The hybrid building concept. Topological characterisation as a project resource

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The hybrid concept, in general terms, has its origin in the field of biology. As defined by the Royal Academy of Spanish Language, 'hybrid' has different meanings: "it is an animal or vegetable procreated by two individuals from different species"; "it is the result of a combination of elements of different nature"; "it is an individual whose parents are genetically different"[1].

The concept of biological hybridisation was first introduced by Aristotle, who theorised about the origin of certain animal species as a result of cross-breeding[2]. He also observed the tendency toward 'hybrid sterility', or the infertility of species as a consequence of genetic cross[3]. In the 18th and 19th centuries, the geneticists Kolreuter and Mendel laid the biological and mathematical foundations for the hybridisation of forms of life. Kolreuter also discovered 'hybrid vigour' or 'heterosis', defined as "[...] the tendency of cross-breeding to produce an animal or plant with a greater hardiness and capacity for growth than either of the parents."[4]

The concept has been extrapolated to other fields of knowledge as, for instance, the field of mechanics, in order to describe engines and vehicles that can function with both fuel and electricity[5]. In the architecture field it is a term that generates controversy and confusion around details that allow a building to be considered hybrid or not, depending on the author's criteria.

Almost every author will agree that a hybrid building has to house a range of uses. This is the reason why Martin Musiatowich claims that hybrid buildings were ignored or confused with mixed-used buildings[6], until the publication of "Hybrid Buildings" by Joseph Fenton (1985)[7]. In accordance with Musiatowich's understanding of the matter, the difference between the hybrid and the mixed-uses building is that in the former, individual programs "relate to one another and beings to share intensities"[8].

Although the word 'hybrid' was sometimes used in terms of architecture prior to Fenton's publication[9], "Hybrid Buildings" may have been the first extensive theoretical development of this concept, rather than any other seemingly similar architectural concept.

In order to illustrate the term, Fenton classified a series of American high-rise buildings from the end of the 19th to the beginning of the 20th century, based on their morphological composition [Fig. 01].

If we look exclusively at the definition of a hybrid building and its differentiation from mixed-use buildings, it is not surprising that there is some controversy and confusion around other categories, such as social condensers and megastructures.

Recent research also challenges the multifunctional nature of the hybrid building[10]. These studies suggest that nature-to-hybridate is not about the use of architecture, but about infrastructural and landscape components.

Through a comparative analysis of functional character (use), typology (shape), topology (system) and semantics (verbal definition), the intention is to clarify differences between contemporary hybrid buildings and other typologies and architectural classifications. The analysis will provide an updated definition of the hybrid building concept and will verify the topological characterisation of contemporary hybrid buildings. Beyond achieving a categorical definition, the idea is to evince a design method and present architectural hybridisation as a strategy or project tool.

Soviet Social Condenser

The social condenser concept was introduced by Moisei Ginzburg as a new architectural type that intended to transform the house, the factory and the club in accordance with the political and social conditions of the Soviet Union[11].

Because both social housing and social clubs have different spaces for community activities, they are usually mistakenly considered hybrid buildings. Aurora Fernández Per, in "Hybrids Versus Social Condensers", identifies some of the differences between hybrid buildings and social condensers[12]. She focuses on the type of project promotion, land ownership (public, private or mixed) and political sphere in which they originate, as the main differences[13].

The Unité or minimum housing is the best-known social condenser. It is based on the extreme reduction of the dwelling private space and the collectivisation of almost every dwelling family space.

On the basis of a functional analysis, social housing and the residential hybrid are the same type[14]; in both models, circulation areas function as triggers for social activity[15]. However, on the basis of a user analysis, social housing and hybrid buildings are different. Whereas the residential hybrid has facilities accessible to residents and external users alike, the social condenser only supplies the needs of a gated community.

In social housing, the relationship space is part of the building that is arranged in a community way, whereas in the residential hybrid, the relationship space is part of the city that steps into the building.

This difference in the approach to socialization space has direct implications on the structuring of both building models. In a comparison between the Narkomfin social housing development by Moisei Ginzburg and Ignaty Milinis [Fig. 02] and the Linked Hybrid by Steven Holl [Fig. 03], from a topological perspective, it can be noticed that social housing responds to a more conventional system that places collective spaces in lower levels and private ones in upper levels[16]. Holl's Hybrid, however, looks for the closest possible connection between public and private space by placing public facilities in upper levels, as a connection ring between the different residential towers.

Nevertheless, the Soviet idea of merging community facilities and housing in one same building can be taken as a necessary precedent that allowed imagining the later megastructures and modern hybrids as buildings capable of housing space for public use.

Regarding the social condenser in its workers' club modality, it is even more difficult to discern the so-called hybrid with a thematic program.

According to Fenton, buildings with different programs that revolve around a theme are a subtype of hybrid[17]. This is the reason why the Downtown Athletic Club in New York [Fig. 04] appears in his catalogue of hybrids[18].

Fernández Per affirms that the Soviet Social Club was not a hybrid building because, for a building to be hybrid, it should combine initiative, investment and management, both public and private[19]. This approach is misleading because, as Federico Soriano claims, nowadays some public-owned spaces function as private, and vice versa, private spaces are used publicly; the relational space or collective space is independent from the land ownership[20]. In order to discern whether a building is hybrid or not, it is important to understand its capacity to engage different types of users.

That capacity lies in the topological arrangement and organisation of the building as a whole. It revolves around the idea that the general system of the building allows or even develops interrelationships between spaces that could be used publicly or privately.

Koolhaas, years after explaining in *Delirious New York* (1978) the similarity between the Downtown Athletic Club and the constructivist social condensers[21], uses his own interpretation of the social condenser as a project resource for the Villette Park in Paris [Fig. 04]. He divides the park into different strips and, as if it were a section of a mixed-use building, he assigns every strip to a different program[22]. He makes use of mixed-use as a project tool: Regardless of the functional program raised by the developer, imagines endless potential activities and articulates the project according to these; the result, without sacrificing the original program and its use in the entire plot, may respond to potential programs that go beyond preliminary needs.

What allows differentiating the social club from the hybrid building is the asyndeton[23] generated by omitting the mobility system and relegating circulation between floors exclusively to the elevator and stairs. The absence of a diagrammed system, independent of the programs of each floor, that connects every level, apart from hindering the mixing of programs, also hinders the building from being used in both a public and a private way.

Architectural Megastructures

Avant-garde architecture in the mid-20th century has sparked a paradigm shift in history. These radical architectures had simultaneous origins in the United Kingdom and Japan, and took less than a decade to globalise[24]. Quite interesting for this study, due to their similarity to hybrid buildings, are the architectural megastructures that happened to crop up during this period of history (a fact which highlights the lack of studies relating both)[25].

According to Fumihiko Maki, "The megastructure is a large frame in which all the functions of a city or part of a city are housed. [...]. [Inherent in the megastructure concept] is the suggestion that many and diverse functions may beneficially be concentrated in one place."[26]

One of the best examples summarising the megastructuralist theory is Kenzo Tange's project for the urbanisation of Boston Harbour, developed with some MIT students [Fig. 05][27]. Of special interest is the analysis that Maki makes: "[Professor Tange presents a proposal that] includes a megaform, and discrete, rapidly changeable functional units which fit within the larger framework. [...]. Tange's megaform concept depends largely on the idea that change will occur less rapidly in some realms than it will in others, [...]. This suggests that the megastructure which is composed of several independent systems that can expand or contract with the least disturbance to others would be more preferable to the one of a rigid hierarchical system. [...]. Two basic operations are necessary to establish this optimum control mechanism. One is to select proper independent functional systems and to give them optimum interdependency through the provision of physical joints at critical points"[28].

Regarding the megastructure, the functional and the topological analysis converge. As Maki notes, the main goal of megastructures is to house all the functions of a city. However, in a seemingly contrary way, their project techniques are based on functional indeterminacy and capacity for change. The megastructuralist architectural project takes shape based on the selection of different unstable 'functional systems' and also through articulations and interrelations between them.

The megastructure is defined by balances between formal and architectural determination and indeterminacy. The global megaform is configured mainly by the interrelations among the different parts, which set up the internal mobility system of the building. With regard to the building-city simile, this mobility system acts as an infrastructure of streets and public-use spaces.

When comparing the explanatory diagram of the megastructure composition [Fig. 05] with the diagram of mobility system and connections with the environment from OMA's Kningin Julianaplein project [Fig. 06], the megatrsucturalist influence on the hybrids of the 21st century is quite clear. Despite the differences between the overall shape of the Boston Harbor project and the hybrid of OMA, both respond to the method described by Maki.

The similarity in the composition of both projects, with different formal results, shows an 'anti-type' character of both architectures. The typological analysis is not valid for an architecture whose form is diagrammed.

In 1968 Ralph Wilcoxon expands the definition of megastructures. Unlike Maki, Wilcoxon focuses on tectonic issues (modulation, scalability, structure and durability)[29]. This has associated megastructures with a type of building that, although it could be hybrid, has to belong to a specific period of time, given that a contemporary description of hybrid would not emphasise constructive features nowadays assumed to be present in any existing building.

As an answer to the question of why megastructures went into decline, Banham's main explanation is that they "went out of style[30]. The 'megastructure' concept went from representing an avant-garde typology to symbolising a set of routine solutions that led to the "the megastructure look-like"[31].

Nonetheless, if we just consider the definition and analysis of the first megastructures according to Fumihiko Maki, who ignored matters of appearance and construction and focused on the composition method, we may observe the huge conceptual load of the megastructures in contemporary hybrid buildings.

Mixed-Use Skyscraper Review

The hybrid building concept was first developed in the 1980s. The decline of the megastructures during the previous decade perhaps explains the emergence of a new term that describes an almost similar reality. The megastructures crisis may also be the cause of the boom in research on the American skyscraper in the late 19th and early 20th centuries. Both Rem Koolhaas and Steven Holl joined this trend, but most of the observations they make are actually qualities learned from megastructures, which is not surprising, given their training at the Architectural Association in London over the 1970s[33].

Steven Holl in "Alphabetical City" catalogues various American high-rise buildings of the early 20th century based on their similarity in plan view to the letters of the alphabet[34]. In the prologue he writes a brief paragraph to explain that the case studies are functionally hybrid buildings[35].

Contrary to the results of the functional analysis, the formal analysis of "Alphabetical City" shows the strong typological character of its case studies. For the skyscraper of the beginning of the century, the topological analysis on the architectural system that defined the later megastructures is not valid. The functional diversity of these skyscrapers, as Koolhaas was going to note, is just a consequence of the large scale. At an organisational level, most of the "Alphabetical City" case studies lack an architectural system and hierarchy.

The mere fact of working on architectures that are classifiable by shape shows their functional rigidity. Even the examples published in "Hybrid Buildings", although better exposed and represented [Fig. 07], are mere approximations to the contemporary hybrid compared to megastructural experiments. Despite hosting various programs, the case studies lack an organisational structure; they do not have a mobility system made up of spaces for public use. Four years after publishing "Alphabetical City", Steven Holl will admit to having erred, after analysing the advantages of topological analysis over typological analysis[36].

Koolhaas, without using the term hybrid, goes through a similar process. In *Delirious New York*, he investigates the New York skyscraper with an approach marked by his mega-structuralist training. Concepts such as the "reproduction of the world"[37] or "lobotomy"[38] refer to the megastructuralist endeavors to simulate the behavior of a city and build a 'megaform' or exterior framework that maintains a solid urban appearance in the face of internal programmatic instability.

In *S, M, L, XL*, Koolhaas redefines his interest in *Delirious New York* and summarises it in a single paragraph in which he acknowledges the strength of the programmatic instability that the city demands in the face of the weak functional rigidity of architecture[39]. This discovery will unleash, in "Bigness or the Problem of Large", the proposition that all large-scale buildings, by the mere fact of their size, are capable of simulating the behavior of the metropolis. From his point of view, only the large scale allows the accumulation of critical mass, and only this generates the instability that makes buildings absorb the changes demanded by the city[40]. The multifunctionality of the skyscraper is due to its large scale.

Later, in "Junkspace" and "Generic City", Koolhaas will observe how the absolute instability of the large scale brings with it the loss of identity of the space[41] and the emergence of junk-spaces[42]. After these reflections, Koolhaas will investigate concepts such as "compartmentalized flexibility" or "interness modified"[43] (both with a theoretical basis similar to Cedric Price's concept of "calculated uncertainty"[44]), which consist of balances between instability and determination, similar to the methods of the megastructuralists. He also experiments with devices such as the "loop"[45] or the mat-building yard strategy as methods that introduce specificity by generating alternative promenades or counter-programming[46].

Non-Multifunctional Hybrids: Architecture, Infrastructure and Landscape

Since the beginning of the 19th century there has been an alternative line of research that maintains that the nature of architecture does not lie in its functionality, and that therefore the architectural hybrid should not be multifunctional. The pioneers of this research are Marc Angèlil and Anna Klingmann, who affirm that a hybrid building is that which is architecture, infrastructure and landscape[47] at the same time.

This definition, which seemingly avoid functional issues, will be developed by Rita Santos-Fernández, who states that, if beyond possible relationships, links or references to landscape or infrastructure an indissoluble union is established between them and architecture, it is a hybrid building[48].

Santos-Fernández denies that the multifunctional *objet* is hybrid. Its main argument is that the multifunctional building, because it simulates the behavior of a city, ends up self-sufficient and independent of its environment[49]. It exemplifies her concept of a hybrid with very different architectures in terms of typology, program, structure and scale, such as the Port of Santa Cruz de Tenerife, the Museum of Anthropology and Human Evolution in Torre Pacheco, the Karstadt Parkhouse in Amsterdam, the Malaparte House in Capri, and the Ponte Vecchio in Florence, among others[50].

For this meaning of the concept of hybrid architecture, the analysis of uses would not make sense, as it starts from the negation of the multifunctional quality. The examples of hybrid architecture-infrastructure-landscape are so diverse that typological analysis is not feasible either. Topological analysis could work, but the abstraction of the definition, again added to the disparity of the examples, makes it impossible to obtain generalisable results. In conclusion, as the hybrid architecture-infrastructure-landscape has been defined, the only valid analysis method is semantics.

Regarding the infrastructural characterisation, as the analysis of megastructures has revealed, the mobility system is inherent in the ability to simulate the behavior of a city, and it functions as a mobility infrastructure. In the case of Steven Holl's work and theory of hybrid architecture, the infrastructural component is even more evident, since he has repeatedly investigated and used bridge-type infrastructures as a mobility system and a hybridisation method[51].

Regarding the landscape characterisation, this definition of hybrid may be interpreted in one way or another depending on how the concept of 'landscape' is understood. One of the most interesting interpretations is the one associated with the idea of 'datascape', developed by MVRDV and defined as "a kind of technique or a tool that tries to unfold the chaos theories, which appear so much in the current architectural debate"[52], which respond to demands, rules and logics that go beyond formal predeterminations and are the result of social behavior[53].

The *datascape* theory is reaffirmed with the analysis of the so-called *da-me*[54] architectures published in *Made in Tokyo*. According to their authors, these architectures respond spontaneously to the supply-demand (data) rules requested by the city[55]. This guidebook also defines the idea of 'environmental unit' as a coherent environment of adjacency between functions that may belong to different categories[56]. This concept interprets the urban landscape as a set of entities formed by functional syntagms that can be housed in a single building, or connect adjacent buildings.

Supported by the concept of 'environmental unit', recent theories question the exclusive functional characterisation of the hybrid, exposing a displacement of the concept towards ecological efficiency[57]. The ecological advantages of hybrid architecture are obvious, but these are always a consequence of the main purpose of the architecture (its use). Various programs can be energetically and structurally complemented, but if the city does not demand one of them, the result will be anti-ecological.

With the same theoretical basis, but with different conclusions, the theory of the urban landscape as a fractal or set of ecosystems stands out, as those ecosystems "are the external elements that condition the programs and the layout of the hybrid support"[58]. Thanks to its ability to adapt to different uses, the multifunctional hybrid remains at the mercy of the supply-demand situation of the city, being, therefore, an architecture inextricably linked with the landscape.

Despite the denial of the functional component in the definition of hybrid as the indissoluble combination between architecture, landscape and infrastructure; the analysis of its two variables (infrastructure and landscape), using an updated approach, brings us back to the idea of a multifunctional hybrid.

Use of this definition is discouraged, however, as it could lead to confusion. Proof of this are examples like the Malaparte house, which, despite configuring a hybrid system with the landscape (viewpoint over a house over a rock), lacks infrastructural character. To a large extent, the latter is due to the reduced scale of the single-family architecture, which makes it impossible to absorb more complex programs.

Conclusions

Despite the fact that many authors identify the main paradigm shift of hybrid buildings in other typologies, the origin of hybrid buildings, as we understand them nowadays, originates mainly from megastructures and the first theories on the design of these. If we ignore technical issues and the pejorative connotations of the megastructures, from the comparative analysis of these and contemporary architecture, we can obtain an updated definition of the concept of hybrid building.

The most correct meaning of a hybrid building is that which refers to its capacity to beneficially accommodate different uses. On this basis, the quality that gives hybrids this capacity is the organisational or topological system, which is independent of the uses it serves at any given time.

The topological system of hybrids has to be made up of various subsystems or independent programs[59] that in turn have to be organised and interrelated by means of a larger-scale general system. The general system works as a mobility infrastructure. This must connect absolutely all the parts or programs if it is to condition the building form, or at least have a presence in the section of the building.

For a building to meet these characteristics, a minimum scale is required. A small building could never house the diversity and programmatic complexity necessary for the whole to be considered hybrid.

The building must be positioned in a balance between architectural determination and functional indeterminacy. The latter allows it to be able to respond to the functional needs demanded by its environment even without losing the specificity and identity that each specific program requires.

Finally, it should be mentioned that the hybrid concept itself implies a synergistic use of the different building techniques and technologies. Except for this last point, this definition deliberately sidesteps the technical issues of construction. Although there are invariants in structural, energetic and constructive solutions, their inclusion would link the term to the technological limitations of our time. The design procedure developed responds mainly to social issues.

If, for example, we analyse OMA's CCTV building in China [Fig. 09], we see that it fulfils the entire method of hybrid projects. It is a large-scale building made up of different sub-systems or programs. It is structured on the basis of a main system that works as a mobility infrastructure (called by Koolhaas himself as a *skyscraper-loop*)[60].

The main CCTV system connects absolutely all its sub-systems. Its diagram provides architectural determination and conditions the general shape of the building. In turn, the main system provides indeterminacy, since it functions as a public space composed of large-scale flexible spaces. The function of these is to trigger social activity among the users of the various sub-systems or programs.

1. Real Academia Española, "Híbrido, Da," 2019, https://dle.rae.es/híbrido.

2. Aristóteles, "Libro II," in *Reproducción de Los Animales* (Madrid: Gredos, 1994), 176–84.

3. Ibidem, 177–74.

4. Kolreuter as quoted in Joseph Fenton, "Hybrid Buildings," *Pamphlet Architecture* 11 (New York: Princeton Architectural Press, 1985): 4.

5. Real Academia Española, "Híbrido, Da."

6. Martin Musiatowicz, "Vigor híbrido y el arte de mezclar = Hibrid vigour and the art of mixing" in *Hybrids I: Híbridos Verticales = High-Rise Mixed-Use Buildings* (Vitoria: a+t ediciones, 2008), 6.

7. Fenton, Op. cit, 3–40.

8. Musiatowicz, Op. cit, 7.

9. Steven Holl uses it in previous publications of the same Pamphlet Architecture journal. Steven Holl, "Bridges," *Pamphlet Architecture* 1 (December 1977):5. Steven Holl, "The Alphabetical City," *Pamphlet Architecture* 5 (March 1980): 6. Steven Holl, "Bridge of Houses," *Pamphlet Architecture* 7 (July 1981): 4.

10. In 1999, Angélil and Klingmann opened a line of research on non-multifunctional hybrids. Marc Angélil and Anna Klingmann, "Hybrid Morphologies - Infrastructure, Architecture, Landscape," *Daïdalos* 73 (1999): 16–25.

11. Leonardo Benevolo, *Historia de La Arquitectura Moderna*, trans. María Castaldi and Jesús Fernández Santos (Barcelona: Gustavo Gili, 1977): 591-592. L. Benevolo refers us to Anatole Kopp, *Ville et Révolution: Architecture et Urbanisme Soviétiques Des Années Vingt*. (Paris: Anthropos, 1967).

12. Aurora Fernández Per, "Hybrid Versus Social Condenser," in *Hybrids III: Híbridos Residenciales = Residential Mixed-Use Buildings* (Vitoria: a+t ediciones, 2009), 4-13.

13. Ibidem, 4–13.

14. "the same functions that can be found in a hybrid can be found here [in a social condenser], especially in Unités and those that followed, where business and even offices were inserted on the so-called inner street" Ibidem, 11.

15. Ibidem, 8.

16. Since the appearance of the first high-rise mixed-use buildings, the most common functional arrangement has been forming a gradient based on the most public to the most private programs. Marcelo Faiden, "Los Bajos de Los Edificios Altos" (PhD diss., Universitat Politècnica de Catalunya, 2015), 250–8.

17. Fenton, Op. cit, 6.

18. Fenton, Ibidem, 20.

19. Fernández Per, Op. cit, 10.

20. Federico Soriano, "Espacios. Espacio Público y Privado," in *Diccionario de Metápolis de Arquitectura Avanzada* (Barcelona: Actar, 2001), 203.

21. "At the Downtown Athletic Club, the skyscraper is used as a constructivist "social condenser": a machine to generate and intensify some more desirable modalities of human relationships". Rem Koolhaas, *Delirio de Nueva York*, trans. Jorge Sainz (Barcelona: Gustavo Gili, 2004), 152.

22. "Programmatic layering upon vacant terrain to encourage dynamic coexistence of their interference, unprecedented events. [...]. Take the section of the typical skyscraper and put it on its side; now declare each floor a different program; [...]. Instead of treating "park" as the opposite of the city, a programmatic non-entity, this approach demonstrates that the park can sustain program with superior ease". Rem Koolhaas, *Content* (Cologne: Taschen, 2002), 73.

23. Alberto Nicolau, "Figuración Retórica En La Obra de Rem Koolhaas" *Cuadernos de Proyectos Arquitectónicos* 8 (2014): 81, http://polired.upm.es/index.php/proyectos_arquitectonicos/article/view/3976.

24. Cedric Price stands out as a pioneer of radicalism in Europe. He was considered the "guru" of the Archigram group, which in turn inspired other groups of European architects such as Archizoom and Superestudio. According to Stanley Mathews, Price and the Japanese Metabolists reached the same conclusions simultaneously. Stanley Mathews, *From Agit - Prop to Free Space: The Architecture of Cedric Price* (London: Black Dog, 2007): 242.

25. Javier Mozas has observed this similarity when identifying Mat-buildings as a precedent for horizontal hybrids. Also noteworthy is the research of N. Mestre, who develops the concept of hybrid with various examples of megastructures. Javier Mozas, "Usos Mezclados. Un Recorrido Histórico= Mixed Uses. A Historical Overview," in *Hybrids II: Híbridos Horizontales= Low-Rise Mixed Use Buildings* (Vitoria: a+t ediciones, 2008), 4–25. Nieves Mestre Martínez, "Híbrido: Entre La Disidencia y La Ecología= Hybrid: Between Dissidence and Ecology," in *ZARCH: Journal of Interdisciplinary Studies in Architecture and Urbanism* 3 (2014): 158–67, https://zarch.unizar.es/images/Descargas/PDF/Revista03/0311-Nieves Mestre.pdf.

26. Fumihiko Maki, "Investigation in Collective Form," in *The School of Architecture. Washington University* 2 (1964): 8.

27. "One of the most interesting developments of the megaform has been done by Professor Kenzo Tange with M.I.T. graduate students when he was a visiting professor there" Ibidem, 9.

28. Ibidem, 9–12.

29. "[...] A structure that frequently: 1. is built with modular units; 2. is capable of great and even "unlimited" enlargement; 3. is a structural framework into which smaller structural units (for example, rooms, houses or small buildings of other types) can be built – or even "plugged" or "clamped", after having been prefabricated elsewhere; 4. is a structural frame that is supposed to have a much longer useful life than the smaller units it could support." Reyner Banham, *Megaestructuras. Futuro Urbano Del Pasado Reciente*, trans. Ramón Font (Barcelona: Gustavo Gili, 1978), 8–9. He refers us to Ralph Wilcoxon, *Council of Planning Librarians Exchange Bibliography*, Nº 66 (Illinois: Monticello, 1968), 2.

30. Banham, Op. cit, 164–95.

31. "Towards the end of the 60s, certain formal uses, groupings of parts, connective resources, such as pedestrian bridges, etc., were beginning to present a persistent typology that could be called "the megastructure look-like", without even pretending to offer the simulation of adaptability or the factual variety of urban functions that could be found in Cumbernauld." Ibidem, 179. "Some ideas can survive this kind of degeneration and adulteration; apparently, the "megastructure look-like" could not, unless it was made rigid and regular by the supposedly permanent values of the architecture (that is, those dating more than a generation earlier). On this basis, the definitive tombstone of the institutionalised and decadent megastructure concept must be the biggest and most terminal monster of them all: Thamesmead" Ibidem, 190–1.

32. In the case of Koolhaas, he shows interest in the New York skyscraper in *Delirious New York* and express rejection of the megastructures in *Bigness*. Koolhaas, Op. cit, *Delirio de Nueva York*. And Rem Koolhaas, "Bigness," in *S, M, L, XL* (New York: The Monacelli Press, 1995), 494–517. Holl describes the megastructures as vast mixed-use buildings, and prompts Fenton's analysis of hybrids based on a catalog of various American skyscrapers: "The term "hybrid" makes a clear distinction between the "mixed use" designation frequently used to describe the sprawling megastructures of the middle of this century". Steven Holl, "Foreword", in Fenton, Op. cit, 3.

33. Rem Koolhaas graduated as an architect in 1972 and Steven Holl did his postgraduate studies in 1976.

34. Holl, Op. cit, "The Alphabetical City", 1–71.

35. Ibidem, 6.

36. Steven Holl, "Porosity," in *Parallax* (Basel, Boston, Berlin: Birkhäuser Architecture, 2000), 302.

37. Koolhaas, Op. cit, *Delirio de Nueva York*, 82.

38. Ibidem, 101.

39. "The permanence of even the most frivolous item of architecture and the instability of the metropolis are incompatible. In this conflict the metropolis is, by definition, the victor; in its pervasive reality architecture is reduced to the status of a plaything, [...]. In Manhattan this paradox is resolved in a brilliant way [...]. Its interiors accommodate compositions of program and activity that change constantly and independently of each other without affecting what is called, with accidental profundity, the envelope". Rem Koolhaas, "Foreplay," in *S, M, L, XL* (New York: The Monacelli Press, 1995), 23–43.

40. Rem Koolhaas, Op. cit, "Bigness", 494–517.

41. Rem Koolhaas, "Generic City," in *S, M, L, XL* (New York: The Monacelli Press, 1995), 1239–64.

42. Rem Koolhaas, "Junkspace," *October* 100 (2002): 175–90.

43. Koolhaas, Op.cit, *Content*, 83.

44. Rowan Wilken, "Calculated Uncertainty: Computers, Chance Encounters, and 'Community' in the Work of Cedric Price" *Transformations Journal of Media and Culture*, no. 14 (2007): 1-14.

45. Koolhaas, Op. cit, *Content*, 76.

46. Francisco González de Canales, "Beyond Bigness. Sobre las implicaciones críticas de una lectura formal de la obra de Rem Koolhaas (1987-1993)," *Proyecto, Progreso, Arquitectura* 10 (2014): 43, https://doi.org/http://dx.doi.org/10.12795/ppa.2014.i10.02.

47. Marc Angélil and Anna Klingmann, "Hybrid Morphologies - Infrastructure, Architecture, Landscape," *Daïdalos* 73 (1999): 16–25.

48. Rita Santos-Fernandes Pinto de Freitas, "Arquitectura Híbrida_ context, Escala, Ordre= Hybrid Archtecture_context, Scale, Order" (PhD diss., Universitat Politècnica de Catalunya, 2011), 37.

49. Ibidem, 171.

50. Ibidem, 185.

51. In almost all of Holl's works there are connecting walkways like bridges and these are almost always shown as a means of connection between differentiated parts. This constant can be observed from initial projects such as the Payroll Gymnasium-Bridge (1977) to the Linked Hybrid (2003-2008). Bridges and hybridisation are also frequent resources in his literature: he writes two volumes of the Pamphlet journal on bridges, in which he makes explicit mention of the idea of hybrid architecture. Steven Holl, Op. cit, "Bridges". Steven Holl, Op. cit, "Bridge of Houses".

52. Winy Maas et al., "El espacio del optimismo= The space of optimism," *El Croquis* 86 (1997): 10.

53. Manuel Gausa et al., *Diccionario Metápolis de Arquitectura Avanzada* (Barcelona: Actar, 2001), 146. He refers us to MVRDV, *Farmax. Excusions on Density*. (Rotterdam: 010 Publishers, 1998).

54. Da-me architecture is defined as the "ones giving a priority to stubborn honesty in response to their surroundings and programmatic requirements, without insisting on architectural aesthetic and form". Momoyo Kaijima and Junzo Kuroda, *Made in Tokyo: Guide Book* (Tokyo: Kajima Institute Publishing, 2001), 9.

55. Ibidem, 9–13.

56. Ibidem, 13.

57. Mestre Martínez, Op. cit, 158–67.

58. Salvador Haddadi, "Fractales: (Eco)sistema de sistemas" in *De forma et vita. La arquitectura en la relación de lo vivo con lo no vivo* (Sevilla: Athenaica, 2020), 226.

59. The concept 'program' is ambiguous. It is frequently used as a synonym for 'function' or 'set of functions', but the correct meaning is more linked to the system: "We understand, then, the architectural program as that sequence of encoded instructions that are inserted in the process of the architectural project [...]. They are those instructions that contain the information that will give basic conditions and modifiable use in the architectural project, to provide it with the ability to generate an event." In Amadeu Santacana, "El acontecimiento en un mundo como yuxtaposición" (PhD diss., Universidad Politécnica de Cataluña, 2013): 21.

60. Koolhaas, Op. cit, *Content*, 511.

Hybrid
Mixed-use
Topology
Megastructure
Bigness