal conclusion of a research trajectory whose first comprehensive formulation had been his 1959 book *L'urbanistica e l'avvenire della città negli stati europei*. Rhetorical as the title of the 1971 book was, the unity of architectural urbanism reflected Samonà's central concern: how to find a new synthesis between two disciplines that had increasingly pulled apart to become separate galaxies throughout the twentieth century – or, to put it in another way, how to resist technocratic planning based on parameters and numbers and to claim the fundamental role of architectural form as an agent of urban transformation.

64. Giuseppe Samonà, 'Introduzione', in *L'unità architettura urbanistica* (Milan: Franco Angeli, 1975), 9–50.

In the 1971 essay, Samonà explained how, until the 1930s, architecture and urbanism still formed an indissoluble equation kept together by the modernist architect-urbanist. The two still participated in the dialectical relationship summarised by Le Corbusier's notion that 'architecture proceeds from the inside to the outside and is resolved into urbanism, as a figurative solution'.[65] These latter words were uttered by Samonà on the occasion of a retrospective exhibition on Le Corbusier held in 1963 at the Palazzo Strozzi in Florence, which offered him the occasion to look back at the mastermind of modernism while others were directing most of their attention to a newer generation of late modernists (as reflected by honorary degrees awarded to Kahn and Tange a year later). It has been noted that both in his writing and his projects Samonà engaged in a discussion in *absentia* with Le Corbusier,[66] one that aimed to reclaim the 'idea of extending to the city the same reasons that justify a new architecture',[67] as opposed to the Swiss architect's approach to the delocalising practices of a garden city model that Samonà had attacked in his 1959 book.[68]

In 1971, Samonà further clarified that a temporal disjunction in the project of the city had been promoted since the early postwar years, according to which architectural specification was meant to follow – and only to follow – a preliminary moment of urbanistic decision-making. He went on to link this disjunction to the taking of command of scientific thought in modernity, which led to a fundamental switch from a direct and experiential relationship between humans and reality to the *in vitro* study of reality guided by science.[69] Samonà was observing the demise of a sensorial relationship between humans and the material world of objects, and the shift to a 'super-historical reality grounded on the super-experiences of a world oriented to the future of scientific development'.[70] Two different conceptions of history had thus been separated: an atemporal history – the history of the scientific fact whose validity is irrespective of time – and a history of the present – the only possible history of the built environment that, while grounded on the past and oriented to survive in the future, can exist solely in the present.

In the same years as Samonà, other thinkers attempted a critique and theorisation of advanced scientific and technological societies and followed similar arguments to those of the Italian architect. Among them, Henri Lefebvre initiated an influential line of urbanistic thinking that re-evaluated the relationship between humans and the built environment.[71] His approach favoured a bottom-up reappropriation and indeed later lent itself to the development of arguments about participatory planning and self-managed urbanism. Conversely, although claiming that the architect could (and should) sympathise with the social demands of the poorer strata of society, Samonà viewed participatory planning as the wrong answer because it put further pressure on the less privileged classes to define the means of their own social redemption.[72] He firmly believed

65. Giuseppe Samonà, 'Relazione ufficiale in occasione della inaugurazione della mostra dell'opera di Le Corbusier', in *L'unità architettura urbanistica*, 100. First published in *Casabella*, no. 274 (1963).

66. Pasquale Lovero, 'La disseminazione didattica', in Giuseppe Samonà, *L'unità Architettura Urbanistica*, 580.

67. Samonà, 'Relazione ufficiale', 99.

68. Samonà, 'Introduzione', 103.

69. Ibid., 27.

70. Ibid.

71. Henri Lefebvre, *Le droit a la ville* (Paris: Anthropos, 1968); English translation: 'The right to the city' in Henri Lefebvre, *Writings on cities* (Oxford: Blackwell, 1996).

72. Samonà, 'Introduzione', 39.

in the possibilities of turning the modern scientific mentality – and the top-down practice of a scientific/rationalising project – to an advantageous role in the direction of urbanisation. However, his interest in the scientific is not to be misunderstood as an alternative version of the celebration of technology by canonical megastructuralists. For Samonà, the scientific was a necessary contrasting force to the sensorial – it was *the* force that guaranteed the actual survival of the sensorial. So, whereas Lefebvre would have welcomed, *tout court*, a stop to top-down social engineering as it took form in welfare state planning – from housing estates to university campuses – Samonà believed these to be the last hope for society to retain some direct relationship with the built environment.

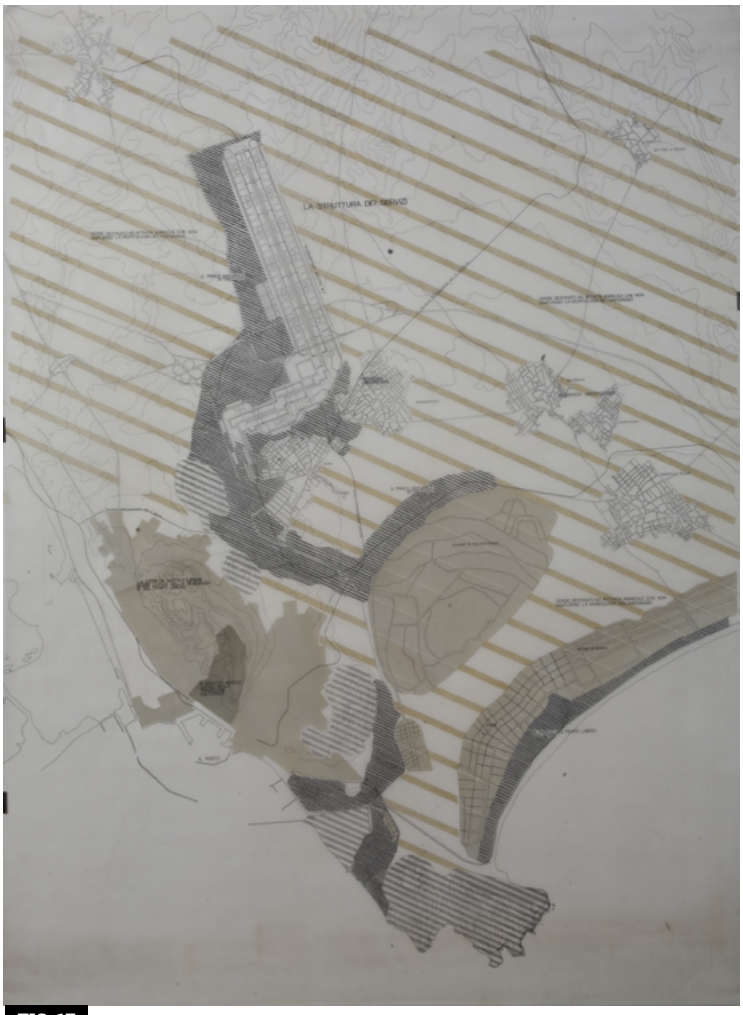

FIG. 17 Giuseppe Samonà et al. Competition project for the University of Cagliari (1971–72). General plan. (CSAC Parma, Archivio Samonà)

Samonà envisaged, therefore, urban territory as a coexistence of opposites. On the one side was the city grown through bottom-up, private forces, which included speculative construction as well as all the forms of more or less legal individual interventions. On the other was the public authority, whose delicate role was to oversee this situation in such a way as to allow for its survival within reasonable limits. He located himself, as an architect, on the latter side, acting on behalf of public authority and pursuing the role of providing exemplary – formal – rational spaces capable of countering – but not eradicating – the continuing growth of the city via private intervention. Manfredo Tafuri linked Samonà's search for a difficult territorial balance to the influence of Nietzsche's *The birth of tragedy*, noting that:

A totalising relationship between the being of things and their collective experience was, for him, the essence of the Apollonian. Thus, the real tragedy becomes the impossible retrieval of that relationship; the conscience of an impossible return to that synthesis. […] Therefore, Samonà opts to live a state of suspension between the contemplation of a totality rejected by history and being in the present; he acknowledges the relativity (and misery) of such present.[73]

A new synthesis between the scientific and the empirical/sensorial could not be achieved from within a single intervention, no matter how big, as it would only reproduce the anachronistic myth of the harmonious community falsely promoted by the garden city ideology, as well as by the

73. Manfredo Tafuri, 'Gli anni dell'attesa: 1922–1945', in *Giuseppe Samonà 1923–1975: cinquant'anni di architetture* (Rome: Officina, 1975), 14. Translated by the author.

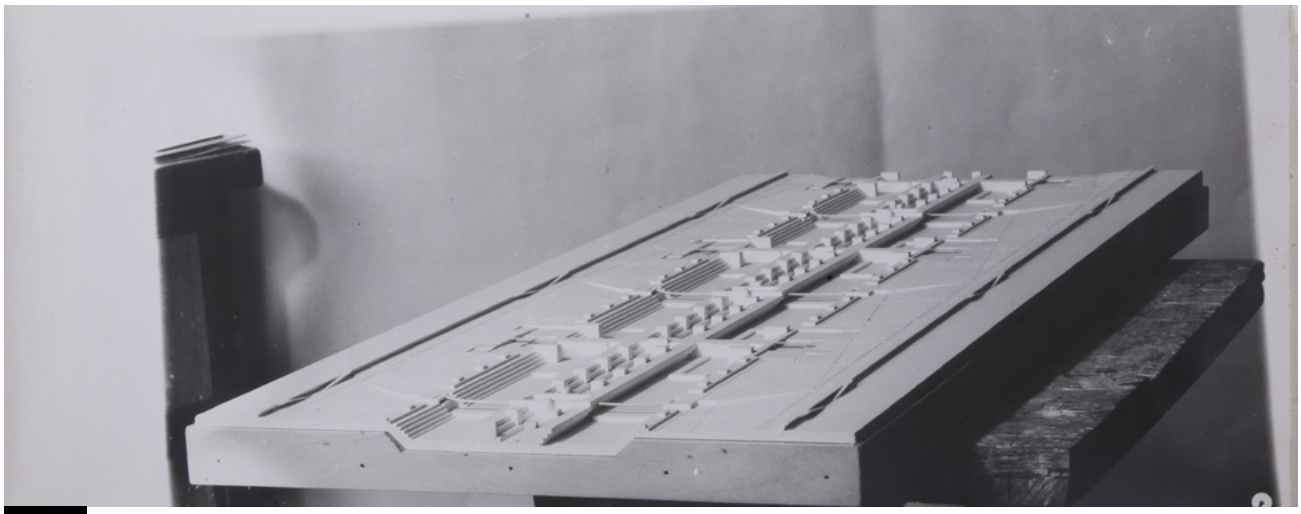

FIG. 18 Giuseppe Samonà et al. Competition project for the University of Cagliari (1971–72). Photo of model. (CSAC Parma, Archivio Samonà)

walking city of Archigram. Synthesis could only be found on a wider scale, its image being that of a vast territory shaped by the abrupt juxtaposition of exemplary, 'scientific' (Apollonian) pockets of order within a field of disparate (Dionysian) forces of private development. This territory of opposites is what Samonà's gigantic bas-relief sculpted on the valleys outside Cagliari aimed to achieve: a scientifically defined, totally rational exemplar of order contrasting – but also accepting – the continuing growth of the city through forces that could not be stopped [Figg. 17-18].

Conclusion

Since the 1959 competition for Barene di San Giuliano, Italian architecture had taken on a new dimension that placed it in the forefront of megalomania for the following two decades. A strong figurative objective in the monumental crescent structures drawn by Quaroni for that competition overshadowed those other conflicts between 'design and spontaneity, the large and the small, the permanent and the transient'[74] that Banham would indicate as haunting the dreams of the international megastructuralists.

Figurative anxiety permeated Italian architectural discourse, and it was perhaps most clearly expressed by Vittorio Gregotti in his book *Il territorio dell'architettura* – the other fundamental marker of the Italian contribution to a theory of architecture and the city published in 1966, although less internationally celebrated than Aldo Rossi's *The architecture of the city*. Gregotti discussed the goal of an architect as being the 'invention of landscape as a whole', arguing that the built world could only be interpreted as 'matter operated upon by architecture'.[75] A fundamental corollary to this posited that, while large-size architectural interventions can reveal this definition of the built environment in a clearer way – hence Gregotti's own predilection for mega-projects as test beds of theory in the 1970s[76] – size ultimately did not matter too much because any formal

74. Banham, *Megastructure*, 10.

75. Vittorio Gregotti, *Il territorio dell'architettura* (Milan: Feltrinelli, 1966), 82–83.

76. Manfredo Tafuri, *Vittorio Gregotti: progetti e architetture* (Milan: Electa, 1982); Joseph Rykwert, *Gregotti Associati* (Milan: Rizzoli, 1995).

articulation had an impact on the *ambiente totale* (total environment). The result, Gregotti claimed, was very different 'from those practices that for a long time have characterised urbanism as mere enlargement of architecture'.[77]

77. Gregotti, *Il territorio dell'architettura*, 83.

Gregotti's words help prune the confusion that necessarily arises when one considers the project by Giuseppe Samonà for the University of Cagliari, together with the following statement, also by Samonà, from ten years earlier: 'I believe any idea of gigantic spatial parameters to be absolutely out of question'.[78] Had Samonà, when approaching the Cagliari brief, suddenly accepted the need for large architectural size? The answer is more complex than a simple yes or no; rather, it is located in the amalgam of ideology and figurative anxiety that had as its background the formulation of an idea of tertiary society for which architects could still play a relevant role and not be sidelined as mere detailers of decisions taken by planners.

78. Samonà, 'Relazione e conclusione', 91.

Samonà's project was defensive in a twofold sense: urbanistically, it aimed at avoiding uncontrolled urbanisation of the megalopolitan type for an Italian landscape that was still not as excessively compromised as elsewhere; on a more personal level, it was a stronghold against planners taking command of architects that tried to disempower the former by blurring their field of action through – as Samonà put it – a new model that 'could no longer be divided into traditional typologies distinguishing a domain composed by the general schemes of the individual buildings from that composed by schemes for the urbanistic configuration.'[79]

79. Samonà, 'Introduzione', 43.

Samonà's project for Cagliari is the locus where a general Italian approach to the architecture of the city in the 1960s encounters the personal drama of its author entering the 1970s. The project should be connected to a series of realised or unrealised proposals by him and his collaborators, which argued for the fundamental dialectic between architecture and urbanism. These projects span four decades and Italy from north to south, from Turin's *centro direzionale* of 1962 to the competition for a *metropoli sullo stretto* (1969) that aimed to reconfigure the geography of the Calabria–Sicily strait as a service territory, all the way back to Samonà's first important professional success at the 1930 competition for the reconfiguration of Messina's *palazzata*. The latter, a large formal redefinition of the edge of the city along the waterfront, already established the relation and unity between architectural form and urbanistic plan as a central concern for its author. Perhaps as a coincidence, forty years later Samonà might have found an echo of this concern in a similar but much older *palazzata* in Cagliari that had resulted from a general urbanistic reconfiguration of the city following the demolition of its fortifications in the second half of the nineteenth century. The *palazzata* in Cagliari shows the coexistence of differentiation within repetition, with the buildings along the linear complex differing from

one another yet clearly belonging to a family sharing a common DNA[80]. It was the latter quality – the interplay of totality and variety – that the many megastructuralists of the 1960s aimed to replicate. A fundamental postulate for successfully achieving this replication was the existence of a single client, either public or private, with enough political and economic power to ensure the correct implementation of the project. The spectre of the interrupted project – of a tragic *incompiuto* – thus haunted megastructure from the outset.

In Cagliari, Samonà could not avoid also being haunted by the same ghost. His project remains problematically suspended between being an exemplar that necessitates the completeness of its object in order to be exemplary, and a large settlement that can be implemented over time while still retaining coherence at each stage of its development, yet it remains the case that it should be considered both the epilogue of his lifelong career and the signal of a pivotal moment in recent Italian architectural and urbanistic history. The competition for Cagliari came at the end of Samonà's three-decade reign over IUAV (he died two years later, in 1973) and it marks the definitive schism between a group of architect–urbanists still arguing for Samonà's unity of the two realms (the Gruppo Architettura enlisting Carlo Aymonino, Aldo Rossi, Luciano Semerani and others)[81] and a new, independent degree programme in planning (*Urbanistica*) created in 1970 and directed by Giovanni Astengo.[82] The expanding role played in the late 1960s by Manfredo Tafuri in promoting a conception of non-operative history – that is, history not instrumentally subsumed within design prerogatives – further added to the separation of different realms of the project, which eventually resulted in a tripartite split of Samonà's unity into architecture, urban planning and history.

Seen against the mounting shadow of this schism, the project for the University of Cagliari is charged with immense symbolism as the last bastion of a period of Italian architectural thinking about the city that refused both the technological euphoria of canonical megastructuralism and the paralysing action of an upcoming spreadsheet urbanism. Dwelling inside its defensive fortress against technocracy and technology, Samonà's university, although not the last piece of large-scale architectural heroism to be produced in Italy, somehow sealed the experience of Italian mega-architecture as it had evolved over a decade, stamping it with the label of an eccentric outsider willing to confuse and destabilise the official historiography of megastructure.

80. Francesco Tentori, *I Samonà: fusioni tra architettura e urbanistica* (Turin: Testo & immagine, 1996).

81. Claudio Aldegheri and Maurizio Sabini, eds., *Per un'idea di città: la ricerca del Gruppo Architettura a Venezia* (1968–1974) (Venice: Cluva, 1985).

82. For a series of readings of Samonà's role at IUAV, see Giovanni Marras and Marco Pogačnik, eds., *Giuseppe Samonà e la scuola di architettura* (Venice and Padua: Il poligrafo, 2006).

Megastructures: a great-size solution for affordable housing. The case study of Rome.

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ABSTRACT

During the 70's and 80's, affordable housing production in Europe faced the huge emergency caused by rising urbanization. In suburban areas of European main cities, megastructures appeared, drawing visible marks in urban fabric. Megastructures were planned to synthesize residential functions and all existing services of traditional city in unique buildings. Nowadays, these buildings are affected by bad physical conditions and they are no longer able to satisfy the needs of the contemporary demand. The proposed paper investigates the genesis of housing megastructures with particular regards to the Italian case and council housing districts realized in Rome within the 1st public plan for council and affordable housing (1964), an original plan for the settlement of 700,000 inhabitants. A focus will be proposed concerning the differences between megastructures and traditional big buildings and the main connections between the spread of great-size buildings and the industrialization and automatization of construction techniques. An insight about possible future regenerations intervention is suggested.

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KEYWORDS
Megastructures; Council housing; Great-size Intervention; Regeneration; Existing Buildings

Introduction

Large-scale buildings appeared in Europe after the Second World War in the late 1950s as the result of the achievements of affordable housing research developed in the first half of the century. Rationalism deeply focused on minimal surfaces and standards. At the end of the First World War, important researchers began to investigate new solutions to ensure minimum requirements for low-cost housing[1]. The work of Gropius, Le Corbusier and not least Klein was aimed at introducing, in housing design, dimensional solutions that would guarantee the individual and the family satisfaction of the minimum needs and not exclusively the respect of hygiene standards.

The introduction of concepts such as the *existenzminimum* was the driving force for the diffusion of large-size complexes. Given the minimum living space for the satisfaction of human needs, the cell-unit could be repeated on a large scale, in a socialist vision of the world in which all men are equal without taking into account their social class. This approach presented by the rationalist movement allowed the introduction of industrialization in housing construction, according to the logic of the maximum result with the minimum economic effort[2].

In this cultural context, large-scale interventions started spreading. The term "*grand ensemble*" appeared for the first in 1935 in an article by the urbanist Maurice Rotival[3] published in "*L'Architecture d'aujourd'hui*" in which the concept of the *grand ensemble* is proposed to contrast the "*lèpre pavillonaire*" of the suburban traditional sprawl. From its origin, the great dimension approach is conceived as a way to provide respectable shelter to working classes and at the same time to guarantee a well-formed and structured urban development. Particularly interesting on the phenomenon of the French *grands ensembles* are the writings of A. Samonà[4].

A universal definition for "large-scale complex", or better with the French term *grand ensemble*, does not exist. There is not a legal definition and there is not an official category for this sort of urban development. The term does not define a manner of construction but rather a shape or a kind of landscape characterized by towers and lines in suburban areas[5] .

In 1959, the geographer Philippe Pinchemel[6] defined the *grands ensembles* as large-scale constructions with several thousands of apartments inserted in balanced and complete residential complexes. In France in 1959 to define a ZUP[7], the minimum threshold of 500 dwellings was defined. The threshold of 500 dwellings is considered a distinction between a large and a non-large housing settlement.

However, the size of the settlement cannot be the only factor for such a clear distinction between large and non-large housing. Given the ambiguity of the definition, Vieillard-Baron in his text finds five criteria for

1. Baffa Rivolta, Matilde and Augusto Rossari, eds. *Alexander Klein, Lo studio delle piante e la progettazione degli spazi negli alloggi minimi. Scritti e progetti dal 1906 al 1957* (Milano: Gabriele Mazzotta editore, 1975).

2. Renato De Fusco, *Storia dell'architettura contemporanea* (Napoli: Laterza,1982).

3. Marcel Rotival, 'Les Grands Ensembles', *L'Architecture d'aujourd'hui*, no. 6 (1935): 57–72.

4. Alberto Samonà, *La nuova dimensione urbana in Francia. I grands ensambles e la modificazione della forma della città* (Padova: Marsilio Editori, 1966);
Alberto Samonà, 'L'esperienza dei *grands ensambles* e il rinnovamento della struttura urbana', *Zodiac*, no. 13 (1964).

5. Hervè Vieillard-Baron, *Sur l'origine des grands ensemble,* in *Le monde des grands ensembles,* edited by Frédéric Dufaux, Annie Fourcaut (Paris: éditions Créaphis, 2004).

6. Philippe Pinchemel, Revue Logement n° 115, octobre 1959.

7. Zone à urbaniser en priorité.

defining a *grand ensemble*:

- the sharp break with the nearby urban fabric;
- the shape of constructions (*tours et barres*);
- the size (at least 500 accommodations);
- the method of financing with public partnership;
- the use of repeated construction procedures and the inclusion in the buildings of services and shops.

The definition of megastructures

Bars connected to towers, terraced houses merged into unitary complexes with multi-storey buildings, lines with concave or convex shapes, paths for pedestrian mobility (such as bridges or balconies) hosting residences and services: the occasion of the great size was an incentive for many designers to propose innovative typological solutions. Once the minimal residential cell (typological unit[8]) is defined, innovative solutions come from their varied aggregations.

The concept of housing becomes wider and complex: through impact solutions, architects tried to provide in unitary buildings all the functions to satisfy inhabitant needs. In this way, residential megastructures were born.

In the wake of this international great size fever, which arose in the first half of the '50s with interesting housing solutions especially in France and Great Britain, a series of residential megastructures began to be realized in Europe. During the 1960s with the definition of new settlements in suburban areas of big cities, architects and urban planners proposed interesting and disruptive housing solutions.

Important efforts were produced to design networks linking humans, technology, infrastructures and environment[9]. Several urban layouts appeared based on large-scale design and interactions between functions, structures and infrastructures: for Paris, Yona Friedman's Spatial City (1960) and Paul Maymont's Circular City (1965); for Tokyo, Kenzo Tange's Tokyo Bay project (1960) and Buckminster Fuller's Tetrahedral City (1968); for London, Archigram's Plug-In City (1964)[10].

The designers proved to be sensitive to the theme of the large dimension and proposed megastructures. On the contrary, many designers considered megastructures a complete social failure and started re-proposing in opposition traditional typological solutions, although marked by the great sign.

Within the definition of large dimension settlements, therefore, a first major distinction can be made: (i) large-scale interventions characterized by residential megastructures; (ii) large-scale interventions characterized

8. For typological unit is meant a group of flats (2 or 3 ... 8) and shared spaces (landings and stairs) composing the smallest autonomous unit in which a building can be subdivided (Lorenzo Diana, *Metodo CRI_TRA: un metodo di valutazione comparativa delle criticità e della trasformabilità edilizia del patrimonio residenziale pubblico in Italia* In *L' Analisi Multicriteri tra valutazione e decisione,* edited by Enrico Fattinnanzi and Giulio Mondini (Roma: DEI-Tipografia del Genio Civile, 2015); Enrico Fattinnanzi, 'La valutazione della qualità e dei costi nei progetti residenziali. Il brevetto SISCo', *Valori e valutazioni*, A. 5, no. 7-8 (2011)).

9. Larry Busbea,*Topologies: the Urban Utopia in France, 1960-1970* (Cambridge: MIT Press, 2007).

10. Ariane Lourie Harrison, *Architectural Theories of the Environment: Posthuman Territory* (London: Routledge, 2013).

by traditional types (simple multi-story complexes, towers, terraced houses).

It is difficult to give a univocal definition to the term "megastructure". Definitively univocal, however, is its precursor: Fort Empereur of Le Corbusier [Fig. 1]. Present in the Plan of Algiers of 1931, Fort Empereur shows an unlimited length and the clear distinction between the main permanent structure and the single residences, arranged according to the individual needs[11].

11. Reyner Banham, *Megastructure: Urban Futures of the Recent Past* (New York: Harper & Row Publishers, 1976).

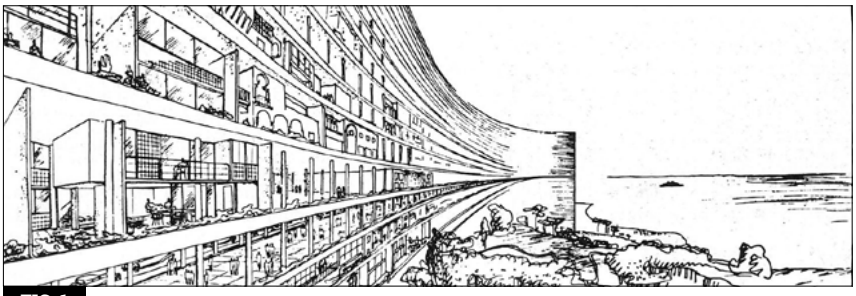


FIG. 1 Fort Empereur (Le Corbusier) present in the plan for Algiers of 1931 [Picture taken from: https://adt1314.wordpress.com/page/16/]

Fumihiko Maki, in Investigations in Collective Form, defined the megastructure as: "... a large frame in which all the functions of a city or part of a city are housed. It has been made possible by present day technology. In a sense, it is a man-made feature of the landscape. It is like the great hill on which Italian towns were built"[12].

In 1968, Ralph Wilcoxon (urban planning librarian at Berkeley's College of Environmental Design) proposed an introduction to his Megastructure Bibliography that defined megastructure:

- "... not only a structure of great size, but ... also a structure which is frequently:
- constructed of modular units;
- capable of great or even "unlimited" extension;
- a structural framework into which smaller structural units (for example, rooms, houses or other small buildings of other sort) can be built - or even "plugged-in" or "clipped-on" - after having been prefabricated elsewhere;
- a structural framework expected to have a useful life much longer than that of the smaller units which it might support"[13].

12. Fumihiko Maki, *Investigations in Collective Form* (St. Louis: Washington University, School of Architecture, a special publication book 2, 1964).

13. Ralph Wilcoxen, *A short bibliography on megastructures* (Monticello, Ill.: Council of Planning Librarians, Exchange bibliography 66, 1968).

Among the different types of megastructures, residential megastructures result to be particularly interesting. Given the assumption that in a megastructure more functions are provided within a single complex, it must be underlined that isolating and separating residential megastructures from other kind of megastructures is difficult and fundamentally wrong.

In this way, a residential megastructure is considered: a particular sub-class of megastructures where the residential function is prevalent; a kind of suburban development in antithesis to the traditional sprawl; a housing settlement with a social and popular connotation; a building with a strong functional mix. Several recurring elements distinguish residential megastructures: the multi-functionality; the monumentality of the structural elements; the possibility of successive extensions; the

double level of fixed structure on a large scale and minor housing units.

The Great Britain was a country where many residential megastructures were built. However, the trend towards large size, both in Britain and in other European countries, had always influenced the history of social housing. The concept of vast residential block has become almost a symbolic guarantee of the good intention of "giving houses to the people"[14]

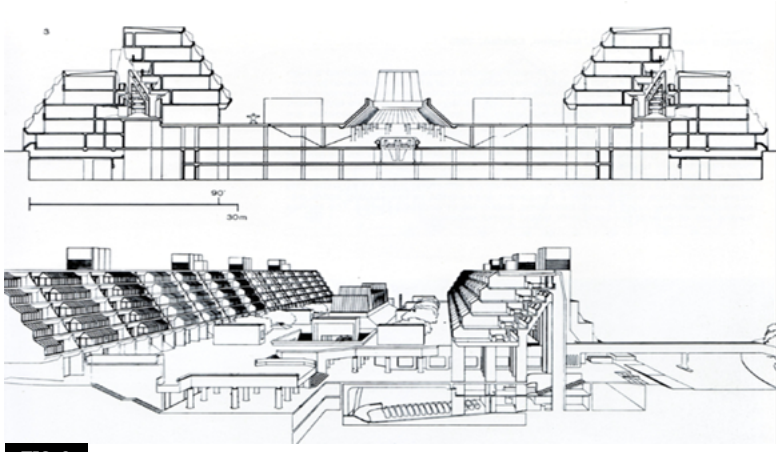


FIG. 2 Brunswick Center in Bloomsbury (London) – section [Picture taken from: https://www.pinterest.ch/pin/697917273479532929/]

Some examples of residential megastructures in England are emblematic.

In 1964, Sir Leslie Martin and Patrick Hodgkinson designed the Brunswick Center in Bloomsbury (London – [Fig. 2]). The Brunswick Center was defined as a megastructure right from the start: perhaps the first example of urban megastructure, a building that is a city instead of to be simply one component of a city[15]. It appears a megastructure even based on a merely visual criterion. It has two back-to-back *terrassenhauser* sections, facing one of the sides of the lot. The A-frames that support them are asymmetric: not only one of the legs of each frame is vertical but also the terraces are arranged asymmetrically. The terraces of the external facades begin and end two floors lower than those of the internal facades. For eight bays of the external east façade the terraces are completely abolished, and the vertical pillars form a gigantic portico through which it is possible to pass from the external public space to the internal space of the Brunswick Square. One of the main coincidences with the megastructure principles is the fact that the existing building is expandable if needed. The tribute to Antonio Sant'Elia [Fig. 3], the foremost ancestor of megastructures, is clear: the *terrassenhauser* sections above the public access spaces inside the A-frame; the twin towers that flank the entrances and stairways; the tapering of the surfaces around these entrances; the horizontal lines fluted in the side walls. Even the tapering of the vertical pillars in the open portico appears unequivocally

14. **Banham,** *Megastructure.*

15. **Renato Crosby, "Brunswick Center, Bloomsbury, London. Criticism by Theo Crosby."** *Architectural Review* **no. 908, vo. 152(1972): 211-214**

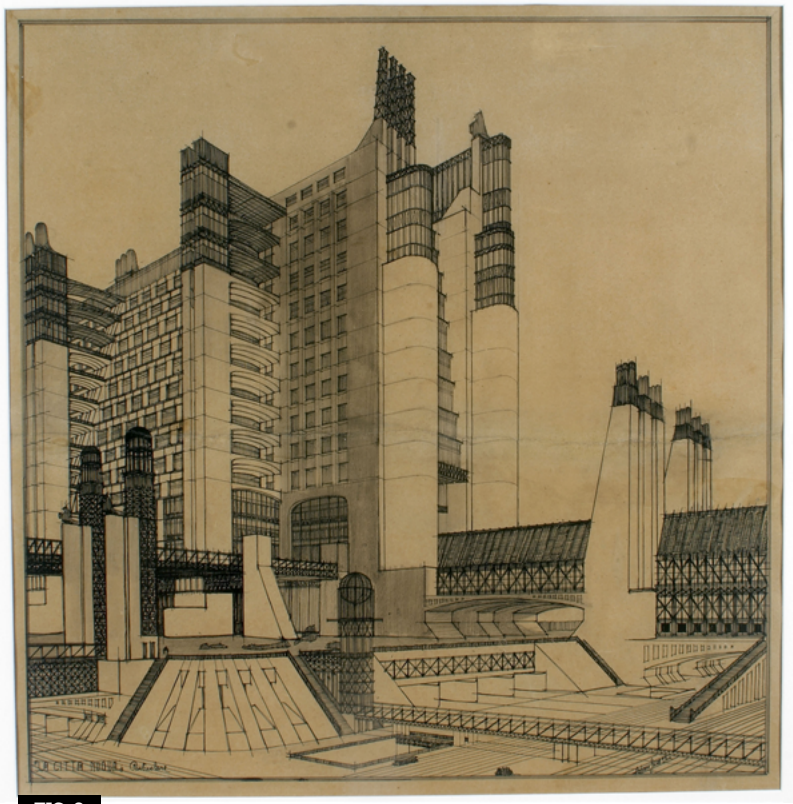


FIG. 3 Antonio Sant'Elia, particular of the series La città Nuova, 1914 [Picture taken from: HYPERLINK "https://it.wikipedia.org/wiki/Antonio_San%27Elia" \l "/media/File:Casa_Sant%27Elia.jpg" https://it.wikipedia.org/wiki/Antonio_San%27Elia#/media/File:Casa_Sant%27Elia.jpg]

futurist[16].

In 1963, Chamberlin Powell and Bon designed the Barbican District in the City of London **[Fig. 4]** including 2,000 apartments and multiple functions. Functionally it looks like a megastructure but the vision is less "megastructural" than the contemporary Park Hill in Sheffield **[Fig. 5]**. In the construction details, Barbican District recalls the romantic classicism of the last Le Corbusier: the concrete is left *brut* giving a general atmosphere of magnificent ruins. The general conception is based on a pair of long slabs raised on *piloties* above the parking spots (like *unité d'habitation* of Le Corbusier). These slabs are disposed along three sides of a square, to evoke memories of classic Georgian London urban planning procedures. For many years it was called "the damn megastructure" because incomplete[17].

FIG. 4 Barbican District in the City of London [Picture taken from: http://www.london-epc.co.uk/wp-content/uploads/2014/11/barbican.jpg]

FIG. 5 Park Hill in Sheffield (Jack Lynn and Ivor Smith) [Picture taken from: https://www.citymetric.com/fabric/massive-cliff-windows-regeneration-sheffield-s-park-hill-estate-3462, Image: Hawkins\Brown]

FIG. 6 A scene from the movie "A clockwork Orange" by Stanley Kubrick set in Thamesmead [Picture taken from: https://umd.studio/journal/thamesmead/]

The Thamesmead neighborhood, in the suburbs of London, was a complete New Town that looked like a single great-size building of several miles. It can be considered as a typical residential megastructure, not even bad at first sight with *terrassenhauser* on water, shops, schools, and a health center all accessible through varied network of pedestrian coverings[18]. When Stanley Kubrick wanted to conjure up an urban dystopia for his film "A Clockwork Orange" **[Fig. 6]**, the concrete tower blocks, artificial lakes and elevated walkways of Thamesmead provided the futuristic backdrop[19].The Alexandra Road complex **[Fig. 7]** in the Borough of Camden in North West London, designed by Neave Brown, tends to use the term "megastructure" in a remarkably narrow and frankly hermetic sense. Paradigm of geometric simplicity among other megastructures: standard *terrasenhausen* section, with inward-facing terraces and railroad-facing shoulders. The 7-storey section is repeated without any variation for the 1,700 meters of the entire block, with the only variation of the slight curvature. The Alexandra Road complex was accused to be "inhumanly boring" as well as the district of Clipstone Street in London (by Mike Gold, Studio Armstrong and McManus), product of the so-called "cold school"[20].

16. Banham, *Megastructure*

17. *Ibid.*

18. *Ibid.*

19. Joanne O'Connor, 'From Kubrick's dystopia to creative hub – London's new town is reborn'.*The Guardian online*. 2017. (Source: https://www.theguardian.com/society/2017/may/13/thamesmead-regeneration-kubrick-dystopia-creative-hub-clockwork-orange).

20. Banham, *Megastructure.*

FIG. 7 Alexandra Road, Camden (North London) [Picture taken from: http://www.panoramio.com/photo/16965970]

FIG. 8 Robin Hood garden (Alison and Peter Smithson) [Picture taken from: http://www.justurbanism.com/tag/london/]

In London, another intervention of a brutal nature that can be considered for the typological mix as a megastructure is the Robin Hood Garden **[Fig. 8]** by Alison and Peter Smithson.

In the other side of the world, around 1960, the launch of the Metabolic manifesto[21] was an attempt to present megastructures as a Japanese contribution to the modern architecture, marking the independence and maturity of Japanese architecture. The Metabolism tried to fuse the great size dimension approach of megastructures with the continuous transformation of cities as active biological organisms. Urban Metabolic utopias were based on the concept of "city as a process" in opposition to modernist ideas of the "city design"[22]. Kenzo Tange best exhibited the ideals of the Metabolist manifesto in the 1960 Tokyo Bay project. The project is based on the idea that the standard modern city is victim of the sprawl. Tokyo has no more free land to exploit; therefore new building plots must be artificially created on the sea with a process of interlocking loops expanding across the bay. Following the principles of megastructures, fixed monumental structures are the pattern of the intervention while small units, dedicated especially to housing, have a temporary role and can be continuously regenerated. The basic structure has a curved A-section with not aligned units stacked on top of each other **[Fig. 8a]**[23]. Metabolic architectures appear powerful, imposing, brutalist, irregular, bringing out the use of reinforced concrete in a monumental and massive way. The Metabolism, despite its strong iconographic charge, remained more a theoretical and symbolic utopia rather than a practical movement. Only some individual buildings were built all around the Japan. A clear symbol of the Metabolic architecture is the Nakagin Capsule Tower, designed by Kisho Kurokawa in 1970 **[Fig. 8b]**.

For the definition of residential megastructures, as done previously for large-scale settlements, we try to establish a conventional definition.

21. Launched by a group of young architects including Fumihiko Maki

22. Zhongjie Lin, *Kenzo Tange and the Metabolist Movement: Urban Utopias of Modern Japan* (London; New York: Routledge, 2010).

23. Banham, *Megastructure.*

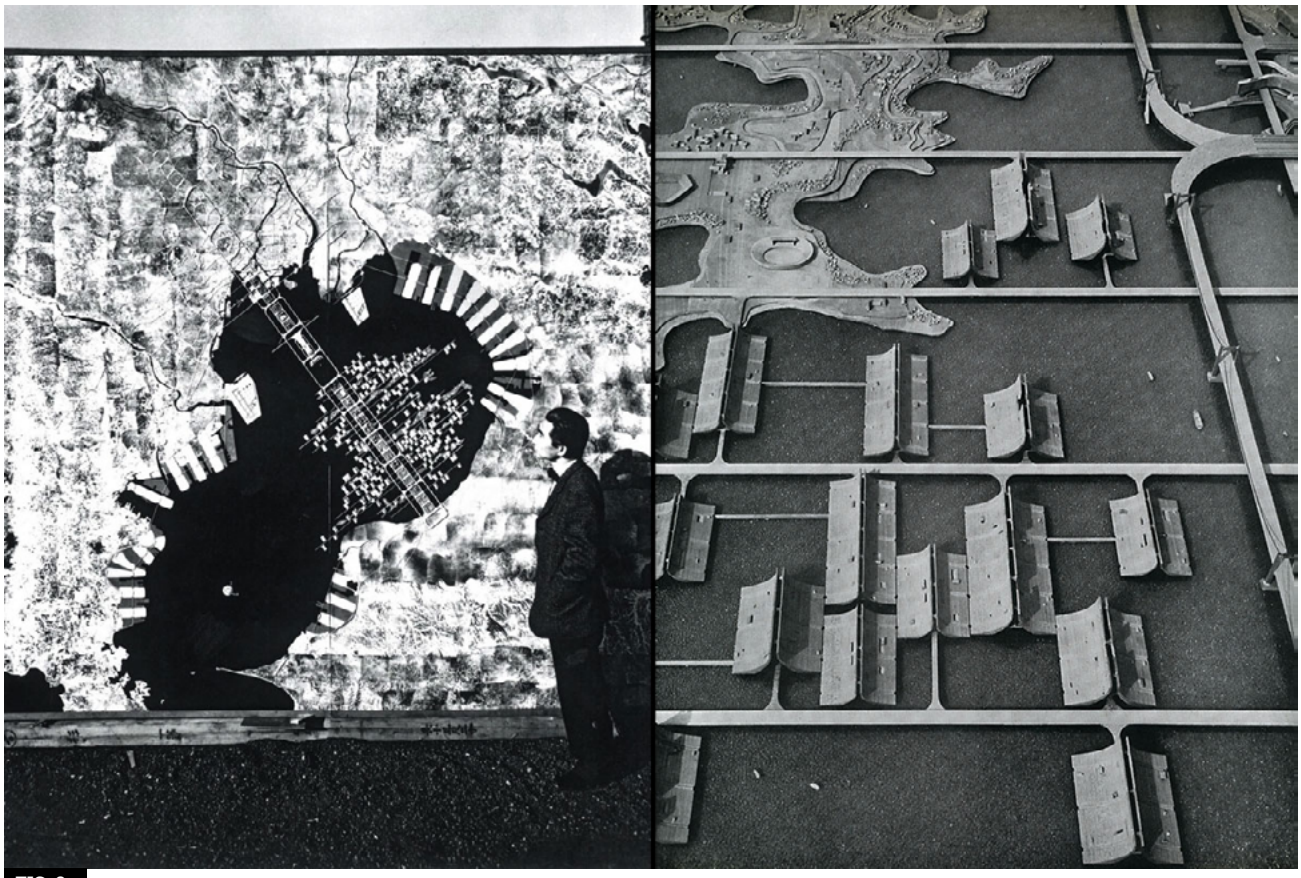


FIG. 8a Kenzo Tange's Tokyo Bay project (1960) [Picture taken from: http://archeyes.com/plan-tokyo-1960-kenzo-tange/]

Large-scale complexes are considered as residential megastructures if, within high-density unitary buildings mainly for residential use, there is:

- a functional mix between spaces for flats, spaces for commercial activities, spaces for services to people and spaces for collective activities;
- a clear separation between the flows linked to vehicular and pedestrian mobility, with intersections between the two (eg the case of bridge buildings);
- an important presence of common spaces, open or closed, with a clear shape identified in the overall organism;
- a modular and repetitive housing system;
- an integration between different typological units;
- a monumental structural framework and a housing system at smaller scale;
- a relationship with the orography of the site in which they are inserted.

Several residential megastructure arose in various European countries. In detail, we will analyse the production of residential megastructures in Italy and more specifically the case of Rome. In Rome during the years ranging from 1960 to the end of the 80s, a massive intervention in terms of council housing was set.

FIG. 8b Nakagin Capsule Tower in Tokyo (Kisho Kurokawa) [Picture taken from: https://en.wikipedia.org/wiki/Nakagin_Capsule_Tower]

A large part of the Italian council housing asset has been built since 1960s, in continuity with the global utopian megastructure fever. In those years, main cities were populated in the suburban areas of great-size structures designed for affordable housing, with the target of hosting all the functions of the whole city in unique buildings.

Several megastructures were built in the suburban area of big cities: Corviale, Laurentino, Vigne Nuove and Pineto in Rome, Rozzol Melara in Trieste **[Fig. 9]**, Monte Amiata in the Galleratese district in Milan **[Fig. 10]**, Le Vele in the Secondigliano area in Naples **[Fig. 11]**, Forte Quezzi in Genova and many others. In these structures, the architectural sign bypasses its traditional dimension to become urban as an artificial element of the landscape. In these settlements, an interesting interaction can be found in the distribution system, in the different functions and in the different mobility systems.

Rome and the 1st P.E.E.P. – description of the asset

The period ranging from 1964, the year of approval of the 1st P.E.E.P.[24] (1st public plan for council and affordable housing) of Rome, to the end of

24. In Italian, P.E.E.P. stands for Piano di Edilizia Economica e Popolare.

FIG. 9 Rozzol Melara (Trieste) [Picture taken from: https://c1.staticflickr.com/3/2811/9004643693_81063ac07e.jpg]

FIG. 10 Gallaratese (Milano) [Picture taken from: http://www.atlantedellarteitaliana.it/immagine/00010/6294OP1593AU10698.jpg]

FIG. 11 Le Vele (Napoli) [Picture taken from: http://www.listonemag.it/wp-content/uploads/2014/06/vele3.jpg]

'80s, year of completion of the last settlements, is the period defined of the "great dimension".

The different districts approved and realized within the P.E.E.P. plan indeed do not share between each other only a specific period of construction. What almost all districts share is the design approach: the districts realized are considered as finite parts, concluded in itself, following the approach of the large dimension, completely antithetical to the traditional compact city.

The main interesting elements regarding the 1st P.E.E.P. are:

- the numerical consistency and localization of the districts that makes Rome a unique case in Europe for the number of council housing units built and for the contribution given to the urban development of today's suburbs;
- the morphology and the density of districts, in sharp contrast to the compact existing city;
- the typology proposed for buildings, a virtuous example in many cases of articulations and experiments, including the experiences of megastructures;
- the construction techniques, with the use in many cases of prefabricated elements or the use of tools aimed at the industrialization of the construction procedures.

The distinctive traits of the 1st PEEP in Rome: the monumental urban architecture

The 1959 was a turning point in Italian architecture. It was in fact the year when Ludovico Quaroni presented for the competition for the CEP

district of the Barene of San Giuliano in Mestre his proposal: a group of "circus" of varying sizes, respectively with 370, 270, 170 meters of internal diameter [Fig. 12]. Quaroni's project did not win the competition but, given its strong figurative power, it became a "model" to be copied in infinite variations, prototype of the "designed" architecture, of the gesture, of the architect's self-referential and individual sign.

This project became emblematic for a whole generation of designers to the point of repeating and emulating the model in countless cases. "The excess of figurative charge, of non-requested monumental and symbolic values, of excessively redundant plasticism at the minute scale (monotonous at the urban scale)"[25] of the public housing districts realized in Rome between the second half of the '60s and the end of '80s made these suburbs a "formalistic museum of illustrious language but of dubious civilization"[26].

Most of the neighborhoods planned in Rome within the 1st P.E.E.P. (1964) respond to these logics: self-referencing districts, where designers mainly sought the uniqueness of the architectural gesture that became urban and of great size to obtain a strong recognition and a unique link with the creator. In the constitution of a Roman great-size architectural trend, a key role was also played by the approval of the General Urban Plan (PRG[27] urban project: a project for the development, the reorganization and the relocation of directional structures and infrastructures outside the historical city centre,

25. Francesco Tentori, 'L'architettura urbana in Italia', *Rassegna di architettura e urbanistica*, A XXV, no. 73/74/75 (1991): 89.

26. *Ibid.*, 90.

27. Piano Regolatore Generale.

FIG. 12 Proposal for the CEP district of Barene di San Giuliano in Venezia-Mestre (Ludovico Quaroni)
[Picture taken from: http://studioata.com/]

already overloaded of functions and traffic. The S.D.O. urban project was a large-scale intervention for the generation of a structural axis[28] cutting the town in the eastern part from the north to the south. The S.D.O. project was never realized (in 2008 the official abandonment of the project) but for decades was a main research topic[29] . The research about the urban development of the S.D.O. fed designer awareness on the importance of the interaction between infrastructures (urban highways and main roads), directional and residential functions. In the different areas involved, monumental great-size structures were considered as interesting solutions for the interaction between the different functions **[Fig. 12a]**. The S.D.O. has been the occasion to analyse in detail the link between city and great-size projects, underling the importance of the relationship between formal and technological features of megastructures and urban development. For some designers the general S.D.O. orientation was too unbalanced towards high-ranking directional functions not considering the importance of housing and small-scale functions[30]. Their criticism to the S.D.O. was because it proposed megastructures only in the shape but not in the substance of the functions proposed. On the contrary, Aymonino et al. (1973) proposed an important role to the housing function that was considered as the base of urban development, introduced even on a large-scale.

28. The so called "Asse attrezzato" (equipped axis).

29. Mario Ferrari, *Il progetto urbano in Italia: 1940-1990* (Firenze: Alinea, 2005).

30. Carlo Aymonino, Costantino Dardi and Raffaele Panella, 'Proposta architettonica per Roma-est', *Controspazio*, no. 6 (1973): 45-48.

Formal aspects were not the only reason to push the housing size towards urban scale. Indeed other important reasons are added to this logic.

Above all, we find the need of Public Administration to cope as quickly as possible with the strong demand for housing due to the process of urbanism that had brought to Rome a very large number of inhabitants from the surroundings and living in precarious shelters and slams. The need of a large number of flats in a short period of time led to large size interventions because of the sharp reduction in construction time, optimizing the urbanization networks and the overall costs.

The great size interventions introduced by Quaroni with the Barene di San Giuliano project were in line with the international movements at the time. The French grands ensambles, the English megastructure proposals, the Japanese metabolic projects were in fact some

FIG. 12a S.D.O. project, solution for the test area Prenestino-Casilino. Preliminary study by Bruno Zevi, Mario Fiorentino, Riccardo Morandi, Lucio e Vincenzo Passarelli, Ludovico Quaroni e Vincio Delleani [Aa. Vv. 2006 – picture taken from: http://www.architetti.san.beniculturali.it/architetti-portlet/showImage/fedora?pix=san.dl.SAN: IMG-00006589 /DS_IMAGE_1/2012-05-30T16:00:00.125Z]

very important references that conditioned the international design scene for years.

Quantitative aspects: a plan for 700 thousand inhabitants

Originally the 1st P.E.E.P. of Rome was a plan for 700,000 inhabitants on a surface of 50 km square **[Tab. 2]**. First interventions started at the end of '60s. After some modifications to the original program, the total number of inhabitants settled has been 400,000[31]. With 400,000 inhabitants, the 1st PEEP plan would ideally amount to the 7th place by number of inhabitants among Italian cities, ahead of important capitals of region like Bologna, Florence and Bari **[Tab. 1]**.

Nowadays the council housing asset of the city of Rome is still particularly large. In 2000, there were 89,096 flats managed by public administrations. Of these accommodations, a portion is directly managed by the municipality of Rome while the largest number (52,592 flats[32]) is owned and managed by the ATER (the Territorial Company for Council Housing). Despite the processes of alienation[33] of the recent years, we cannot underestimate the numeric importance of this data. The council city is not a depleted asset, a closed experience of the past, a dead city. Considering 2.4 inhabitants per accommodation[34] the total number of inhabitants is 213,830, still an impressive figure!

Main Italian cities for number of inhabitants Roma2 872 800 inh.Milano1 366 180 inh.Napoli966 144 inh.Torino882 523 inh. Palermo668 405 inh.Genova580 097 inh.1st P.E.E.P. of Rome401 275 inh. Bologna389 261 inh.Firenze380 948 inh.Bari323 370 inh.Catania311 620 inh.Venezia261 321 inh.Verona257 275 inh.Messina234 293 inh. Padova210 440 inh.Trieste204 338 inh.Table 1 – Main Italian cities for number of inhabitants with the total number of inhabitants settled by the 1st P.E.E.P. of Rome

Applying the definition of Vieillard-Baron[35] to the interventions of the 1st PEEP, with the minimum threshold of 1,000 dwellings, to align the definition to that one of Philippe Pinchemel, we immediately find a particularly interesting figure.

The dwellings currently owned by ATER that are in buildings identified as large-size complexes are 21,842, equal to 92.27% of the total. The remaining 1,830 equal to 7.73% refer to more minute and discrete interventions **[Tab. 3]**. Therefore, the city planned by the 1st PEEP can be considered as the city of the great dimension, the city where the design gesture goes beyond the architectural scale to become urban.

31. Anotnio Albano, *Roma il piano e i piani. Residenza pubblica e integrazione urbana*. (Roma: Gangemi Editore, 2001).

32. Data from the « ATER 2008 Social Report » .

33. Here considered as: a conveyance of property to another.

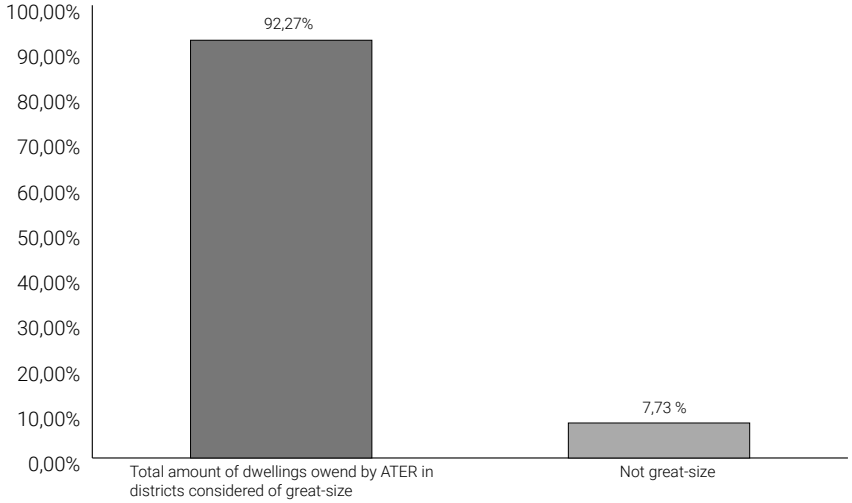
34. V.v.Aa, *LaboratorioCittàPubblica. Città pubbliche, linee guida per la riqualificazione urbana* (Milano: Bruno Mondadori Editore, 2009).

35. The term great-dimension settlement does not define a manner of construction but rather a shape and a kind of landscape characterized by towers and lines in suburban areas.

Main Italian cities for number of inhabitants	
Roma	2 872 800 inh.
Milano	1 366 180 inh.
Napoli	966 144 inh.
Torino	882 523 inh.
Palermo	668 405 inh.
Genova	580 097 inh.
1st P.E.E.P. of Rome	**401 275 inh.**
Bologna	389 261 inh.
Firenze	380 948 inh.
Bari	323 370 inh.
Catania	311 620 inh.
Venezia	261 321 inh.
Verona	257 275 inh.
Messina	234 293 inh.
Padova	210 440 inh.
Trieste	204 338 inh.

TAB. 1 Main Italian cities for number of inhabitants with the total number of inhabitants settled by the 1st P.E.E.P. of Rome

"Great" buildings and megastructures



TAB. 3 Dwellings owned by dell'ATER included in great-size complexes

Among the factors that positively qualified the 1st PEEP there was certainly the typological articulation of some buildings, with solutions of particular interest. The 1st PEEP proved to be a unique typological

N.	Piano di Zona	REALIZZAZIONI			DENSITÀ ABITATIVA	F.A.R.
		stanze (abitanti)	mc totali	superficie totale	ab/ha	SUL/St
1	Castel Giubileo	8.046	724.500	462.000	174	0,52
2	Fidene I	3.445	317.400	246.700	140	0,43
3	Fidene II	1.075	89.010	142.060	76	0,21
4	Serpentara I	8.690	803.300	445.750	195	0,60
5	Serpentara II	10.919	958.518	396.200	276	0,81
6	Valmelaina	15.800	1.308.240	1.214.250	130	0,36
7	Vigne Nuove	8.333	492.730	549.000	152	0,30
9	Prima Porta	4.551	440.000	725.000	63	0,20
10	Casal dei Pazzi	21.143	1.880.555	1.525.400	139	0,41
12	Rebibbia	9.663	864.956	728.600	133	0,40
13	Pietralata	11.380	407.000	850.450	134	0,16
14	Tiburtino Nord	11.048	758.037	1.112.070	99	0,23
15	Tiburtino Sud	37.000	3.309.893	1.875.100	197	0,59
16	La Rustica 1	1.132	104.550	77.800	146	0,45
16a	La Rustica 2	1.548	124.050	127.000	122	0,33
18	Arco di Travertino	2.074	154.386	366.350	57	0,14
19	Tor Sapienza	4.650	446.500	492.780	94	0,30
20	Ponte di Nona	6.651	532.730	666.000	100	0,27
22	Tor Bella Monaca	28.000	2.178.650	1.880.000	149	0,39
23	Casilino	10.903	999.480	403.200	270	0,83
25	Fontana Candida	3.523	324.110	392.000	90	0,28
27	Giardinetti	4.320	297.660	323.000	134	0,31
28	Torre Maura	4.000	367.792	362.000	110	0,34
29	Torre Spaccata Est	4.120	378.927	225.800	182	0,56
30	Torre Spaccata Ovest	2.112	259.000	83.000	254	1,04
31	Osteria del Curato 1	2.070	118.208	192.100	108	0,21
33	Quarto Miglio	1.107	104.038	29.800	371	1,16
34	Cinecittà	1.702	156.638	118.000	144	0,44
35	Cecafumo	930	85.600	20.900	445	1,37
35/a	Roma Vecchia	1.010	92.920	14.500	697	2,14
37	Ferratella	11.019	947.700	536.400	205	0,59
38	Laurentino	30.984	2.722.880	1.645.083	188	0,55
39	Grottaperfetta	28.791	2.630.497	1.315.560	219	0,67
40	Vigna Murata	16.860	1.548.874	842.250	200	0,61
46	Spinaceto	26.612	2.407.500	1.873.250	142	0,43
47	Tor de' Cenci Nord	9.670	875.303	688.400	140	0,42
53	Palocco	1.913	158.544	157.837	121	0,33
55	Ostia Lido Nord	6.987	621.825	644.000	108	0,32
57	Isola Sacra	970	72.824	82.300	118	0,29
59	Colli Portuensi Sud	6.978	567.616	250.000	279	0,76

60	Colli Portuensi Nord	3.392	312.103	339.243	100	0,31
61	Corviale	8.512	760.150	605.300	141	0,42
65	Pineto	4.375	400.000	179.440	244	0,74
67	Acqua Traversa Sud	672	53.760	161.200	42	0,11
68	Primavalle Ovest	8.945	262.799	731.410	122	0,12
70	Cortina d'Ampezzo	545	44.800	152.500	36	0,10
71	S.Maria della Pietà	1.238	102.440	213.500	58	0,16
72	Ottavia Nord	2.137	160.168	204.500	104	0,26
	TOTALE	401.545	33.729.161	26.668.983	151	0,42
		stanze (abitanti)	mc totali	superficie totale	ab/ha	SUL/St
N.	**Piano di Zona**	**REALIZZAZIONI**			**DENSITA' TERRITORIALE**	**FAR**
	VARIANTI SINGOLE					
15bis	Tiburtino III	4.073	376.248	322.200	126	0,39
74	Torrevecchia 1	3.652	320.000	244.624	149	0,44
79	Casette Pater 1	130	11.360	8.153	159	0,46
81	Quarticciolo	718	62.385	57.680	124	0,36
83	La Lucchina	4.541	327.410	440.000	103	0,25
	TOTALE	13.114	1.097.403	1.072.657	122	0,34
	VARIANTI INTEGRATIVE					
1V	Cinquina	2.290	158.865	327.250	70	0,16
2V	San Basilio	2.500	202.000	255.000	98	0,26
3V	Settecamini	1.740	142.400	116.000	150	0,41
4V	Casale Caletto	2.960	243.150	316.000	94	0,26
10V	Acilia 2	8.532	711.380	627.618	136	0,38
11V	Dragoncello	1.900	143.250	271.400	70	0,18
12V	Acqua Acetosa	2.126	160.120	339.000	63	0,16
13V	Quartaccio 1	2.433	199.050	303.460	80	0,22
14V	Portuense	1.900	157.320	322.800	59	0,16
15V	La Pisana	1.770	146.556	177.000	100	0,28
	TOTALE	28.151	2.264.091	3.055.528	92	0,25
		stanze (abitanti)	mc totali	superficie totale	ab/ha	SUL/St
N.	Piano di Zona	REALIZZAZIONI			DENSITA' TERRITORIALE	FAR
TOTALE complessivo		442.810	37.090.655	30.797.168	144	0,40

TAB. 2 All the districts of the 1st PEEP of Rome

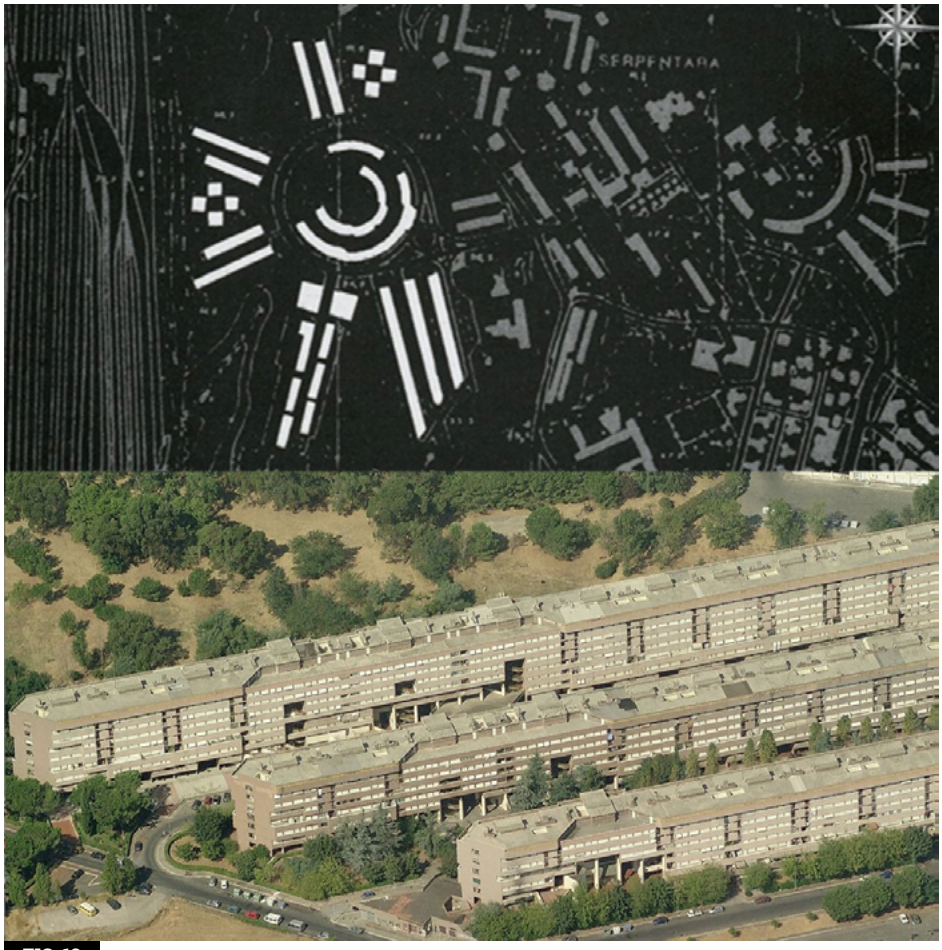


FIG. 13 The Serpentara I district (N 4)

FIG. 14 The Valmelaina district (N 6)

FIG. 15 The Casilino district (N 23)

FIG. 16 The Corviale district (N 61)

laboratory, a harbinger of cutting-edge experimental solutions.

The large size provided designers the chance to undermine the standard conception of housing ensuring the possibility of aggregating, in plan and in elevation, the different units in an alternative way. Large-size housing inspired designers to undermine the concept of standard aggregation of units, based on the repetition of the same model. Often, aggregations in plan and in elevation of dwellings were planned in a completely alternative way if compared to conventional solutions. In the whole building, designers tried to go beyond standard designing approaches based on schematic repetition of standard models. Some interventions in particular tried to propose a varied supply of dwellings, with different shape and size, added up without repetitiveness. In cases with a high articulation, the detection of the different units results particularly complex. The construction elements limiting the freedom of aggregation and articulation of units are: spaces for housing distribution, structural and pipe systems and vertical and horizontal connections.

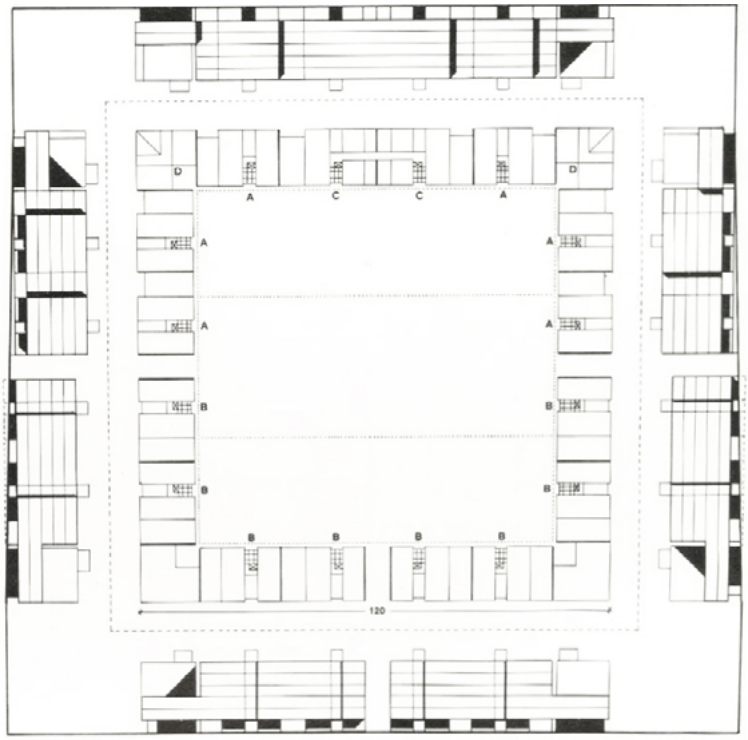


FIG. 17 The district of Valmelaina (N 6), layout of a court, clear repetition on large-scale of standard types [Picture taken from a journal]

In addition to particular aggregations in upper floors, another experimental element was the morphological and functional organization of spaces at the ground floors and roofs. These spaces were characterized by the presence of articulated paths and open and closed common areas with a clear shape identified in the overall organism.

Furthermore, the inclusion of services was an important step forward the integration between housing and urban context, trying to relate the private and the public aspects of life. The intent was to create spaces for meeting and participation in community life. The residential service intended to promote self-management and self-organization processes of tenants. If some higher-ranking functions were initially located in separate buildings, in the course of the years services and residences joined unique buildings. The attempt was to bring the house property closer to the equipments, re-proposing the human measure in interventions of monumental measure[36]. The main residential services included in the ground floors and in the roofs were: meeting rooms for assemblies; spaces for cultural, sporting and recreational functions; local service offices; offices for social services; music rooms; deposits; game spaces; theaters; shops. In some cases these spaces are located even in the intermediate levels like in Corviale district (N 61). Here, the commercial and service floor is at the fourth level.

36. M. Costa, 'I servizi residenziali. Punti d'incontro per una vita collettiva', *Edilizia popolare*, no. 123 (1975): 24-54.

FIG. 18 The district of Tor Bella Monaca [Picture taken from: https://www.bing.com/maps/]

The pedestrian paths (galleries, passerellespassarelles, bridges, subways) and the common volumes became iconographic elements characterizing the project to the point of becoming also place names (for example the term "bridges" to characterize the intervention of Laurentino 38 or " the gallery" the fourth floor of Corviale).

Although the articulation of ground floors, as well as of residential floors, proved to be virtuous, not in all the districts architects were able to propose attractive solutions. The occasion of the great dimension did not always translate into articulated solutions and experimentations. On the contrary, the great dimension often became a constraint. The designers who for various reasons did not choose the megastructure solution were forced to propose traditional housing solutions repeated at the great scale [Fig 17].

Thus it is possible to distinguish two different approaches: (i) composite and articulated cases in line with international megastructures; (ii) other cases with the re-propositions of typological standard solutions on a large scale [Fig 18]. The two approaches overlap temporally but especially in the last phase of the 1st PEEP (the '80s), megastructure projects were mostly abandoned. Megastructures indeed after the mid-'70s proved to be already culturally compromised and quickly abandoned. The designers, however, respecting the quantities approved by the 1st PEEP planning, were forced to propose traditional housing solutions on a large scale. The enlargement at the large scale of traditional types caused the construction of buildings repetitive and alienating. Are we sure that traditional but "big" buildings cased less social damages than megastructures?

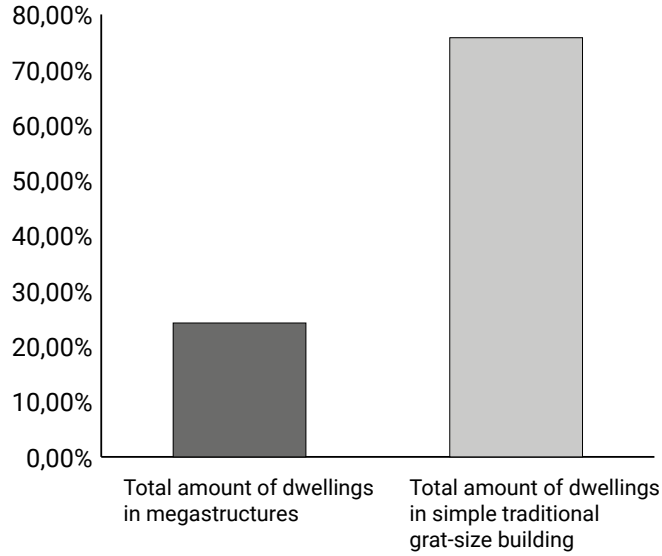
Megastructures and the 1st PEEP

Although within the districts realized during the 1st PEEP of Rome we can identify "only" four main megastructures (Corviale, Vigne

Nuove, Laurentino, Pineto)[37], their incidence in number of dwellings is still relevant. Out of the total dwellings owned by ATER considered as large-scale interventions, those in megastructures [Tab. 4] amount at 5,732 equal to the 24.21% of the total. The remaining dwellings, attributable to traditional typologies, are 17,940 equal to 75.79%.

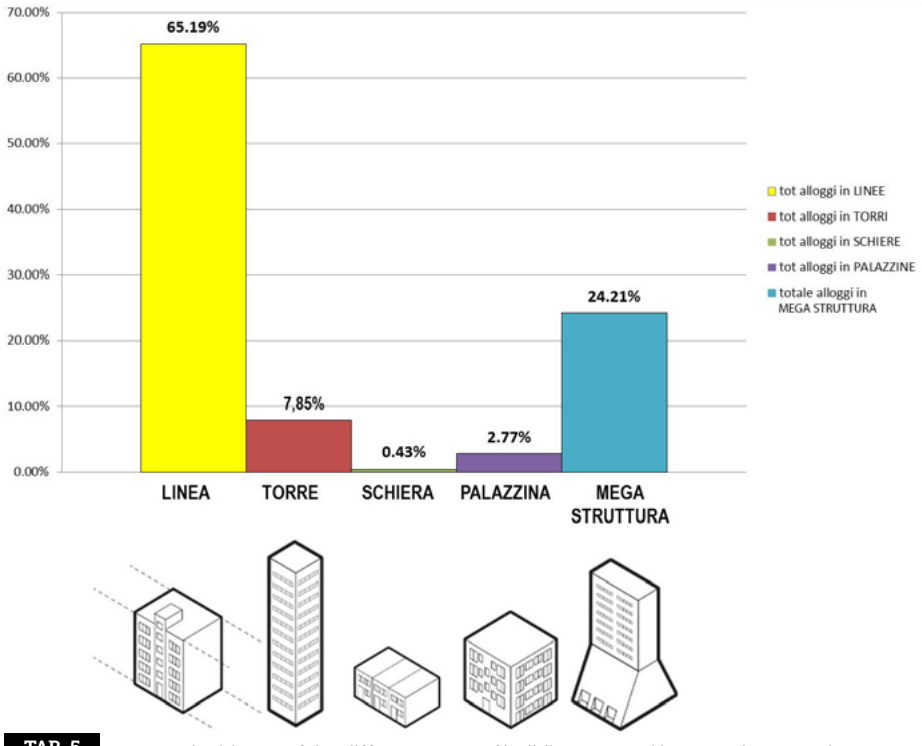
By entering into detail [Tab. 5] concerning the different housing types composing the asset owned by ATER: 15,431 dwellings equal to 65.19% are realized in buildings of "line-type"; 1,859 dwellings equal to 7.85% are located in "tower-type" buildings; only 102 dwellings are located in terraced houses (0.43%); while 656 dwellings, equal to 2.77% are located in "palazzine" (isolated medium-rise buildings). As stated before, the number of dwellings in megastructures is 5,732, equal to 24.21% of the total.

37. Lorenzo Diana, Gissara, M., Currà, E. and Cecere, C, "Tor Bella Monaca e la grande dimensione: scenari di manutenzione e rigenerazione ERP", *Territorio*, no. 78 53-62.



TAB. 4 Dwellings owned by ATER in megastructures and in great-size buildings

Within the districts realized during the 1st PEEP, five cases have been selected and studied in detail [Tab. 6] : two of them considered as megastructures and three considered as traditional great-size buildings. The case study of Prima Porta is shown in figure 19; Vigne Nuove in figure 20; Pineto in figure 21; Torrevecchia in figure 22; Castel Giubileo in figure 23.



TAB. 5 Per cent incidence of the different types of buildings owned by ATER in great-size districts

PDZ	Year of construction	Typology	Structure	Envelope
Prima Porta (N 9)	1972	Standard	r.c. frame	Cavity walls
Vigne Nuove (N 7)	1973	Megastructure	r.c. frame	Light pre – casting
Pineto (N 65)	1979	Megastructure	r.c. walls	Sandwich precast panels
Torrevecchia (N 74)	1982	Standard	r.c. walls	External precast panels
Castel Giubileo (N 1)	1986	Standard	r.c. walls	External precast panels

TAB. 6 The five case studies selected within the districts of the 1st PEEP

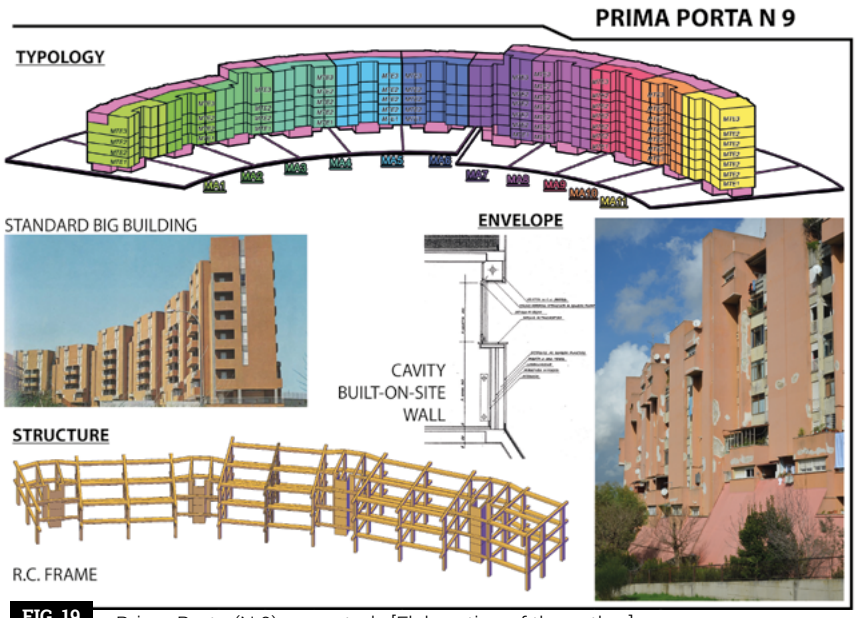


FIG. 19 Prima Porta (N 9) case study [Elaboration of the author]

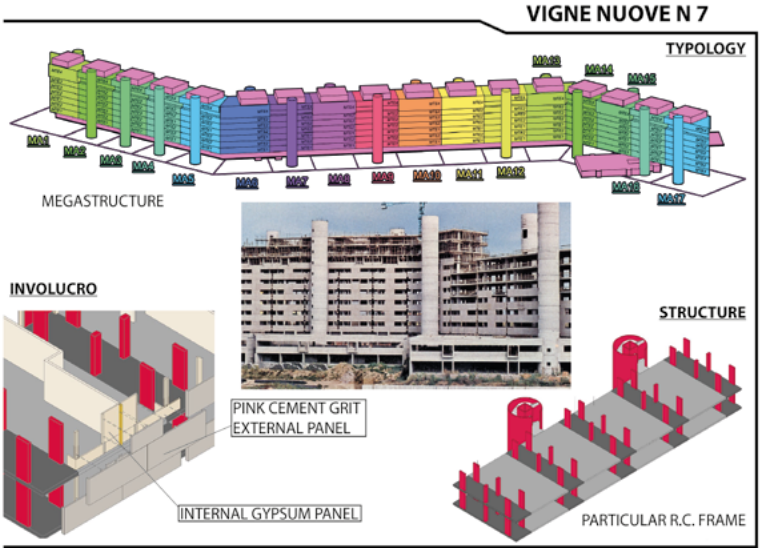


FIG. 20 Vigne Nuove (N 7) case study [Elaboration of the author]

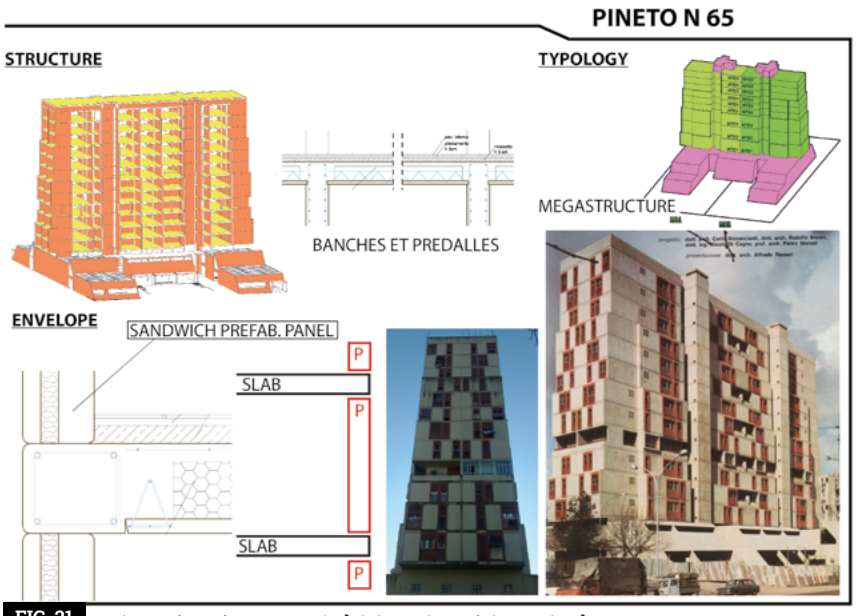


FIG. 21 Pineto (N 65) case study [Elaboration of the author]

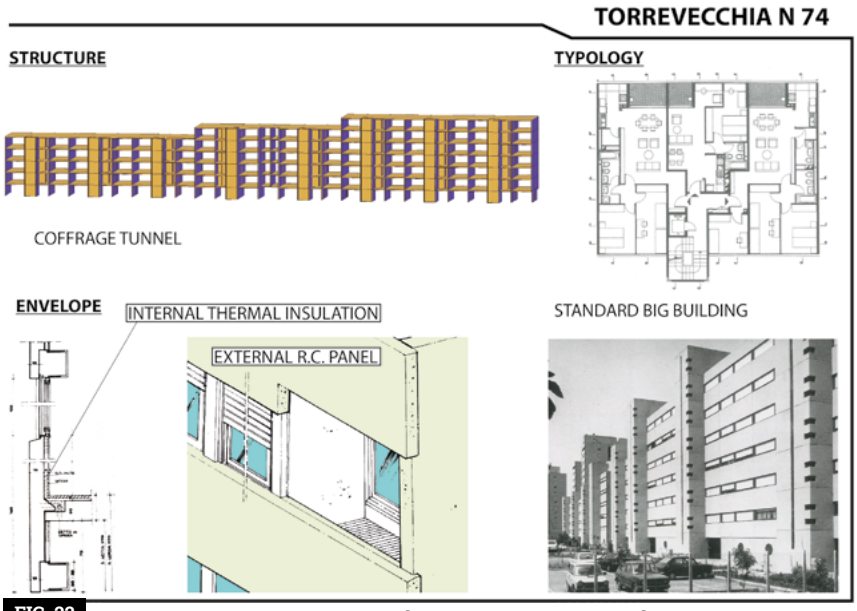


FIG. 22 Torrevecchia (N 74) case study [Elaboration of the author]

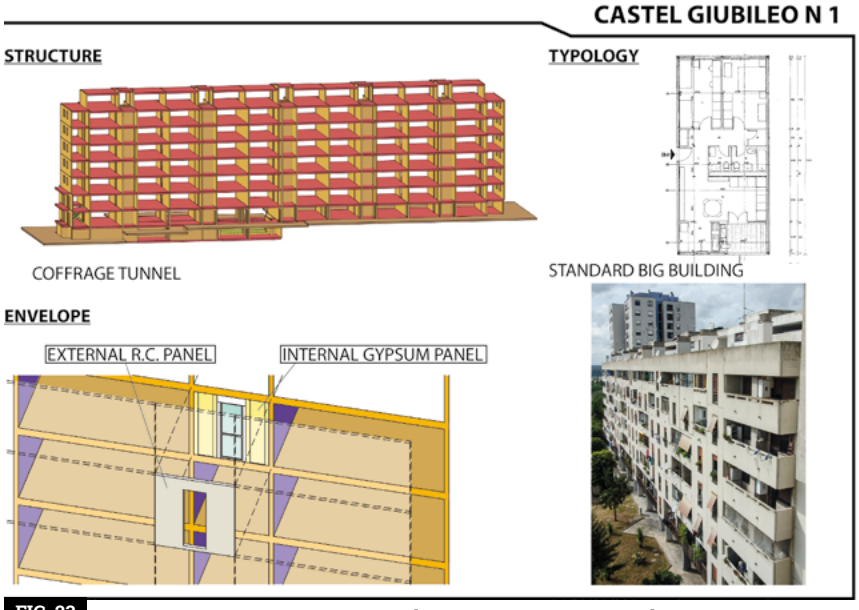


FIG. 23 Castel Giubileo (N 1) case study [Elaboration of the author]

Construction aspects: the beginning of prefabrication

In the historical evolution of the Italian construction industry, the '70s have been characterized by the great trust in prefabricated construction elements. The enlargement of the use of industrialized technologies also to the building sector allowed a sharp acceleration of construction times. In parallel, an automatization of some construction processes (e.g. casting of structural elements, movement of materials etc.) resulted in a reduction of construction costs. The prefabrication of construction components and the automation of some processes were two innovations that were well suited to the open morphology of the great-size interventions of 1st PEEP (… which one has influenced the other? …). The trust in new technologies was such that the majority of council housing interventions were oriented towards this industrialized model. In this way the Italian construction industry tried to fill the gap with other European countries. In fact, already during the second half of the 50s and during the 60s, in Europe, experiments and applications of prefabricated elements to the public residential constructions began.

With the approval of Law 167/1962[38] and the diffusion of megastructures and large-scale interventions, a deep interest arose also in Italy for the prefabrication of construction component and for the automation of the building site.

However, the introduction of prefabrication was often not synonymous with optimal results. Not always companies, apart from the cases in which the excellence in the sector intervened, were qualified: lasting and satisfactory results were few. The poor quality in the original productions is perceived in the current degradation of some components.

38. The Law 167/62 was the law that introduced the possibility for Municipalities to recover lands for the purpose of construction of council housing in the suburban areas of city with more than 25 000 inhabitants.

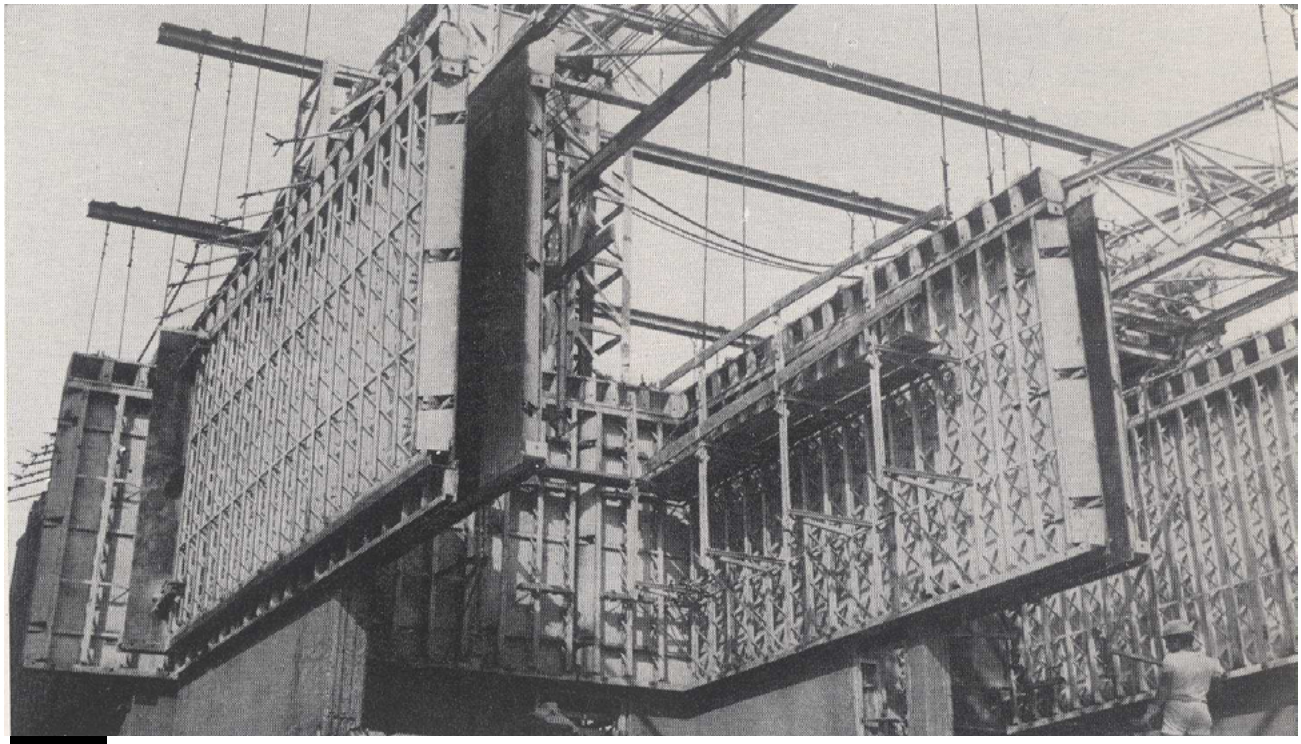


FIG. 24 Prefabricated formwork used for the automatization of the cast phase of the load-bearing structure [Picture taken from a journal]

The work of Imbrighi (1987) resumed and classified the main aspects of the industrialized framework of Italian construction industry. It revealed the main distiction between the system of automatic techniques for the cast in place of load bearing structure and the system of prefabricated techniques for construction elements. The main innovations were applied in the construction of the load bearing structure and in the realization of the envelope elements.

Considering the load bearing structure, a simplification of the worksite operations was carried out, trying to speed up the casting operations by using prefabricated and reusable formworks [Fig. 24]. The use of reusable prefabricated formwork, with the most diversified shapes, allowed the concurrent casting of vertical and horizontal structural elements ensuring a particularly rigid result, with good seismic performance. Over the years, structural elements proved to be durable and reliable.

Concerning envelope elements, pre-assembled components were realized of at the factory and exclusively assembled on site. For the prefabricated elements of the envelope, we cannot speak of a similar success as that of load bearing structure, especially for opaque panels. The prefabricated panels, externally applied, have usually shown problems of resistance to atmospheric agents, especially in the joints with the load bearing structure.

The introduction of prefabrication in building construction determined a renewal in the approach to housing design, both at the reduced scale of housing units and at the scale of the building and the settlement. The large-scale settlements required, for the reduction of times and for the repeatability of site operations, the introduction of tools that automatized some procedures, with a consequent reduction of costs. The study of Nuti (1984) tries to understand and evaluate the link between the productive factors and the conformation of the housing units. One of the main consequences of the use of prefabricated elements for the casting of the structure was in the layout of dwellings. The shape of dwellings was heavily influenced by the use of transversal cross-sections shear walls, which especially in the standard "big" interventions limited the freedom of internal longitudinal layout [Fig. 25].

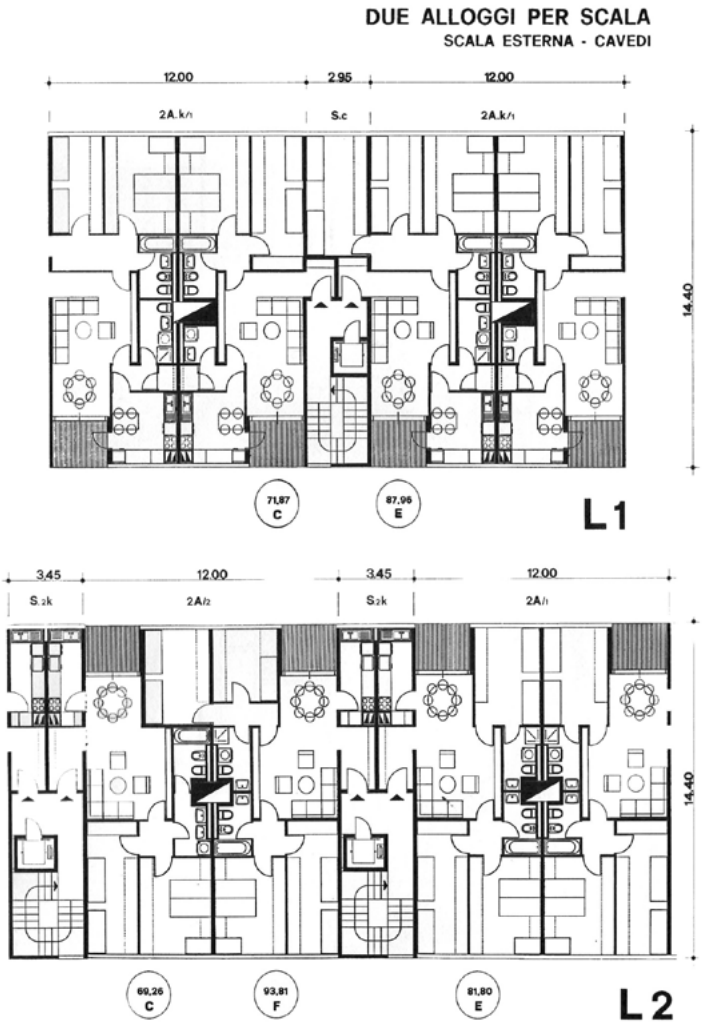


FIG. 25 Standard aggregation of dwellings characterized by parallel r.c. walls: the layout of the dwellings is limited by the presence of transversal structural walls

The structural system

From a constructive point of view, given the vast time interval of the 1st PEEP (mid-60s / last-80s), we are dealing with different cases. Some settlements were realized prior to the introduction of prefabrication and are therefore strongly linked to traditional technologies. In other settlements, we can see a strong presence of prefabricated components.

Concerning load-bearing structures, therefore, it is possible to find some interventions in reinforced concrete frame completed with composite slabs of reinforced concreate joist and hollow clay blocks up to cases with the use of the *coffrage tunnel* technology.

As mentioned before, one of the main procedure that was automatized at the construction site was the casting of structural elements. In this perspective, among the different construction systems, the most frequent procedures were those characterized by the presence of shear walls cast with prefabricated formworks, according to the technology of *coffrage tunnel* or *banches* et *prédalles*. The main difference between the two systems lies in the presence of fulfilled or lightened slabs.

The *coffrage tunnel*, which greatly speeds up the casting process, presents the contextual casting of vertical and horizontal structural elements thank to reverse U-shaped formworks. Times are reduced but at the expense of flexibility in the spatial layout of dwellings. In fact, the passage of the technical plants must be established at the time of the casting, identifying the location of conduits and cavities. This choice, precisely due to the presence of fulfilled slab, is no longer modifiable in the future unless invasive structural interventions. The same applies to openings inside vertical bearing walls. Openings in walls indeed must be realized with modular formworks inserted inside the main formwork that allow, at the moment of casting, the creation of doors and windows.

Despite well-articulated cases, in most *coffrage tunnel* realizations the repetitive sequence of parallel r.c. walls enhanced the semantic of the *loculus* [Fig. 26]. In great-size interventions, this has contributed to discredit considerably the use of the *coffrage tunnel* technology[39] .

39. P. Marcheggiani, 'La disposizione longitudinale degli elementi di carpenteria "a tunnel", *Edilizia Popolare*, no. 139 (1977).

In conclusion, the technology of the *coffrage tunnel* provides poor performances in terms of flexibility in project layout. The presence of supporting parallel walls limits the flexibility in the organization of dwellings. The internal distribution is hardly constrained by the span between one wall and another and by openings in walls. On the contrary, from a structural point of view, an excellent behavior is detectable. The contextual casting of slabs and vertical elements gives a great rigidity to the structure, ensuring a good behavior in contrasting earthquake actions. The contextual casting guarantees a box-like behavior to the structure with a good general distribution of loads and tensions. Important for the application of the technology of the *coffrage tunnel* was the approval of

FIG. 26 A building of the district of Valmelaina (N 6), the repetitive sequence of parallel r.c. wall enhanced the semantic of loculus,clearly shown here also in the façade envelope cladding panels

Law No. 64/1974 that first introduced some notions on the dynamics of the structures. The *coffrage tunnel* technology, proposing a particularly rigid structure, received the indications of the norm and was often used in seismic areas.

In contrast with the *coffrage tunnel*, in several cases we find the banches et prédalles system: after the casting of the vertical load-bearing structure, a second casting phase generates the horizontal elements. *The prédalles* are prefabricated concrete sheets of 4-6 cm, with steel framework, playing the role of disposable formwork, containing the concrete casting. The slab is lightened by brick or polystyrene elements that considerably reduce the weight of the floor and play a role of acoustic and thermal insulation. The flexibility of intervention on the floor is greater than in the case of fulfilled slab.

Depending on the year of construction, the different settlements present structural systems more or less characterized by the use of industrialized technologies. It is not by chance that, among the first interventions carried out, we find a strong link with the traditional structural systems and few references to prefabrication. For example, in PRIMAPORTA district (N 9, urban planning approval 1965, beginning of construction 1972), we find a traditional concrete frame structure completed with composite slabs of reinforced concreate joist and hollow clay blocks.

In Vigne Nuove district (N 7, approval of the urban planning 1972 and beginning of construction 1973), we are faced with a partial prefabrication of the structural elements. The structure is organized on the base of a 7 meter-span r.c. trestles with 6 pillars supporting a flat plate. The system is completed with a lightened prefabricated slab.

The intervention of Castel Giubileo district (N 1), with an architectural project by Eng. Elio Piroddi is characterized by the use of the technology of the *coffrage tunnel*. The *tunnels* are positioned transversely. The dwellings, with a double opposite view, are free from internal supporting elements with a structural span of 6 m. Constructively analogous to Castel Giubileo, we find the Studio Passarelli intervention in Torrevecchia district (N 74).

In the Pineto district (N 65) in Rome, the supporting structure is realized with the system of *banches and prédalles*.

The vertical envelope

Concerning the supporting structure, the main innovations concerned the automatization of construction procedures, especially for the use of reusable prefabricated formworks. On the contrary, concerning the vertical envelope, constructive elements itself (like infill walls, windows, balconies, etc) were characterized by deep prefabrication.

The year of construction seems to play a decisive role for the choice of the envelope constructive system. In fact, in the temporal interval of the 1st PEEP, it is possible to find buildings that are still particularly linked to traditional standard constructive procedures and others with several prefabricated components. Thus, in some cases the vertical envelope is based on a standard masonry infill with a high manpower needed, while in other cases the worker assumes the simple role of the assembler of façade elements realized of at the factory.

In the case of the Primaporta district (N 9), one of the first realized, we find a conventional vertical envelope system, with infill walls consisting of an external plaster, a row of solid bricks, an air cavity, a row of perforated internal bricks and the interior plaster.

A good level of prefabrication can be found in the intervention of the Vigne Nuove district (N 7), where the external finishing panels in marble/cement granules are prefabricated and attached on a substructure of small concrete pillars cast in place. The envelope panels are completed internally, after an air cavity, by a row of perforated blocks of gypsum.

More recent settlements present a higher level of prefabrication of external panels. The approval of Law No. 373/1976 introduced rules for the reduction of energy consumption of buildings: the envelope components therefore took on a more important role with regard to thermal insulation. Initially absent, layers of thermal insulation began to appear in envelope panel stratigraphy.

Among the different case studies analyzed, the most advanced in terms of prefabrication of the envelope components is the Pineto district (N 65) which presents a single-piece sandwich panel (cement / insulation / cement).

The Castel Giubileo district (N 1) is characterized by a vertical envelope composed of single exterior panels of concrete with a square shape. The panels are provided with a hole to accommodate windows that will be installed on site later. The width of the panels coincides with the span of the underlying structure and they are installed, with the use of cranes, from the outside. Once installed, the panels are completed internally by a row of lightened gypsum blocks. The whole panel does not provide a layer of thermal insulation. This depends on the high level of thermal performance of the external prefabricated panel.

The case of Torrevecchia district (N 74) differs from Castel Giubileo for two main reasons. First, the panels applied externally does not have a square shape such to incorporate the windows. The panels are rectangular elongated shaped leaving a whole free band to be used for ribbon windows. The second difference lies in the stratigraphy of panels. The external prefabricated panel is completed with an internal layer of thermal insulation and a plasterboard panel.

The Regeneration of Megastructures

Nowadays, after about forty years, council housing great-size districts are in dramatic strong isolation conditions. Spaces intended for public gardens and parks are untreated and abandoned. Buildings live situations of material decay and general social issues such as unemployment and precariousness, enhanced by the economic crisis, are widespread.

In this general situation of emergency, megastructures constitute a priority for suburban sustainable regeneration policies. In a context of revitalization of existing public city, looking at megastructures as the target for regeneration interventions results to be the present challenge for cities able to preserve and reuse their existing resources.

As said before, in Rome residential megastructures, although detectable in only 4 cases, amount to 24.21% (equivalent to 5,732 dwellings) of the total number of accommodations in great size buildings. The relevant number of tenants and the consistence of the housing stock would ensure reliable outcomes to regeneration projects.

The necessity of regeneration is supported by the general conformation of public and open spaces of great size districts. Indeed, large empty spaces are available, often exceeding in terms of streets and parking the standard needs of inhabitants. This implies good chances for future transformations, such as little densifications intended for reconnecting with nearby districts, or intervention on the general environmental qualities by actions on gardens and parks.

Also the architectural and constructive conformation of buildings gives the chance for potential transformations, in terms of densification of ground floors and change of use of the roof floors.

As said before, within the complexes of great size of the 1st PEEP, there are two different sets of buildings: the megastructures and the standard big buildings. Especially in megastructures a greater predisposition to transformation is found compared to cases of standard buildings, becoming the preferred target for urban regeneration interventions.

In Pineto (N 65) and Vigne Nuove (N 7), two of the roman megastructures together with Corviale (N 61) and Laurentino (N 38), the incidence of spaces at the ground floors and roofs, originally destined for common functions and today used improperly or abandoned, stand respectively for the 30% and 21% of the whole residential surface. These spaces are ideal for the temporary relocation of tenants during regeneration interventions. It must be stressed that these values are higher in relation to the other standard cases analysed, such as Prima Porta (N 9) and Torrevecchia (N 74), that arrive at 9% and 8%. Two other indexes fundamental for transformation are the possibility of installing solar panels on the roof floors, and the average height of common spaces. Both indexes in megastructures are higher. In Pineto and Vigne Nuove, the index of free space for solar panel at the roof tops is 62% and 46% of the total roof surface. In the conventional cases such as Castel Giubileo, Prima Porta and Torrevecchia this value does not reach 40%. The average height of common spaces, in Pineto and Vigne Nuove is 4.01 m and 2.87 m. The index provides information on the chance of intervening with change of use or technological implementation of the slabs. The non-megastructure buildings do not reach 2.80 m.

This confirms what stated before: the global regeneration of contemporary suburbs should start in megastructures as the ideal place for transformation interventions.

The regeneration of megastructures must ensure a multi-disciplinary approach. Designers have to identify the various qualities concerning architectural, typo-morphological, social, structural and energy aspects of buildings and then they have to operate on the main issues using operative assessment tools[40].

40. **Diana,** *Metodo*.

To achieve a complete regeneration of housing megastructures, the traditional retrofitting approach based exclusively on physical actions on buildings and open spaces should be replaced with a series of actions that could allow a radical transformation and an operative regeneration of these complexes. To achieve this complex goal, an interaction between material actions of physical intervention on buildings and public spaces and immaterial actions oriented to social aspects with involvement of population should be proposed. The social aspects are neither marginal nor the result of a regeneration project, but they are basic requirements to provide information on the regeneration process itself.

The regeneration of such important social neighbourhoods has to be structured through a combination of immaterial and material actions.

FIG. 27 Proposition for Vigne Nuove regeneration intervention [Elaboration by Simona Vasinton]

Usually, the imposition of retrofitting actions on final users could not automatically guarantee successful and durable results. On the contrary, the core of the regeneration approach is to coordinate the main goals of the project with the involvement of tenants. This objective is achievable through the participation of social disciplines able to develop a new bond between citizens and the transformed building. Moreover, it is fundamental to avoid the risk of repeatability which is common in traditional retrofitting intervention. The target of the regeneration should not be a partial modification but indeed a profound transformation of the existence, its realignment with the current housing demand and the activation of virtuous and sustainable living models.

Regeneration projects should follow four main areas: social actions, actions tending to an architectural-typological reconfiguration, actions that aim to overcome structural issues, energy retrofitting. This methodology aims to guarantee the sustainability and the feasibility of the regeneration process and to ensure an integrated approach needed for an effective collective management by the tenants and for a public control on the final results.

Social measures should aim to reduce the inhabitants' rate of unemployment and to activate participatory planning process. Architectural and typological aspects should aim to detailed planning solutions of building reconfiguration (new accommodations, new functions, new services) and to their fulfilment through a coordinated set of material and immaterial actions. Technical and constructive measures are material actions on the load bearing structure, structural components and envelope elements and have to guarantee the economic and constructive sustainability. In the end, energy retrofitting measures should aim to sustainability in terms of energy, environmental and

economic savings. Two proposals for regeneration interventions on Vigne Nuove and Pineto can be seen in figure 27 and 28. [Figg. 27-28]

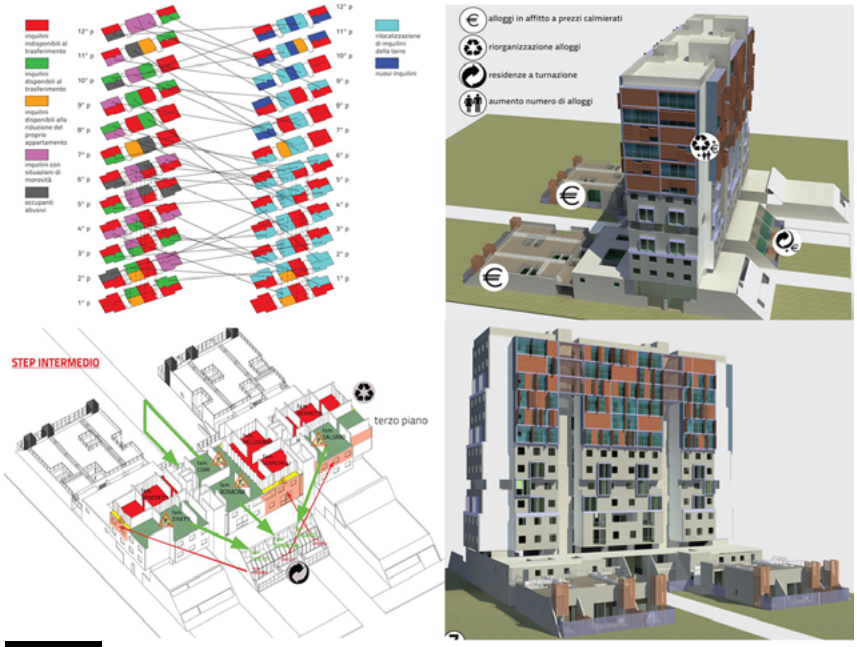


FIG. 28 Proposition for Pineto regeneration intervention [Elaboration by the author]

Conclusion

Megastructures represent an important part of suburban building stock of European cities. During the second half of the 20th Century, great-size buildings arose all over Europe to shelter inhabitants arrived in big towns due to urbanization processes. Within great-size interventions, two subsets exist: megastructures and traditional big buildings. Megastructures started to appear in suburban areas of European cities on the wake of architectural international movements such as the French grands ensamble, the English megastructure proposal and the Japanese metabolic projects.

In Italy, from the second half of the 60s' a huge public intervention in housing is detectable. After the approval of the Law 167/62, big Municipalities approved plans for the construction of great-size districts meant for council and affordable housing. The case of Rome is emblematic: the 1st PEEP was a plan for 700,000 (reduced to 400,000) inhabitants. In Rome, megastructures are detectable in only 4 districts but they amount for more than 5 thousands dwellings (around 25% of the dwellings owned by the public agency in great-size districts). Characterized by a particular approach to urban development, meant to summarize in unique buildings all the functions provided by a town, megastructures were elements at urban scale of particular interest from the typological, the structural and the constructive point of view.

In conclusion, several reasons encourage us to look at megastructures as the place for urban regeneration. Some reasons are referred to the category of the "need", those connected to the raised critical issues, and other fall into the category of "possibility", those related to the predisposition of urban fabric and buildings to undergo interventions of regeneration.

The main critical issues stood in the general state of abandon of the buildings and public spaces, characterized by material and performance decay of constructive elements and widespread state of neglect of green public areas and squares. In addition to this, the complex supply of this type of neighbourhoods fails to intercept the instances of the contemporary demand, especially in terms of type, shape and number of dwellings.

From the transformation point of view, the main features are those concerning the shape and nature of the urban fabric and, at a more detailed level, concerning the typological nature of buildings. The concentration in compact and big unique buildings of all the function of the district leaves huge free spaces on which it is possible to intervene through minimum densification and green strategies. These last would aim to enhance the green areas, by the realization of urban parks and the protection of green lawns and gardens, in a global logic of reduction of the heat island phenomenon.

Regarding the typological aspects of buildings, the conformation of megastructures provides good chance for effective regeneration interventions where, in the ground floors and roofs, the presence of extra-residential function spaces ensure possibility of transformation, change of use and densification with minimum land consumption.

As a whole, for its extensiveness and spread, megastructures are the ideal place for sustainable suburban regenerations that could stimulate virtuous processes also for the nearby neighbourhoods.

The Tragedy of the Megastructure

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Valentin Bourdon is a PhD student at the Laboratory of Construction and Conservation (LCC) EPFL since 2017. His research explores the architectural challenges of the common space. In support of significant historical experiences, and contemporary subjects, such a project aims to help overcome the delay taken by architecture comparing to other disciplines in the appropriation of the notion of 'common'.

ABSTRACT

Relating the megastructure to the issue of the commons is a useful exercise to understand the success and the disappearance of what Peter Reyner Banham called the "dinosaurs of the Modern Movement". All these large-scale constructions suffered the same fate: a conflict between the promise of a large shared space and the temptation of its fragmentation. This quantitative quandary is also raised in another field by Garrett Hardin in 1968 as the 'enclosure dilemma'. The publication of his article "The Tragedy of the Commons" sparked a broad controversy coinciding with the megastructure's momentum. By assessing a number of theoretical correspondences, the article reexamines the impact of megastructures on the interdisciplinary debates of the time. It also considers the relationship between architecture and property as one of the possible–and tragically coincident–reasons for their success and dissolution.

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KEYWORDS
Megastructure; Commons; Ownership; Enclosure; Anti-enclosure.

When the American ecologist Garrett Hardin publishes his famous article entitled "The Tragedy of the Commons"[1] in *Science*, the architectural debate is fully animated by the affirmation of megastructures. At the end of the sixties, a rising awareness of the limits of the planet's resources emerges **[Fig. 1]**. And it paradoxically intersects a craze for an endless above-ground urbanization. The consciousness of the earthly limits leads the gaze toward possible futures, even elsewhere. The conquest of space hence animates all the hopes and all the fantasies. It also appears as the vector of a collective celebration: celebration of progress, of the machine, of science. The delighted extension of human limits occurs at the very moment when the environmental crisis warns of "the limits to growth".[2] Megastructures mobilize an architectural language charged with this innovative and progressive hue: their structures are tubular, extensible, providential because technological; their elements are prefabricated, autonomous and replaceable; compositions are weightless, isotropic and suggest mobility **[Fig. 2]**. Megastructures are the symbol of human control and cultural resistance against an established environment, held at a distance by a sense of escape, arrogance, and because of attention. Such a language claims to be unifying, as it is particularly powerful in its evocative power. It highlights the possibility of a unitary cohabitation, able to be exported beyond the finite limits of its terrestrial conditions. Apart from the strictly quantitative and limiting point of view, megastructures also oppose their visions to the unequal distribution of resources, particularly those of the soil. Driven by the emancipation and the struggle of the working class at the end of the sixties, these architectural experiments challenge the traditional city model and, more particularly, its bourgeois predestinations. The charges brought by Archizoom Associati

1. Garrett Hardin, "The Tragedy of the Commons", *Science* 162, no. 3859, (1968): 1243-1248.

2. The year 1968 is also marked by the creation of the Club of Rome, which will result in the publication of *The Limits to Growth* (Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, William W. Behrens, *The Limits to Growth*, (Falls Church: Potomac Associates, 1972.)) a few years later. Also known as the 'Meadows Report', this major contribution is diffused in a period already associated with the questioning of megastructures.

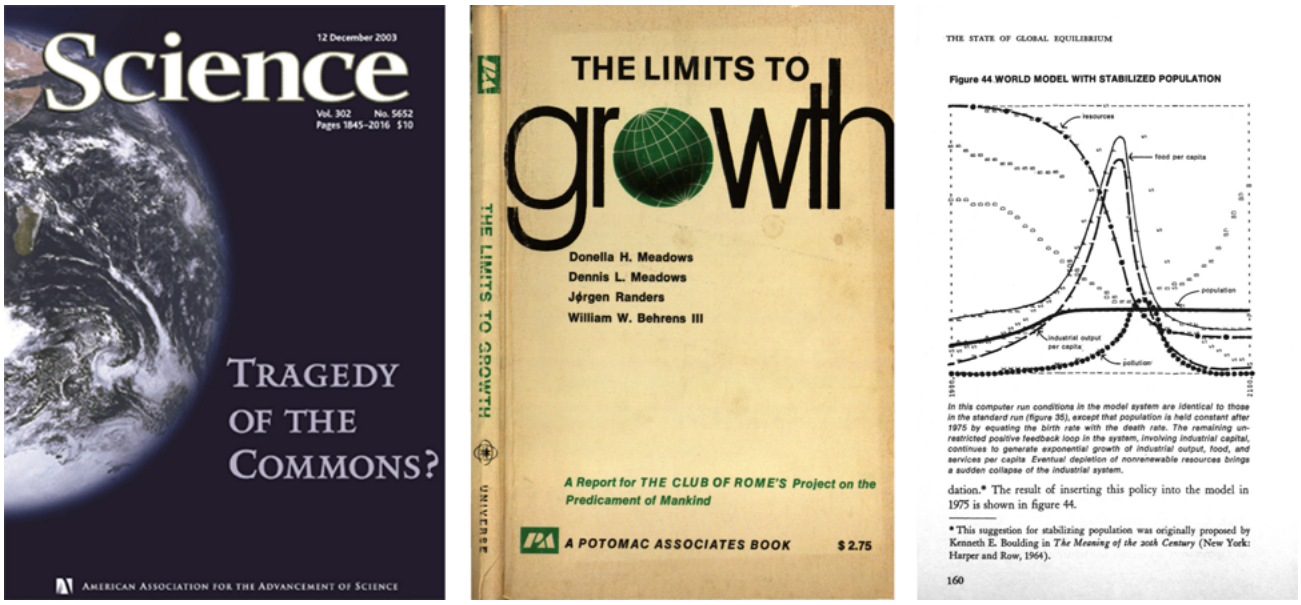

FIG. 1 *Science* No. 5652 celebrates the publication of "The Tragedy of The Commons" 35 years before in the same journal, using Garrett Hardin's title in the interrogative form. The illustration used for the cover is a picture of the Earth taken from the space by Apollo 17 in 1972. In the same year *The Limits to Growth* signaled the unprecedented turn that the late 12th century should face in terms of global resources. (http://science.sciencemag.org/content/302/5652 accessed December 12th 2018 and http://donellameadows.org/ accessed December 12th 2018.)

FIG. 2 The photographs of Kenzo Tange Expo'70 pavilion in Osaka represent very well the collective effervescence produced by the appearance of the new architectural forms that characterize the megastructure. (Tange, Kenzo. 1973. *Kenzo Tange: ein klassiker der modernen architektur*. Zug: Verzinkerei.)

are explicit: "In fact roads do not merely serve the compact fabric of what is private, but they also dissect it and make it communicating, making place for the emergence of architectonic language. The skyline becomes a diagram of the natural accumulation which has taken place of Capital itself."[3] Conversely, megastructures depict an urbanity which is suspended and not subject to a cadaster. They call into question the paradigm of land division on which the city has always been formed, referring urban planning to the issue of land-sharing, of its fragmentation, and to the inequality of its rationing. While industrialization celebrated by these architectures paradoxically is what has encouraged private property and capitalism to root these inequalities, megastructures announce the hypothesis of an unprecedented renegotiation of land ownership. They could, in this respect, be considered as the privileged subjects or detractors in architectural terms–both synchronous and latent–of the argument developed by Hardin.[4] At the same time, and criticizing a faulty distribution of the ground resources (both unequal and defective),[5] megastructures suggest the possibility of an anti-enclosure, leading to their pooling.

Megastructures: for which 'common space'?[6]

All the oppositions on which the principle of megastructure has been affirmed integrate the relationship between collective and individual

3. The group of Florentine architects is particularly involved in publishing political articles in international architecture journals of the time. Andrea Branzi's "Radical Notes" published in Casabella are particularly significant. [Archizoom Associati], «Archizoom: progetto di concorso per l'università di Firenze», *Domus*, no. 509 (Avril 1972): 10-12.

4. Although both discourses coexist during the same period, Garrett Hardin does not refer to any architectural currents in his writings. The protagonists of megastructures, on the other hand, directly base their principles on the political, social and economic context of their time, even though they do not refer to the writings of the American ecologist about the *Commons*.

5. The uncontrolled development of the suburbs generated by 'the motorization' of urban sprawl is a criticism regularly raised by interpreters of megastructures. Michel Ragon, "Architecture et megastructure", *Communications*, no. 42. "Le gigantesque: gigantisme animal, mégalithiques, méga architectires, grands hommes…", (Paris: Seuil, 1985), 72.

6. The notion of 'common space' (as well as 'space of commoning') is currently discussed in interdisciplinary thinking about the Commons and their spatial implications (David Bollier, *Think Like a Commoner*. A short introduction to the life of the Commons, (Gabriola Island: New Society Publishers, 2016). Although it is very used and potentially relevant, it is not yet well defined. Since its theoretical scope is still the subject of much debate, it is used here in a more prospective register than a strictly factual one.

in a particularly effective way. The large collective scale is an artificial and permanent structure. Individual elements of small dimensions are spontaneous and temporary infills. Such a radical reduction, limited to two preponderant and extremely readable registers, nevertheless entails the risk of excessive simplification, not facilitating the declination and the interweaving of all levels of collectivity. One could thus formulate for the megastructure the same remarks that those done by Colin Rowe and Fred Koetter on modern space, and more particularly on the open space which characterizes the *grand ensemble*. In *Collage City*, the authors regret a too strong simplification between the object and the free space that surrounds it, which is automatically and counterproductively associated with the status of public space. They also address the glaring lack of intermediaries between two major polarities: the public and the private[7] . Although based on a radically binary scheme, the megastructure contains more ambiguities than the *grand ensemble*.[8] As an ultimate conciliation between buildings and city[9], the different statuses involved in the megastructure are difficult to distinguish. Does it relocate the public space into a constructed form—totally and ideally public? Or does it still support and serve private estates, as public space does? Is it in itself the collective intermediary between the private units that it contains, and the public soil from which it is detached? Contrary to its original intentions, could it represent a private object erected on public soil, in the manner of a large building within which other sub-property relationships would occur? Confronting such juridical reading grids with the imagination of such a radical movement might be perceived as inoperative. It also can become useful when the architectural vision influences the social conception of the space to such an extent, and in particular its common character(s). Therefore, it is worthwhile to consider three distinct levels of 'common spaces' related to the megastructure: the ground, the support and the cluster.[10] Each of them entails the notion of 'common' according to distinct ambitions, both closely related, and tragically irreconcilable.[11]

7. Colin Rowe and Fred Koetter, *Collage City* (Cambridge: Massachusetts Institute of Technology, 1978), 66.

8. Bokshub Shong, "Le concours d'Évry I: un vecteur pour la nouvelle culture architecturale?", in *Éléments pour une histoire des villes nouvelles*, (Paris: Le Manuscrit, 2005).

9. Ibid.

10. Beyond technical and compositional innovation, megastructures also represent a particularly semantic moment. Specific notions have accompanied the appearance of new architectural forms. Most of them also accompanied their disappearance, and still remain very attached and connoted to the idea of megastructure.

11. Hardin's use of the notion of "tragedy" in his article is not directly understood in its unhappiness connotation, but in terms of "the solemnity of the remorseless working of things" quoting the words of the British philosopher Alfred North Whitehead. Garrett, "The Tragedy of the Commons", 1243-1248.

The large common ground

From The Continuous Monument to No-Stop City, all the radical utopias imagined by Archigram, Archizoom, Superstudio, and most of their fellows are remarkable for their ability to take a step back from the territory they highlight. They are staged in an a-geographical and extra-temporal view of Earth's surface, alluding to the same intensity as the first photographs of the globe taken from the space. Urban projections do not display any limits in the imaginary they convey. In contrast, the world appears generally finite, taken as it is: as a resource to be preserved.[12] Load-bearing elements are punctual, excessively limited (both from the point of view of stability and access). They appear almost transient and revocable, without imprints. There is a total dissociation between what

12. From this point of view, the wide-angle accentuation of the Earth's curve in *New New York* montage by Superstudio (1969) is fully expressive.

already exists on the ground and what starts again differently. This large ground undergoes a sort of reset, whether it is built or even preserved from urbanization. The Earth's surface is perceive as once again charged with an original character, despite a paradoxically very invasive distancing. From the suburbia to the national parks, all sorts of landscapes are exploitable. Everything becomes common good. The territory takes on the value of a "neutral material, continuous and homogeneous".[13] Such an assumption could be related to Garrett Hardin's discourse, particularly to his considerations on the globalized effects of negative externalities related to pollution[14] . However, the ecologist does not consider all their consequences equal on the surface of the globe. This leveling is detached from the values traditionally applied to territorial distinctions and it amplifies in a quasi-schizophrenic way the constitution of a 'common world',[15] artificially renewed.

13. [Archizoom], "Archizoom: progetto di concorso per l'università di Firenze", *Domus*, no. 509, (1972): 10-12.

14. Garrett, "The Tragedy of the Commons", 1245.

15. Expression used by Hannah Arendt to formalize the idea of a transcendence of individual and current lives. Hannah Arendt, *The Human Condition*, (Chicago: The University of Chicago Press, 1958).

The support of cohabitation

The architecture of the megastructure detaches itself from the large 'common world' in order to rebuild another superimposed one. As a support, its primary structure materializes a celebration of the living-together, depicting the image of an infrastructure.[16] The ability of architecture to spatially root a collective dimension is then shifted from the scale of the building to a larger one: that of the 'super-building', that of the city or even beyond. In the megastructure, the strength of self-representation potentially forged by architecture is exerted at a larger level, probably never equaled. Conditions for supporting a collective architectural projection on such a scale inevitably introduce a number of difficulties. Among them—and this is probably one of the main factors breaking away with the city logics—those caused by the rejection of the proven importance of land ownership in the constitution of the urban space[17] occupy a major and highly political place. Since the emergence of cities, the parcel division and the importance of boundaries have been one of the primary means available for urban maintenance and development. Nevertheless, this fundamental aspect is largely diluted in the semantic shift from the plot limits as a 'structure' (metaphorically the hardware) to the structure itself as a material and designed reality. The interweaving of various programs in the same spatial and structural entity automatically induces some difficulties in recognizing the corresponding areas and responsibilities. The difficulties once this built continuum is raised from the ground can be even greater when its structural configuration implicates limited and therefore shared bearing points. The renegotiation of the land propounded by the megastructure implies an extreme complexity of ownership relations. The possible legal conundrum can be avoided through the supervision of a management authority (public or private). More radically and more simply, the alternative consists in the

16. Yona Friedman uses 'the network of support' to qualify the hard and indeterminate infrastructure conceived in anticipation of a multiplicity of elements to accommodate. Yona Friedman, Pour l'architecture scientifique, (Paris: Pierre Belfond, 1971), 60. Jacques Lucan uses the term 'support' in the chapter entitled "Aggregative Structures and the Non-Plan" of *Composition, Non-composition. Architecture and Theory in the Nineteenth and Twentieth Centuries* (Jacques Lucan, *Composition, Noncomposition. Architecture and Theory in the Nineteenth and Twentieth Centuries*, (London: Routledge, 2012), 476)).

17. Hans Bernoulli, *Die Stadt und ihr Boden*, (Erlenbach-Zürich: Verlag für Architektur AG, 1946).

cancellation of any type of property–without even determining how the construction, maintenance and governance of such an infrastructure could be ensured. This last vision remains the most faithful to the idea of associating the megastructure with an artificial common good.[18] It is also the aspect that would have incurred the harsh criticism of Hardin. His argument is particularly skeptical concerning the ability of a group of individuals to ensure the maintenance of a shared good, without seeking (consciously or unconsciously) to satisfy personal interests, to the detriment of the general ones. Indirectly, Hardin might have predicted the ruin of the megastructure. However, beyond the operational scope, he would certainly not have measured the architectural power of this ruins; neither the incredible programmatic potential that these 'colossus' would have produced if they all had been realized. It is just as likely that his main detractor, the American political economist Elinor Ostrom, could not have unconditionally supported the more optimistic idea of a reasoned self-government.[19] The large number of potential participants would far exceed the limits of the models she has experimented with[20] . Upon reading her works, principles of collective action do not seem sufficient to sustain the growth of such a resource, due to its technical challenge and its scale.

18. Elinor Ostrom, *Governing the commons, The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990).

19. Elinor Ostrom is recognized as the leading specialist of the commons. Her studies earned her to receive the attribution of the Nobel Prize in Economics in 2009. She is the main detractor of the argument developed by Hardin. His book entitled *Governing the Commons: The Evolution of Institutions for Collective Action* (Ostrom, *Governing the Commons*, 188) is an explicit answer and alternative to "The Tragedy of the Commons" (Hardin, "The Tragedy of the Commons", 1243-1248) highlighting the ability of a limited group to self-organize the maintain of a resource.

20. Ostrom, *Governing the commons*, 188.

The community clusters

Subdivision into sub-objects is one of the solutions regularly adopted by architects to overcome the gigantism of megastructures. Not all the megastructural experiences accord the same importance to uniformity and the expansive continuum. The project *No-Stop City* by Archizoom certainly represents the most advanced exploration in those terms. Other architectural projects have sought to introduce an intermediate scale into the founding and radical duality between the whole and its parts. Most certainly driven by a greater concern for realism, the subdivision generally results in groups of units, forming clusters.[21], the most realistic megastructures seem to have been inspired by the second one. While the 'megaform' appears unprecedented in the history of architecture, the group-form is reminiscent of traditional constructions accumulated. It reassures by its efficiency and proven experience. In fact, realized megastructures tend to give greater importance to the underlying characteristics of their own components. The compositional fragmentation reduces the architectural issues to a well-known theoretical and practical framework, closer to that of 'the city of the ground'.[22] The political scope of such a division also reduces these initially radical ambitions to more down-to-earth issues: to more economic and safer configurations,[23] also easier to grasp than the large continuous system. In the passage "from the megastructure to the monumental building"[24] a whole fraction of the traditional urban culture is also reenacted, especially in the recalling of the division into neighborhood units, urban segregation or communitarianism.

21. The debate on the dimensions of the urban is already animated since the publication of *The Neighborhood Unit* (Clarence Arthur Perry, *The Neighborhood Unit*, (London: Routledge/Thoemmes Press, 1929), but it intensifies particularly after the apogee of the Modern Movement, with the strong contributions of Alison and Peter Smithson. Among them, the project for *Golden Lane* (1952) is probably one of the most relevant because it announces the introduction by Kevin Lynch of the concept of 'cluster' (Kevin Lynch, "The Form of Cities", *Scientific American* 190, no.4 (1954): 58). It will be named *Cluster City* thereafter. Nowadays, new forms of shared housing are mobilizing this notion of 'cluster' at the housing scale.

22. In contrast with the suspended one, 'the city of the ground' here refers to the city with traditional plot divisions, that analyzed by Aldo Rossi during the same period (Aldo Rossi, *L'architettura della città* (Padova: Marsilio, 1966), English version: Aldo Rossi, *The Architecture of The City* (Cambridge: MIT Press, 1982)). Although The Architecture of the City represents a categorical alternative to the megastructural narrative, both argue to a possible concordance between architectural form and urban entity. Moreover, they both suggest the idea of a truly collective architectural form, summoning two different major principals: typology versus neutrality.

23. Yona Friedman, *L'architecture de survie* (Paris: Casterman, 1978).

24. Referring to the words that Jacques Lucan used in *France, Architecture 1965-1988* see Jacques Lucan, *France, Architecture 1965-1988* (Paris: Electra, 1989), 86.

The return of the urban parceling is expressed even more strongly when the group-forms are formally dissociated from the continuity of the whole building mass. The total insulation can go so far as to produce an autonomous and unitary section of megastructure, usually retaining a somewhat modular and expansive aspect. But the geometric definition of the fragment and its persistent autonomy continue to betray the common ideal initially affirmed, in favor of a sum of communitarian colonies, very spatially instituted.

Enclosure again

To reevaluate the contemporary legacy of megastructures means formulating a double failure. First, its salutary impact on the democratic conception of the urban realm is tragically limited, as described before. Perhaps even more surprising is the disturbing recovery of some of their architectural characteristics in more pragmatic, conformist and lucrative schemes, far removed from the contentious vision of the megastructure's pioneers. The resurgence of complex and very large projects has influenced the international architectural scene of the past twenty years. The latest most publicized designs by OMA studio are among the most representative.[25] Like megastructures, these 'big-buildings'[26] far exceed the scale usually assigned to a building. They break with traditional methods, asking for more particularly sophisticated processes. Legal, financial and decision-making dispositions are adapted to their vastness, as well as their technical and programmatic tangle. The reason for the 'big-building' success—and what distinguishes it from its valiant predecessor—is undoubtedly its relative political disengagement and its economic viability within the commercial sphere. Monumentality no longer embodies the celebration of the common space, but that of power or brand image. It is a promotional vector, celebrating a selective appropriation. The collaboration with the public decision-maker—from which private interests still depend—is often limited to market opportunities and administrative procedures. The political scope of these descendants hence remains far removed from the societal, universal and inclusive substance, which substantiated the vision of the megastructure until the seventies. Even within the repertory of megastructural experiments, some architects had already begun to deviate from Ralph Wilcoxon's 1968 definition, namely to be "capable of great or even 'unlimited' extension"[27]. They undertook the experiment of a contortion of the system, delimited and folded on itself, as visible in the project imagined by Frei Otto in 1971 for a city for 40,000 inhabitants, entirely contained under a 2-kilometer dome, situated in the middle of an extensive and homogeneous Arctic environment [Fig. 3]. For the second version of his *Thalassa* project, designed in 1963 for the Bay of Monaco, Paul Maymont gave the floating city the finished and centripetal contours of a ring. The use of these enclosed forms illustrates the co-presence

25. Rem Koolhaas's passion for the Japanese metabolism movement is described by Jacques Lucan in *Composition, Non-composition. Architecture and Theory in the Nineteenth and Twentieth Centuries* (Lucan, *France, Architecture 1965-1988*, 478). It has certainly influenced the design of projects such as the '*Très Grande Bibliothèque*' (1989), the 'Hyperbuilding' (1996), the CCTV headquarters (2012), or 'De Rotterdam' (2013). Besides, *Delirious New York* (1978) already highlighted how the most extreme capitalism had been able to appropriate the megastructural scale for lucrative purposes, while keeping a close link with the soil, and especially with its profitability.

26. See the thesis of Marta Meira Brandão, The Big Building Housing and Complex Design Strategies [Thesis], completed in 2017 at the École Polytechnique Fédérale of Lausanne - Lausanne, 2017. https:// infoscience.epfl.ch/ record/225961/?ln=fr.

27. Ralph Wilcoxon, *Council of Planning Librarians Exchange Bibliography*, 66 (Charlottesville: University of Virginia, 1968).

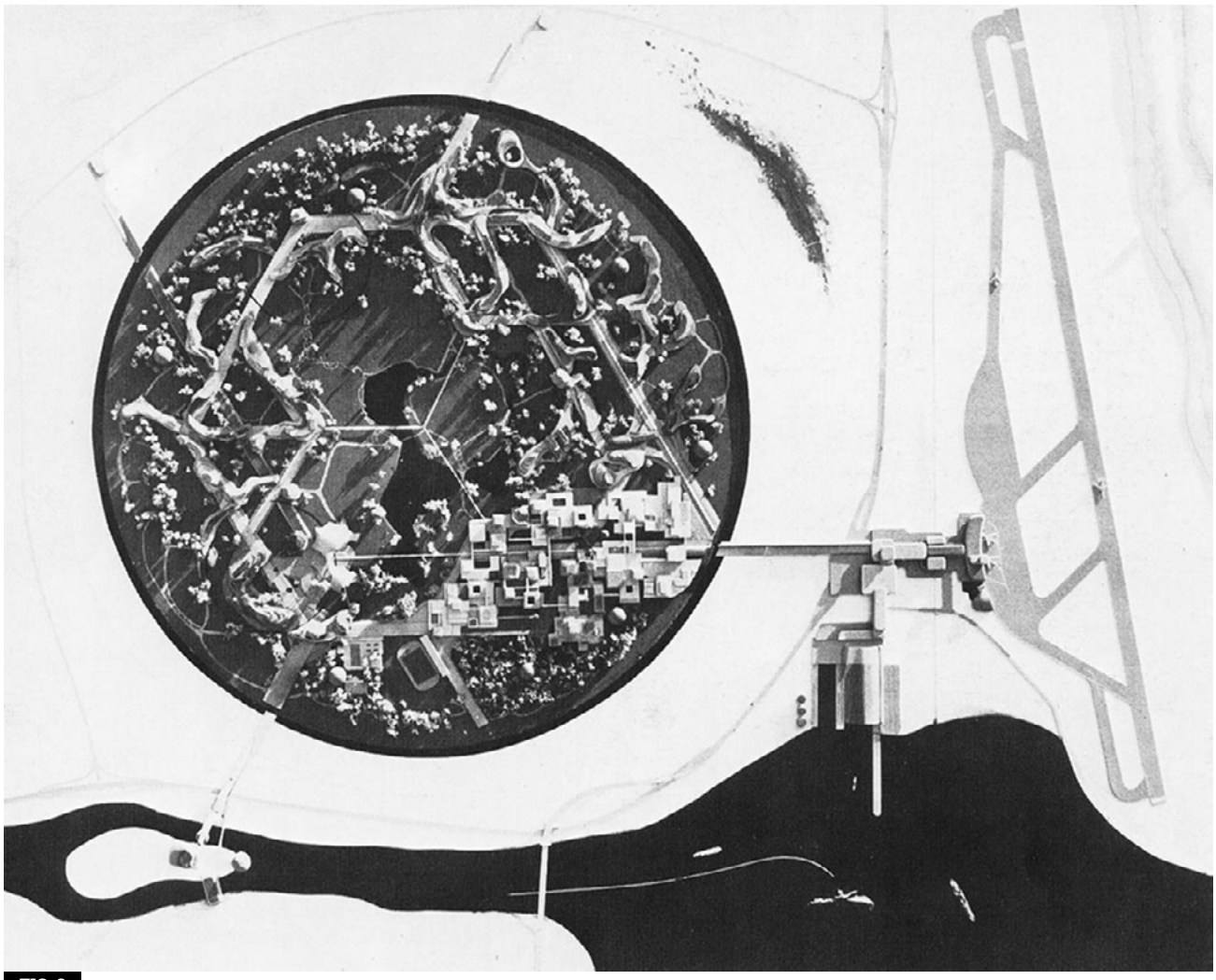

FIG. 3 In Frei Otto's project named *The Artic City* (1971), the powerful contrast between the enclosure bounded by the dome and the expanse of the surrounding great ground is particularly striking. (http://socks-studio.com/2015/10/03/the-artic-city-a-project-by-frei-otto-and-kenzo-tange/ accessed December 12th 2018)

of divergent directions within the same debate, and already portends some latent drifts: those from the 'common' to the communitarianism, or from unicity of the system to the heterogeneity of the objects. Against their original intentions, and because of their lack of persuasion, the megastructures probably helped to revive the hegemony of the cult of the object. In this neglected interval, the 'big-building' found its place and drew all its strength. As an implicit consequence, megastructures also have reinforced the adherence to certain qualities of the traditional city: the use of limited architectural scales, the immediate confrontation of the built masse with the soil, the importance of legal demarcation on the ground of the built masse. These are all elements that the megastructure proposed to abolish, and which still occupy a preponderant, rooted and generalized place within the contemporary production.

Renunciations of public action

Public mandate has made the glory of the megastructure. As recalled by Banham in the introduction to his 1976 book *Megastructure, Urban*

futures of the recent past, "clients for megastructures were more likely to be universities, expositions, municipalities, central governments". The administrations of socialist regimes were particularly active when the real estate pressure was the weakest[28] , but also where the political will was most explicit.[29] It is under large public works policies that megastructure is most solicited, always dependent on a sufficiently asserted interventionism of the State. The infra-structure as a public investment is one of the most promising points attributed by Fumihiko Maki to the megastructure, considered as "a new three-dimensional vision of land use, in which public offices will retain ownership and maintenance of horizontal and vertical circulation systems".[30] Formulated in a political context antecedent to the collapse of the Soviet bloc, the scenario he is reporting appears today bold, even somewhat outdated. The abandonment of large extensible structures is understandable in the context of a weakening of public authority, as observed in the majority of Western countries since the end of the last century. Frightened by the scale and inertia of such buildings, public procurement has since welcomed a return to the scale of the object, a process that the public administration itself has certainly accelerated. The decline in endowments and the search for savings in operation, maintenance and replacement partly explain the renunciation of the public sector to support the construction of these "monumental follies".[31] Beyond the technocratic issues, the embarrassment felt by urban policies with regard to these colossal structures can also be explained for electoral reasons. Mainly related to the late and critical reception of the *grands ensembles*, public opinion has been opposing since the late seventies a violent resistance to massive social projects, whose dimensions are commonly accused of 'inhumane'.[32] A post-traumatic amalgam concerning the large-scale, supposedly unsuitable for human dimensions, resulted in a popular rejection of the megastructure. However, the relation to the human body is far from having been neglected by its protagonists, if one observes the abundant imaginary that it inspired in their productions. The number of studies concerning the relation between megastructure and the human body confirms it, ranging from the minimal housing capsule to the redefinition of clothing standards[33] . Regarding to megastructures the problem is not so much that of the individual relation to the architectural space. The problematic scale perhaps it is more that of the supposed dimension of the collective, and its political adequacy. The constructive nature of megastructures assumes a technical coherence and a certain degree of homogeneity. Because of it, most of them suffer from a dependence on a providential order that guarantees its overall functioning. The necessary supervision constrains very concretely, but also symbolically, this collective dimension at a critical, almost unsurpassable value.

28. Peter Reyner Banham, *Megastructures: Urban Futures of the Recent Past*, (London: Thames and Hudson, 1976).

29. Land ownership has become a regular issue in the history of development, and one of the major tools mobilized in urban renewal projects. In northern Europe in the Nineteenth century, it was one of the main conditions for reformist municipal policies for the hygienic establishment of the urban block with unitarian courtyard.

30. "Although the megastructure concept presents the problems outlined above, it also has great promise for infra-structure as public investment: substantial public investment can be made in infra-structures (the skeleton of megastructure) in order to guide and stimulate public structures around them. This strategy can be further extended to a new three-dimensional concept of land use where public offices will maintain the ownership and upkeep for both horizontal and vertical circulation systems.", from Fumihiko Maki, *Investigations in Collective Form, in A Special publication*, no. 2. (St Louis: Washington University, The School of Architecture, 1964), 8-13, quoted in Peter Reyner Banham, *Megastructures*, in Banham publication's appendix.

31. Banham, *Megastructures*.

32. Such mistrust was particularly high in France.

33. Roberto Gargiani, *Inside No-Stop City* (Paris: B2, 2017).

Hospices of privatization

The disappearance of megastructures, as they were conceived in the sixties, does not exclude the possible contemporary recovery of a number of their characteristics. Among all the generative dynamics of urban development, the private domain has been particularly hospitable. It turned out to be able to recover—or to subvert—the latest principles of these great utopias. The tools of the welfare state, especially the control of the land, proved particularly adapted to the application of the megastructural precepts in the course of the seventies. It is striking to note that today, the same conditions apply to the realization of speculative real estate transactions. Only large private companies (or consortium of companies) seem to be able to support projects of this magnitude. In the most ordinary contemporary investments, major unitary real estate operations revive the megastructure's tradition by dissociating the collective use of a built complex from the land status on which it is built. These large urban structures are commercial complexes, catchment areas, residences, business parks. They take advantage of the street as a hologram (with a public connotation) in very largely private operations. They pose in a different form the question of usurpation, or suspension, of public space in an architectural complex. In megastructures, the ambiguous nature of the accessible places is the result of a lack of spatial self-representation. It is inversely more and more conscious and motivated in large commercial structures.[34] This masquerade is sometimes so brilliantly conducted that it is impossible to recognize, as a passerby, the fundamentally private nature of the visited spaces. Such structures often prefer not to assert their nature despite their scale. This muteness illustrates a tendency to falsify the supposed neutrality of open spaces, rather than to exalt the wide and exogenous architectural events. In view of the partial resignation of the public authorities, the market sector seems today the only one able to organize—or better, to simulate—such a communion. These new practices take place in a lucrative perspective to which megastructures have generally escaped.

34. Refer to the article by Catherine Sabbah, "Espace public, espace privé, le commerce se joue des limites", *Les Échos*, (18.11.2015).

Praise of ruin

In the development of the Administrative Center of the C.D.C.,[35] Yona Friedman confronts an approach for which his contemporaries have shown very little interest: that of the structure as an 'already'.[36] Unlike most megastructures thought to be additional components laid on the natural ground, Friedman's contribution distinguishes itself by considering the skeleton of the megastructure as a part of the large natural common ground. It even resorts repeatedly to trees in order to form these frameworks. Freidman departs from the dichotomy of an artificial megastructure superimposed on a natural ground.[37] He blurs the differences between 'the common ground' and 'the common support',

35. Compagnie Dubonnet-Cinzano-Byrrh, at Ivry-sur-Seine (Paris area).

36. He says about this project: "Let's first look at the preconditions. The company C.D.C. owns a huge warehouse in Ivry, built in the 1920s, covering 2 hectares (70 000 m2 of developed area). [...] By demolishing all the walls and partitions, the building is then transformed into an empty skeleton, where the posts are distributed every 8m", Yona Friedman, "Le Centre administratif de la C.D.C. à Ivry-sur-Seine ", *L'œuvre : architecture et art*, no.1 (1976). "Lieu de travail – Espace de travail "http://doi.org/10.5169/seals-48548, with the ambition to obtain a real "spatial infrastructure" as he defined it in his previous publications [translation of the author].

37. By describing the "global infrastructure" as the biological characteristics that condition the living, Friedman brings together under the same infrastructural terminology: the architectural skeleton, the earth and its biosphere, the sun and its energy, the air around us, or whether the alternating day and night (Yona Friedman, *Utopies réalisables* (Paris: 1975),10-18).

nevertheless reinforcing to the extreme the distinction between the pre-existing permanent supports (lands and structures associated) and their spontaneous and ephemeral additions. Compared to the primary structures usually associated with the idea of megastructure, the 'artificial terrain' he proposes here is also deferred twice. It does not just precede the ephemeral and spontaneous addition of aggregates,[38] but it precedes the very idea of assuming such a role. It is a misappropriation. It is neither conceived nor realized in a megastructural perspective. Friedman opens new horizons by distancing megastructures from interventionism.[39] It inspires the citizen and local re-conquest of obsolete or abandoned infrastructures. Those are no longer considered as operational and structuring elements, but as supports for innovations, diversions and appropriations. Friedman sees in the megastructure not the formalization of an object of conquest, but the fragile frame of a possible survival. By insisting on the minimal character of the support–whose qualification of 'skeleton'[40] evokes in itself the universe of ruin–Friedman identifies an architectural issue to the tragic outcome of the megastructure [Fig. 4].

38. In accordance with the binary division described in point 3 of Ralph Wilcoxon's definition of the megastructure (Wilcoxon, *Council of Planning Librarians*).

39. This is certainly the singularity of Yona Friedman in the international landscape of megastructures, and also perhaps one of the reasons for the remarkable craze of which he is still the object. Its original approach makes possible, in particular, to affiliate a large number of rehabilitated and self-managed industrial structures into a late megastructural trajectory.

40. Yona Friedman uses in French the term "ossature" (Friedman, "Le Centre administratif". «Lieu de travail – Espace de travail». http://doi.org/10.5169/seals-48548.), referring both to the functioning of the human body and to his remains.

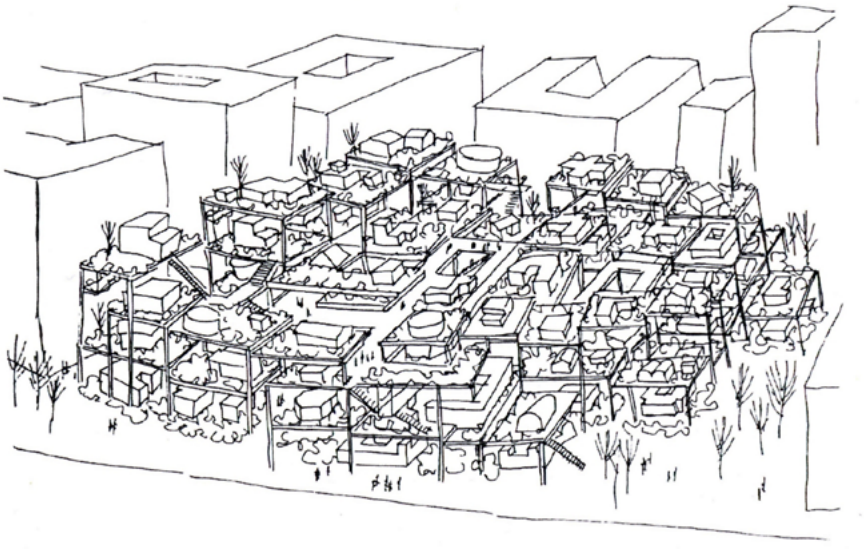

FIG. 4 *Green Architecture / Architecture verte*, Yona Friedman (1979). (Friedman, Yona, Marianne Homiridis. 2010. *Yona Friedman, Drawing & Models, Dessins & Maquettes, 1945-2010* Paris: Les Presses du Réel.)

The greatest good for the greatest number[41]

Both Friedman and Ostrom raise the question of an alternative governance–(respectively and primarily) of habitat[42] and resources–delegating the responsibility for negotiation and collective intelligence to small communities.[43] If both find some relevance in contemporary debates, it is probably because they both participate in the construction of a new useful theoretical framework. Their works help to understand certain emerging directions at the economic, political and social levels,

41. Jeremy Bentham's formula is the spearhead of Garrett Hardin's argument. In his article "The Tragedy of the Commons" he formulates the criticism of a too immediate political interpretation of such a principle, by the demonstration of its main drifts. "The greatest good for the greatest number" has also had a number of repercussions in the history of architecture. The main ones resonating in the names of Robert Owen (one of Bentham's disciples and associates), Charles Fourier or Jean-Baptiste André Godin.

42. 'Habitat' is here understood in the broad sense of the condition of living on the territory.

but also certain architectural orientations that is urgent to develop. In this endless quest for "the greatest good for the greatest number", megastructure could represent to future architects a useful figure of a modern epic. By its heroic character, the tragedy of the megastructure challenges its contemporaries on the political and architectural capacity to conceive the massive nature of the human habitat, without getting into the real tragedy: one's of the unsubstantial urban sprawl.

43. Michel Ragon anticipates the territorial consequences of such a rebalance: "Since large cities are also the result of state concentrations, the image of political power engraved on the ground, it is impossible for cities to wither away if the state remains strong and centralizing. A society without a city would be a society where all political power would have disappeared. In other words, a society which has reached a degree of maturity so exemplary that the government of men would have replaced the administration of things, according to the Saint-Simonian formula, taken over by Marx." (Ragon, "Architecture et megastructure", "Le gigantesque", 69-77 [translation of the author]).

VISUAL

Megastructures and nostalgia for the future.

A CONVERSATION WITH

Simon Stålenhag

Things from the Loop, pp. 18-19, 2015 © 2016 Simon Stålenhag

BIOGRAPHY

Simon Stålenhag (b. 1984) is a Swedish concept artist. His work combines his childhood with science fiction visions resulting in a typical Swedish country landscape with retrofuturistic elements. "Tales from the Loop" was ranked one of the "10 Best Dystopias" by The Guardian, along with such works as Franz Kafka's The Trial and Andrew Niccol's Gattaca. Stålenhag also illustrates prehistorical landscapes and dinosaurs for the Swedish Museum of Natural History and the pictures of hypothetical results of a rising ocean under climate change for Stockholm University's Resilience Centre.

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KEYWORDS
megastructures, dystopia, fictional landscape

Where does the inspiration for your visual universe come from?

My biggest influences and inspirations for making The Electric State was listening to early 90s alternative rock and grunge, especially Nirvana. I was also watching a lot of early *X-Files* and mid 90s horror films like *The Langoliers*[1] and *In The Mouth Of Madness*[2]. I wanted to capture something of that era in terms of mood and culture, in particular the youth counter culture of the 90s. I often start with looking for the right music for the project.

Right now I am listening to a lot of quite scary sounding music, with modern composers like Morton Feldman, Bernard Parmegiani and Tod Dockstader. But for *The Electric State*, and to find the character of Michelle, I listened to a lot of American alternative rock from the early to mid 90s. In my early notes of the story I actually called Michelle "Negative Creep", after the Nirvana song.

1. *The Langoliers* is a horror miniseries based on a novel by Stephen King (1995, ABC) network.

2. *In the Mouth of Madness* (1994) is a horror film directed and scored by John Carpenter.

You often cite the influence on your work by Syd Mead[3] and Ralph McQuarrie[4]. What is the aspect of their work that has struck you most? They are two artists that had a unique impact on contemporary imagery but may be different from each other: would you like to tell us which is the specific work of each of them that most impressed you?

I don't really agree that they are very different from each other, I think they are quite similar actually. Both working in opaque gouche mediums, and excelling in doing hard detailed renderings of hard surface designs. If I had to chose one important piece for each, I would say something of McQuarries from Tatooine, that one where the sandpeople are unloading the Sandcrawlers at dawn in the desert [Fig. 1].

3. Sydney Jay Mead is an American industrial designer and neofuturistic concept artist, known for his designs for science-fiction movies such as *Blade Runner* (1982, Ridley Scott), *Aliens* (1986, James Cameron) and *Tron* (1982, Steven Lisberger).

4. Ralph Angus McQuarrie (June 13, 1929 – March 3, 2012) was an American conceptual designer and illustrator. He worked on the original *Star Wars* trilogy, *Battlestar Galactica* television series, *E.T. the Extra-Terrestrial* (1982, Steven Spielberg), and *Cocoon* (1985, Ron Howard), for which he won an Academy Award.

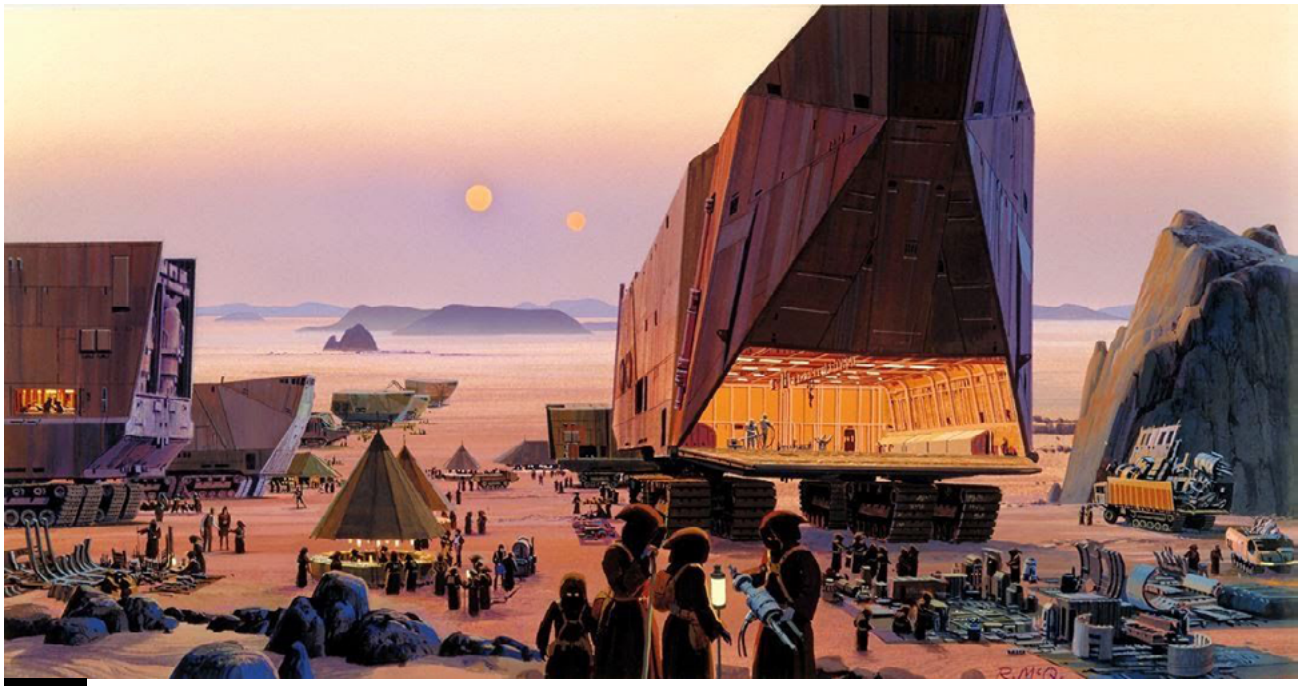

FIG. 1 Ralph McQuarrie, Welcome to Tatooine, concept artwork for Star Wars (1977) © 1977 Ralph McQuarrie

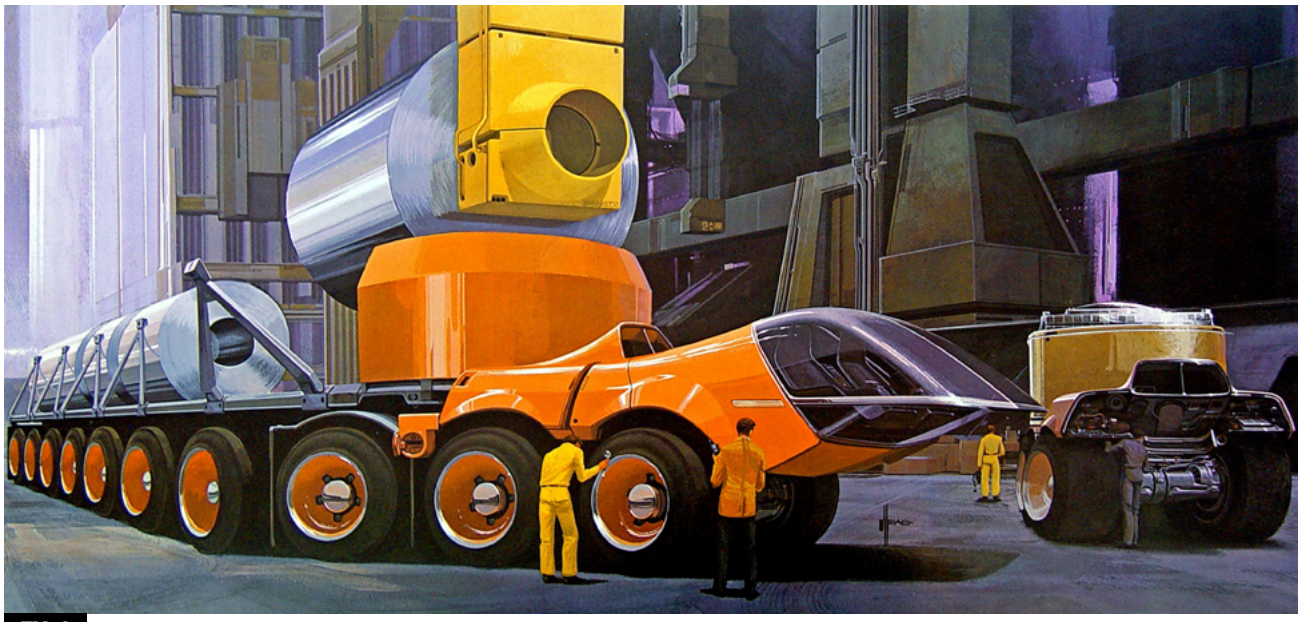

FIG. 2 Syd Mead, *US Steel,* 1961 © 1961 Syd Mead

For Mead, it would probably be the big orange truck from the US steel ad campaign from the 60s **[Fig.2]**.

Their work (and their contemporary peers' work) influenced me in my discovery of Sci-fi art in my mid 20s. but my biggest influences earlier in life was definitely Swedish wild-life artists Gunnar Brusewitz[5] and Lars Jonsson[6] **[Fig. 3]**. I discovered their work as a little nature-loving kid, and without their influence I wouldn't even have been drawn to art at all. And then in my teens I discovered the amazing album art of Storm Thorgerson[7] and Hipgnosis **[Fig. 4]** which had a huge impact on my artistic devolpment in my mid to late teens as well.

5. Kurt Gunnar Brusewitz (1924 - 2004) was a Swedish author, artist and cartoonist.

6. Lars Jonsson (1952) is Swedish naturalistic painter. He has been included in Birds In Art at the Leigh Yawkey Woodson Art Museum since 1982, and he was named Master Wildlife Artist there in 1987.

7. Storm Elvin Thorgerson (1944 - 2013) as an English graphic designer and director. He created work for artists including Pink Floyd, Led Zeppelin, Black Sabbath, Peter Gabriel, Genesis and Yes.

FIG. 3 Lars Jonsson, Winterdawn in Ussuriland

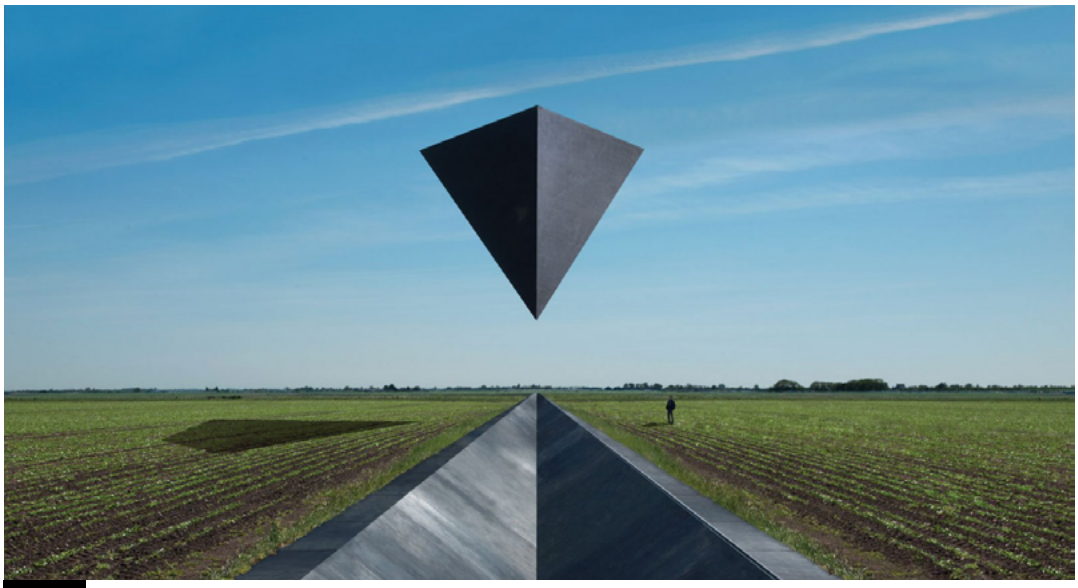

FIG. 4 Storm Thorgerson, The big groove, cover for "Synrise" album by Goose, 2010 © 2010 Storm Thorgerson

Which is the first image you visualized of the Loop cycle?

The first image I made was actually a dinosaur in an orchard. I did it in 2011 and it was the piece that let me think of ways to write a story where robots and dinosaurs could exists in the same place while also being set in my childhood. So I started writing about a very strong secret particle accelerator deep underground the small town that I grew up in, and I tried to imagine how it would have been if that facility really had existed when I was a kid and what memories I would have had from that time.

FIG. 5 "The arch towers at Klövsjö", Simon Stålenhag, *Tales from the Loop*, p. 15, 2015 © 2015 Simon Stålenhag

FIG. 6 "The sky was vaguely bluish, and out there in the morning light we passed a never-ending stream of small towns and suburbs", Simon Stålenhag, *The Electric State*, p. 46, 2017 © 2017 Simon Stålenhag

Which technique do you use? Where does your creative process start from?

All my color art is digital. I do the occasional ink drawings, but the bulk of my work is digital. I take a lot of photos of things around me. I go for long walks with my camera, and I think a lot of the ideas start there - outside somewhere, probably in the countryside.

The characters of your works are often children. Why?

I think I feel most confident writing about the experience of being a child or a young person **[Fig. 5]**. I'm 35 now, and I don't have any kids of my own, so in a way I still feel like my teenage years aren't that far behind me. The experience of being in that age is still very clear in my memory and I wouldn't dare writing about any other age yet. I don't feel I have the life experience.

Why are technological or architectural structures of your images gigantic and ruined?

All my books are set between the late 80s to the late 90s, and the architecture and mechanical designs are mainly a way for me to play around with the aesthetics of that era, or of science

fiction of that era. I'm not really concerned with speculating about the future, I think my work is more of a twisted echo of the past. Most of the man-made stuff we see around us is old and used. I mean, in the lifecycle of a man-made structure there are many more years that they are going to look old and used rather than shiny and new. It just makes more sense that you would encounter it when it has blended in with its environment. And in terms of the "ruin" bit - I think it has to do with the mystery of ruins. It's just a mood that I love to explore. It raises questions, it gets your brain working. In the end the landscapes of Electric State are much more about consumerism, not industrialism. I'm hugely inspired by the architecture of post-war Sweden. That is what you see in my art - most of it are real houses and buildings that exist in Sweden. I just proposed hypothetical architecture a few times in my artistic work and it's oftentime based on that era of Swedish architecture -50s-60s-70s.

For what concerns your works, the adjectives hauntingly and dystopic are often used. What do you think about this?

I think it's accurate to some degree. With my first two books I didn't really imagine that world to be very dystopian. It's more a reflection of my own childhood, so to me it's also a quite well functioning society, and also a very free society, just as Sweden is and was when I grew up. As for "hauntingly" I think it has to do with my preference for twilight and gloominess, which concerns the weather in Sweden I guess. That's how I grew up. *The Electric State* is definitely dystopian. It's almost post-apocalyptic even [Fig. 6]. Unlike The Loop-books, something has gone really bad with society as a whole, whereas in the Loop books, it's just the one facility and a small town.

Megastructures and nostalgia for the future.

GALLERY

FIG. I "The three cooling towers at Bona were a constant presence in the landscape on Mälaröarna. They rose from the fields far out on northern Munsö, in the small community of Bona. The main function of the towers was to release heat from the Gravitron, the core of the Loop that provided the facility with the enormous amounts of energy it required. The middle tower was an im-pressive 253 meters in height, and the towers were a characteristic landmark visible from all of Mälardalen.", Simon Stålenhag, *Tales from the Loop*, p. 11, 2015 © 2015 Simon Stålenhag

FIG. II *Things from the Loop*, pp. 12-13, 2015 © 2016 Simon Stålenhag

FIG. III "The apartment was at the bottom of the Hägerstalund's Diving Tower, one of the twelve vertical cities in Mälardalen. They were built between 1965 and 1970 ad a part of a major public housing program, and Hägerstalund alone consisted of about 1,500 aprtments. The ground level held a subway station, library, school, daycare, and shops. The tower was crowned with the characteristic water tower." Simon Stålenhag, *Things from the Loop*, pp. 16-17, 2015 © 2016 Simon Stålenhag

FIG. IV *Things from the Loop*, pp. 22-23, 2015 © 2016 Simon Stålenhag

FIG. V Simon Stålenhag, *Things from the Loop*, pp. 48-49,, 2016 © 2016 Simon Stålenhag

FIG. VI "Whole apartment complexese that looked like they were getting their energy from salvaged suspension engines had sprung up there", Simon Stålenhag, *The Electric State*, p. 41, 2017, © 2017 Simon Stålenhag

FIG. VII Simon Stålenhag, *The Electric State*, pp. 78-79, 2017 © 2017 Simon Stålenhag

FIG. VII Simon Stålenhag, *The Electric State*, p. 92, 2017, © 2017 Simon Stålenhag