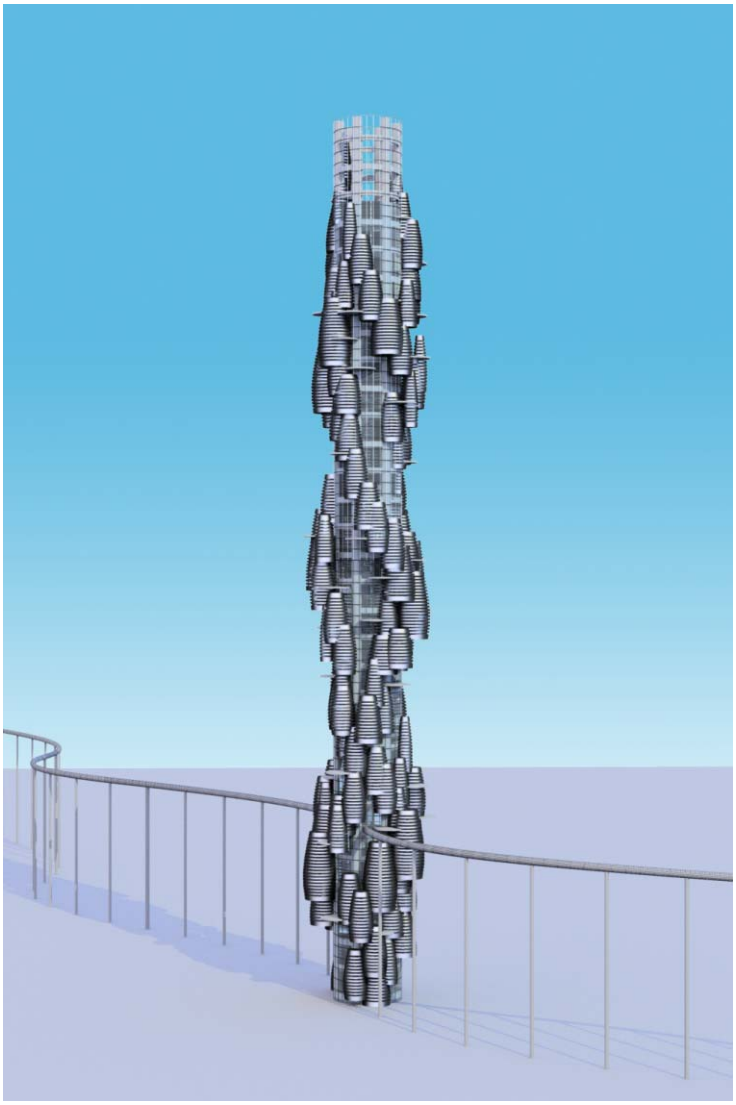
Evolo '07 Skyscraper Ideas Competition
Arch 384 Competition Elective
Peter Graham

What if streets went upwards?

Rethinking the skyscraper context and its context

The skyscraper has changed remarkably little over the century since it first appeared in Chicago and New York. It is – as it was then – a building type primarily concerned with density and efficiency. With a few notable exceptions, skyscraper designs have stayed quite true to their original formula, changing mostly quantitatively over time. While the building type is full of potentialities, speculations about the possibilities, both in and outside of the profession have been relatively sparse and critical dialogue has often been limited to the area of aesthetics. It is clear now, however, that we no longer have the luxury of just quibbling over stylistic issues. If civilization continues on its course of parabolic population growth and resource use in the coming centuries the question of what the skyscraper is and what it might be will need to be opened again.

The fact that skyscrapers have changed so little since their inception is not, as it might at first seem, simply the result of a lack of imagination or technical ability. It is, rather, due largely to a host of social, political and economic factors mostly beyond the control of the individual architect or client: land speculation practices, automobiles, cheap energy prices, economies of scale, prevailing infrastructure and urban planning models, social biases or preferences and so forth. When it comes down to it, the skyscraper hasn't changed much because, for the most part it: a) hasn't been able to, and b) hasn't had to. But in the coming centuries it *will* have to change, perhaps in very dramatic ways. Sustainable design will certainly be part of it. But sustainable design practices implemented solely on the macro level will not suffice in and of themselves. The problem is, in a large part, systemic, and therefore the solutions require a re-thinking of the systems as well as the parts. This project speculates about a direction in which change might occur. It looks as much to megastructures as it does skyscrapers for inspiration and precedents. For, the megastructure visionaries – regardless of the particular problems they were trying to address or the methods they chose to employ – invariably understood the inextricable relationships between buildings and urban systems.



Evolo '07 Skyscraper Ideas Competition proposal

In order to get a better understanding of why a systemic approach is necessary, it helps to look at the primary causes of our urban conditions today. At the time that skyscrapers first began to appear in Chicago and New York around the beginning of the 20th century, the world had a population of approximately 1.5 billion, with 15 percent living in cities. By the year 2000 the world's population had grown to 6 billion with roughly 47 percent living in cities. By the year 2030, some 49 billion people – 60 percent of the world's population – are expected to live in cities (1). The prevalence of skyscrapers today is really more symptomatic of population growth than it is a primary cause. The invention of the skyscraper was simply an expression of the desire and need for density made possible by technologies such as the elevator and steel skeleton frame construction (2). What is really at the root of the dramatic growth of the world's population (and hence cities) in the last century is fossil fuel consumption. Urban populations of the density and magnitude we see today would not be possible without vast transportation, manufacturing, heating, lighting, and farming systems supported by fossil fuels. Unfortunately, cheap (economically) fossil fuels have, in addition to fostering population and city growth, also encouraged grossly inefficient systems of supply. The average piece of food in the United States, for instance, travels 1500 to 2500 miles from the farm to the consumer (3). Likewise our cities have become equally inefficient in their forms, causing them to encroach further and further onto the land that supports them and to consume far more resources internally than necessary. Between 1982 and 1997 urban land areas in the United States grew by 40% while the population grew by only 16% (4). To truly solve our environmental concerns, then, it is necessary to address the unseen generators and inhibitors of urban form. An intervention on the on the level of infrastructure may be necessary. Sustainable design implemented solely at the building level will not satisfactorily address the serious systemic problems.

The potential of the skyscraper to not only address problems of density and efficiency but to even turn it into opportunity was perceived very early on. Early visions such as Pettit's famous illustration “King's Dream of New York” (Figure 1) capture the initial excitement many felt at the possibilities the skyscraper seemed to offer, including unprecedented convenience and freedom from congestion simultaneously. Pettit's illustration was, fundamentally, expressing as much an urban idea as it was an architectural one. But visions like this have failed again and again to materialize in large part due to the low cost of fuels and the way in which land is appropriated / developed. A vision is just a vision without the perceived need, public will, and planning apparatus to make it reality.

Figure 1: Harry M. Pettit “Kings Dream of New York”

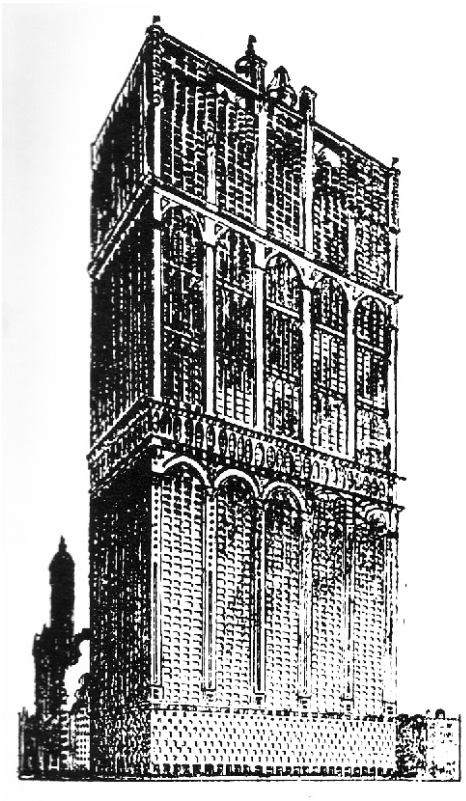


Figure 2: Starrett’s proposed 100-storey tower

But the apparatus has always existed. Suburban sprawl is not an accident. It is meticulously planned and executed – just without any vision most of the time. Municipalities and governments create and service the infrastructure which supports suburbs while tax-payers routinely finance it. All that's necessary is the will to do things differently. Urban systems arguably determine the forms and functions of buildings more than the actual designs of the buildings – and those urban systems have run amok.

The idea of using the skyscraper as a vehicle for vertical urbanism was explored in some detail as early as 1906. In that year Theodore Starrett proposed a 100-story tower for New York (Figure 2) that would stack industry, residences, hotels, public plazas, a roof garden and even an amusement park all on top of each other (5). It now appears that this proposal was way ahead of its time not only technologically but conceptually as well. The idea has resurfaced in a number of contemporary mixed-use projects including Renzo Piano's London Bridge Tower project (Figure 3) and Norman Foster's Millennium Tower, Tokyo (Figure 4). Foster's Millennium tower is of particular note as it was designed to help alleviate Tokyo's population and land shortage problems by creating a small footprint tower in Tokyo bay which would be like a city unto itself. The design calls for a vast 840-metre, 170-storey mixed use tower capable of accommodating 52,000 people. It is broken down into vertical zones or "neighborhoods" with a specially designed electromagnetic elevator system that can travel horizontally as well as vertically (6). Unfortunately building such a tower is a great undertaking and the promised funding for this project has failed to come through as of this writing.

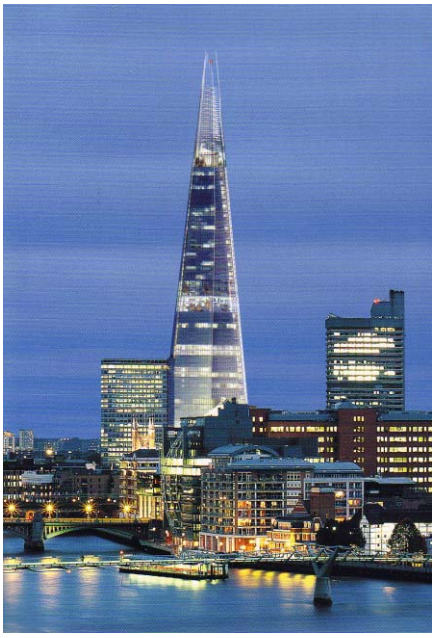


Figure 3: Renzo Piano's London Bridge Tower

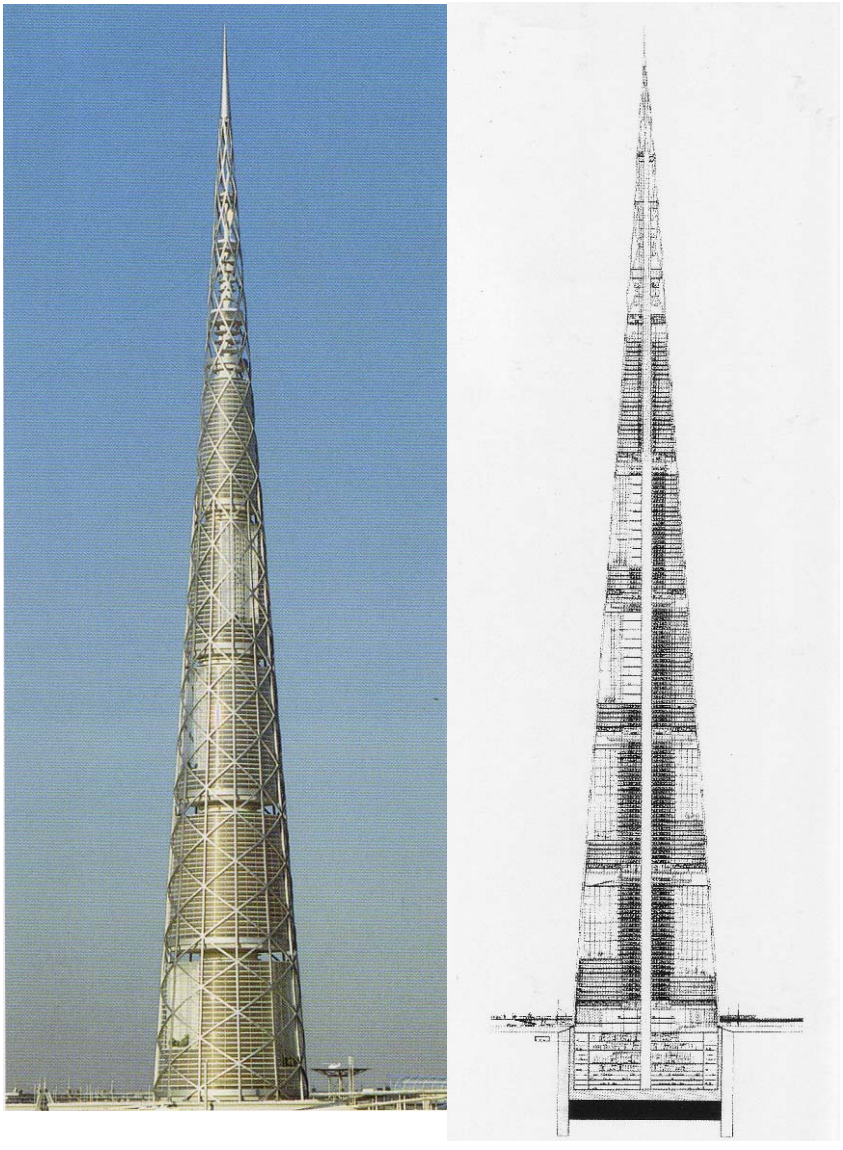


Figure 4: Norman Foster's Millenium Tower proposal

With his Millennium Tower, Foster was in fact re-formulating a much older idea and series of proposals forwarded by a group of Japanese architects know as the "Metabolists". While the idea of the megastructure had been gestating in various parts of the world during the 1950's, it was the Metabolism movement that was to simultaneously give the ideas credibility, coherent form, and worldwide exposure. The megastructure concept had been around at least since Le Corbusier's Algiers project (Figure 5), but was little more than a footnote in the history of architecture and urban planning until several decades later. With the Japanese government's declaration of a land crisis in Tokyo and the Japan Housing Corporation's suggestion in 1958 that the city build out into the bay, the Metabolists set out to solve the problem with new megastructures, that is, large (even vast) modular and extensible artifacts that are simultaneously buildings and infrastructure. Kenzo Tange's Tokyo Bay project (Figure 6) was the most rigorous and will probably be the most enduring project created by the movement. Tange's project coupled housing with highways using A-Frame constructs (Figure 7) while suspending office slabs between vertical service towers in a similar fashion to his Yamanishi Communications Center project (Figure 8). The key to Tange's Tokyo Bay proposal and central to the Metabolist's philosophy was its implication of nearly indefinite horizontal and vertical extensibility as well as the ability to replace smaller components (i.e. the housing and office units) as needed while preserving the main structure. Efficiency, longevity, flexibility and extensibility all rolled into one. Tange summed up the metabolist philosophy nicely in this quote:

"The structural element is thought of as a tree – a permanent element, with dwelling units as leaves – temporary elements which fall down and are renewed according to the needs of the moment. The buildings can grow within this structure and die and grow again – but the structure remains."(7)

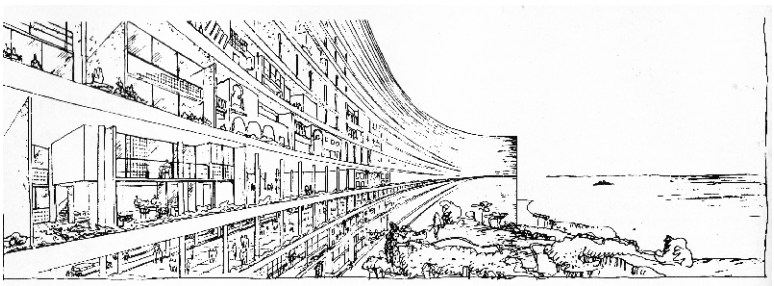


Figure 5: Le Corbusier's Algiers project

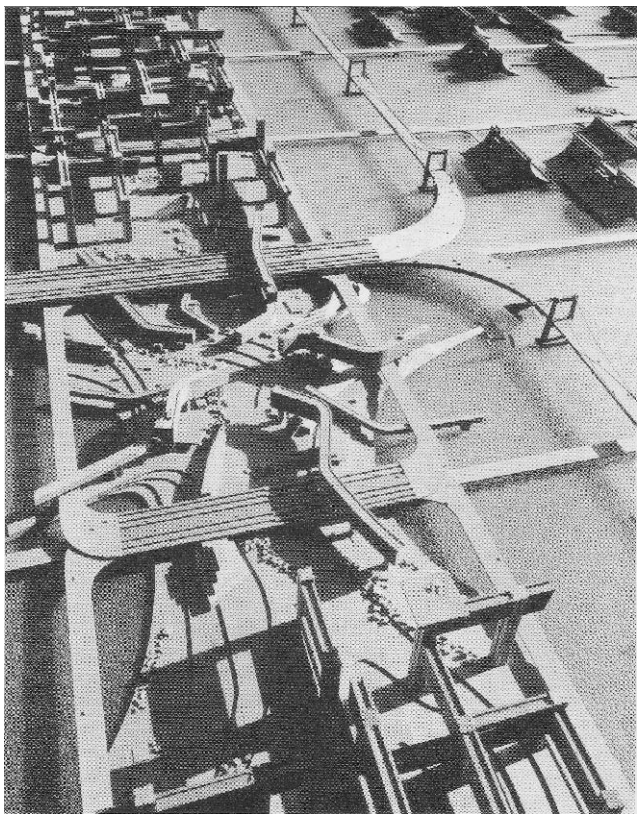


Figure 6: Kenzo Tange's Tokyo Bay project

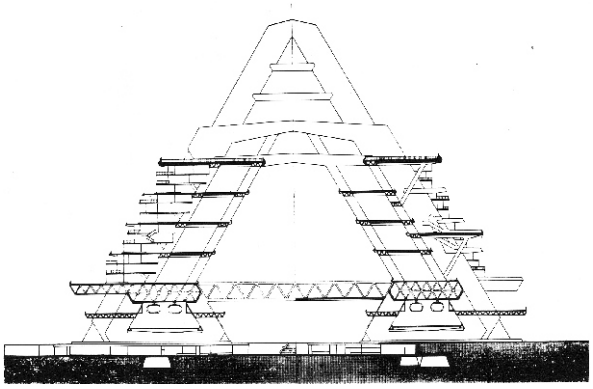


Figure 7: Kenzo Tange: A-Frame or Terrassenhauser section from *Boston Harbor Development* project,

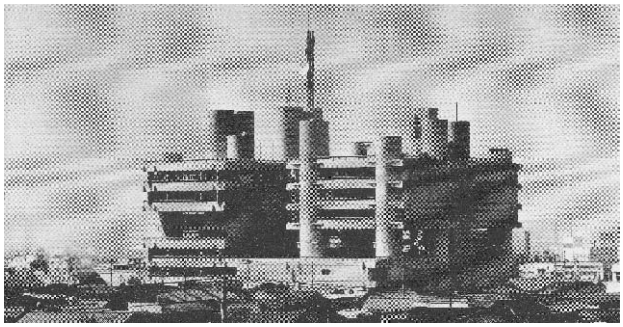


Figure 8: Kenzo Tange's Yamanishi Communications Centre

The megastructure movement, as a whole, was a response to a number of historical factors including the sudden and massive booms in population and prosperity in the decades following World War II. To many, the megastructure was the ideal response to the problems of urban planning and change on unprecedented scales. Additionally, it provided the antidote to the perceived problem of social and statistical urban planning practices robbing cities of their urban identity and coherent form (8).

Soon after the Metabolists made their mark, other architects and artists would begin to explore the idea of the megastructure from just about every possible angle. Of particular note in the broader megastructure movement that followed the metabolists are France's Yona Friedman and England's Archigram group. Friedman took the megastructure to another level by making it much more flexible than earlier projects. In his Urbanism Spatiale projects (Figure 9), for instance, the spatial definition of the megastructure becomes much more varied and contingent. Friedman's three-dimensional lattice was inherently less determinate than previous schemes including the popular A-frames (a.k.a. Terrassenhauser sections) or the vertical circulation towers employed by Tange. Friedman was preoccupied not just with the ability to renew the individual components, but also the ability to freely move them around. So, theoretically, a house could be moved from one part of the structure to another at any given time. The lattice was also designed to "float" above existing cities on piloti with only very heavy industrial activity having to rest on the ground plane. Thus the need to completely level existing structures was eliminated (9). Archigram took the

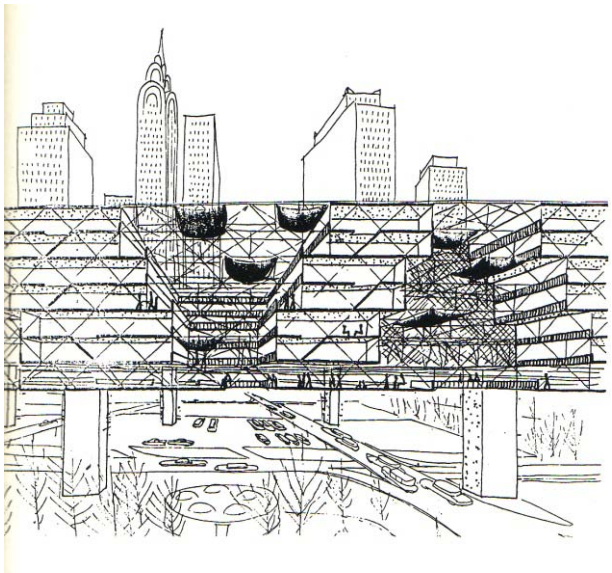


Figure 9: Yona Friedman's Urbanisme Spatiale

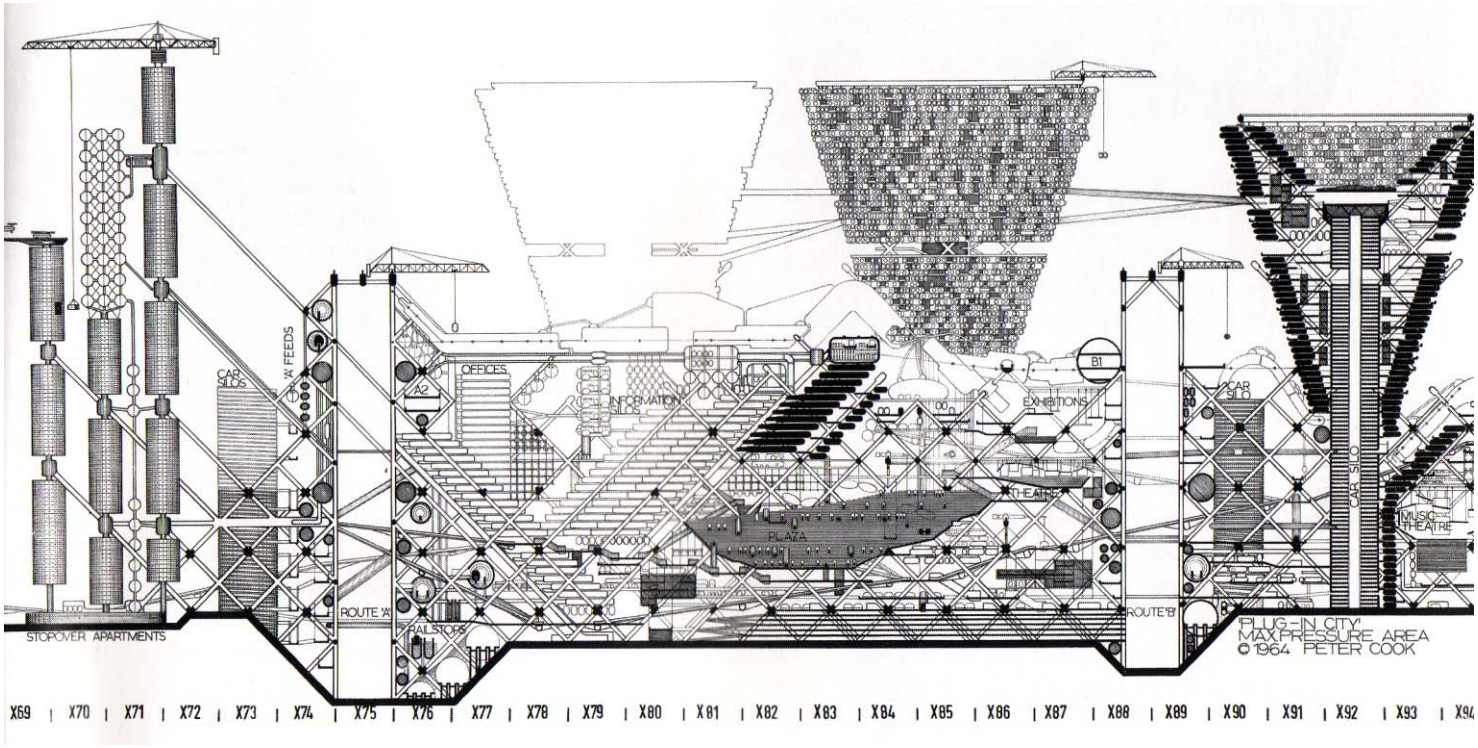


Figure 10: Archigram's Plug-in City

logic even further with their Plug-in City concept (Figure 10). Plug-in City employed a similar three-dimensional lattice approach but with some additional enhancements including cranes which could move any of the parts around as necessary – even the roads themselves. Cook and Archigram were chiefly interested in liberating society from rigid and static design design (i.e. the entrenched modernist dogma and ubiquitous social housing in Britain at the time) by turning both architecture and infrastructure into a framework which would facilitate as well as provides a kind of discipline to an essentially self-organizing society. The idea of pre-fabricated units was very appealing to them due to their economy, standardization, and potential freedom from rigidly defined urban landcapes (10). In 1970 Kisho Kurokawa made at least part of Archigram's vision a reality in his Nagakin tower (Figure 11). The Nagakin tower had interchangeable, prefabricated apartment units which attached to a service core via a simple cantilever mechanism (11). Units could theoretically be added or taken away at will without affecting the structural or functional integrity of the unit.

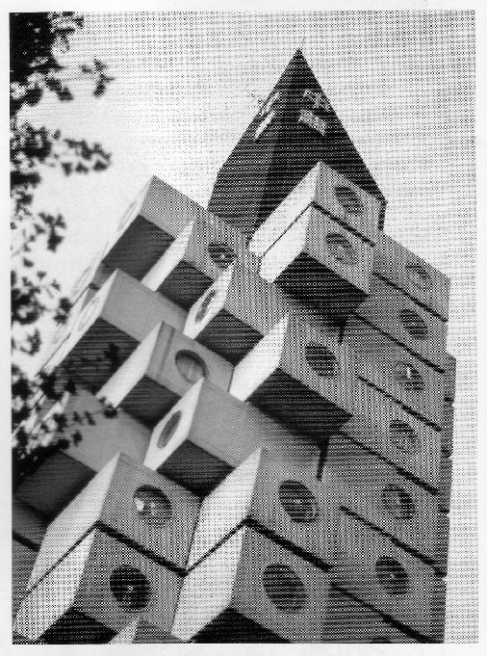


Figure 11: Kisho Kurokawa's Nagakin Capsule Tower

The skyscraper and megastructure visionaries have provided us with valuable insights and ideas for building cities of the future. And even though many of their projects were untenable or even undesirable, it would be folly at this point to completely dismiss them as we search for a path through our anticipated future crises.

We pour resources into building and maintaining infrastructure everywhere and every day. Virtually every aspect of our lives is designed. What if we chose to design things differently from the ground up instead of trying to work within a system which is by its very nature resistant to the changes we need to make? This project reflects on one of many possible approaches we might consider.

The concept is an attempt to synthesize and improve upon some of the ideas presented by the skyscraper and megastructure visionaries. It is a skyscraper. It is a megastructure. It is a street that goes upward. It can free up land and achieve high economies of scale and efficiency while creating new spatial and programmatic relationships. It could have neighborhoods. It could be a neighborhood in a city. It could be a city unto itself.

Notes:

1) Cities People Planet, p. 3
2) Sky High, pp. 16-17
3) Cities People Planet, p. 237
4) Cities People Planet, p. 137
5) The Skyscraper, pp. 8-13
6) Sky High, pp. 74-75
7) Megastructure, p. 45-57
8) Megastructure, p. 32
9) Megastructure, pp. 57-64
10) Archigram: architecture without architecture pp., 36-38, 93-103
11) Archigram: architecture without architecture, p. 108

Images:

Fig. 1) The Skyscraper, p.13
Fig. 2) The Skyscraper, p.10
Fig. 3) Sky High, p. 68
Fig. 4) Sky High, pp. 74-75
Fig. 5) Megastructure, p.8
Fig. 6) Megastructure, p.52
Fig. 7) Megastructure, p.49
Fig. 8) Megastructure, p.55
Fig. 9) Megastructure, p.61
Fig. 10) Archigram: architecture without architecture, p.19
Fig. 11) Archigram: architecture without architecture, p.108

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