



## **FLEXIBLE ARCHITECTURE FOR THE DYNAMIC SOCIETIES**

**Reflection on a Journey from the 20<sup>th</sup> Century into the Future**



**KVI-3900**

**Larissa Acharya**

**Master's thesis in Art History  
Faculty of Humanities, Social Sciences and Education  
University of Tromsø**

**Spring 2013**



## **Preface**

The interest in flexible architecture is known worldwide. This type of architecture has been in use for centuries. From the desert tents of Bedouin and Mongolian yurts to the silvery distinctive shapes of the American Airstream trailer, flexible architecture has inspired designers around the world. With its singular characteristics of lightness, transience and practicality, the possibilities of portable, prefabricated, demountable, dynamic, adaptable, mobile structures are ever-growing.

The world is changing around us. Rapidly developing building technology and new building materials bring revolutionary changes into the architectural world, allowing fantasy to float alongside imagination and produce unique results. What was unthinkable before, finds shape and develops in front of our eyes, pointing towards a different way of thinking about how we live. All these aspects of our ever changing world, along with the great speed of acceleration in the development of high technology, mean that the interest in flexible architecture is steadily increasing.

This thesis investigates the study of different media and research materials that illuminate contemporary flexible architecture in the range of the last century, and touches on the futuristic perspective. It is of great interest for me as a practising architect to explore the dominant aspects of the relationships of modern urban society and flexible architecture. It is my genuine interest to follow the development of new architectural ideas in the modern society, and to study historical facts that influenced the way of interaction between society and architecture. It is also important for me to explore the range of challenges faced by societies today and those that might be part of the future.

## **Acknowledgments**

I would like to express my sincere gratitude to my supervisor, Elin Kristine Haugdal. Thank you for moral support and patience, for every bit of time, criticism and challenging guidance you offered. I could not have done it without your inspirational help and absolute faith.

It has been a unique experience in my life, to study in the most northern university in the world. I will always value it highly. It has been a privilege to have communicated with so many bright and energetic people during the years of studying. Thank you for making my experience special, to Svein Aamold, Hege Olaussen, Ingebjørg Hage, Vidar Trødal.

Thank you to my family for love and support. I would like to dedicate my work to Poppies, the light of my life.

## Contents

<b>Chapter 1: Introduction</b> .....	7
Changing societies in a globalised world .....	8
Aims and objectives of the study .....	9
<b>Chapter 2: Flexible Architecture in Modernism</b> .....	13
Concepts of modernity, modernisation and modernism .....	13
Theories of flexibility in architecture .....	15
Modern living .....	18
Principles of flexible architecture .....	23
Adaptation .....	24
Mobility .....	26
Transformation .....	28
Interaction .....	30
<b>Chapter 3: Portable Architecture</b> .....	32
Loftcube – home retreat for the modern nomads .....	32
Nomadic communities – comparison in time perspective .....	37
<b>Chapter 4: Dynamic Architecture</b> .....	41
Dynamic Tower – the new dimension .....	41
Glimpse into the history of high rise living .....	46
Symbolism of towers .....	50
The Tatlin’s Tower – utopian symbol of modernity and socialism .....	51
<b>Chapter 5: Floating Architecture</b> .....	54
Floating home - living on water .....	54
Adaptation or migration? .....	55
Lilypad – floating city for climate change refugees .....	58
Utopia repeated .....	63

<b>Chapter 6: Instant Architecture</b> .....	69
Red+Housing – housing for urgent situation .....	69
Principles of prefabrication .....	73
<b>Chapter 7: Conclusion</b> .....	80
Architecture and the Future .....	80
Where to now? Suggestions for future research .....	82
<b>Bibliography</b> .....	83
<b>Internet Sources</b> .....	88
<b>List of Illustrations</b> .....	90

## CHAPTER 1

### INTRODUCTION

The Impact of accelerating change on the physical form of the city is radical. Institutions have shorter and shorter lives - railway stations are converted into museums, power plants into art galleries, churches into night-clubs, warehouses into homes - and it is now commonplace to anticipate that a building will outlive the purpose for which it is built in a matter of a few years. Modern life can no longer be defined in the long term and consequently cannot be contained within a static order of symbolic buildings and spaces [...] Buildings no longer symbolise a static hierarchical order: instead, they have become flexible containers for use by a dynamic society.

Richard Rogers, *Cities for a small Planet*, 1997, p.163

Discussion surrounding the future of architecture has generated widespread interest in the last decades. During these years a vast amount of ideas concerning flexible architecture have been produced. The term flexible architecture has been generally understood as an architecture that responds to change, as a “fluid architecture that becomes complete once people inhabit it and use it.”<sup>1</sup> The flexible architecture has been increasingly granted attention by today`s architects and designers. It comprises an arena where thought and design grasps one`s imagination and keeps expanding, directed by a range of purposes.

Today the concept has established itself as one of much importance and enters the contemporary architectural world with great confidence. Some of the ideas surrounding

---

<sup>1</sup> Kronenburg`s lecture on flexible architecture at the Building Centre in London, 5 March 2011  
source: <http://vimeo.com/21803296>

flexible architecture stay experimentally unique with utopian characteristics and remain inbuilt, while many others are increasingly being commissioned by different clients – both private persons and various organisations.

### **Changing societies in a globalised world**

Generally humankind possesses the greatest values that allow to define it as dynamic. These are the abilities to pass on the accumulated knowledge from one generation to the next, to embrace and solve the problems, its natural curiosity to explore, the restless energy, and uncontrollable desire to achieve new goals. All the historical and cultural events that happened in the world known to us, and all that are to happen are based on these qualities.<sup>2</sup> Vladimir Lenin, Russian communist revolutionary and political theorist said: “To live in a society and be free from a society is impossible”.<sup>3</sup> Indeed societies form the network of countries of the world where citizens are organized into certain way of living, framed by set of rules and laws. But of course if we compare the dynamic type of citizen to the static one, we could say that the static type is content to live in a changeless environment. Traditions determine the way of his living, his beliefs, his production techniques, social and cultural activities. Such societies can be remote tribal societies that are ignorant to any kind of innovation and actually have no need or desire for it.

Today, the modern dynamic citizen finds himself in dynamic, ever changing environment. By its nature, mankind has always been transient, to varying degrees through the history. What has changed with the time, and what we can witness today is the speed and scale at which the increasing restlessness occurs. In order for modern architecture to serve the contemporary society, it must embrace and respond to the state of constant transfer, exchange, relocation and adaptation, - the qualities evolved by contemporary societies.

Technology has transformed the world into a global phenomenon. Travelling time has shrunk dramatically during the last century. Journeys that would have taken weeks at the beginning of the century are reduced to just a few hours today. Exchange of information is at our fingertips thanks to the web connections. We use metal and plastic capsules to travel through

---

<sup>2</sup> This is my own very short definition of dynamic humanity based on general knowledge

<sup>3</sup> Vladimir Lenin, , *Partijnaja organizacija i partijnaja literatura* (November 13, 1905.) – omnibus edition, 5th ed., volume 12, p.104



and over land, air and water. Important parts of contemporary society are modern “nomads” – ambitious career and job seekers, students, travellers, soldiers, entertainers, businessmen.

Globalisation is the term that can be defined as “the technological and economic influences that force us together worldwide”.<sup>4</sup> While being a route for wealth for many, globalisation on other hand pass on many problems and challenges. A very small number of countries and multinationals dominate the rest of the world economically and technologically. Massive poverty still finds place despite generally visible prosperity. Presently (statistics of 2002) two billion people in the world live below the poverty limit. Eight hundred people are suffering from starvation.<sup>5</sup> Human’s desire to improve living conditions often results in migration.

Mass migration leaves both positive and negative footprints. Immigrants might shortly lift up the labour shortage, but migration leaves deep scars in the native countries, and sometimes provokes social, cultural and political unrest in host countries. Global consumerism and mobility have provided many with desired freedom, but the results of global warming and climate changes prove to be quite dramatic.<sup>6</sup> The reality proves to be complicated. As corporations and communities continue to expand and contract, re-locate, emerge and vanish, their need to be capable of adapting is increasing. The nomadic lifestyle and working patterns of our mobile society as well as other consequences of globalisation require new dimensions from modern architecture. Modern architectures aim is to serve in a highly effective and sustainable way contemporary society. Perhaps a more functional architecture that is movable, adaptable, transformable and capable of disengagement and reassembly could keep up with the occupants’ need to have multiple activities in one space, help to maintain economy and ease the over use of energy and resources.

### **Aims and objectives of the study**

On the basis of above mentioned background, my research question evaluates the following:

What is flexible architecture in the 21<sup>st</sup> century? How does it differ from the Modernism’s attempt to create a form of flexible architecture and what does it have in common? By analysing central aspects within architectural modernism, I trace the logic, similarities and

---

<sup>4</sup> Hubert-Jan Henket, & Hilde Heyen, *Back from Utopia. The Challenge of the Modern Movement*, 2002, p.14

<sup>5</sup> Ibid, the same page

<sup>6</sup> Ibid, the same page

differences between some contemporary and earlier 20<sup>th</sup> century flexible architectural projects.

In my thesis I illustrate and evaluate chosen flexible architectural projects based on theoretical concepts and objective case-studies. The empirical materials are central projects in contemporary architectural discourse, selected from literature, journals and the use of Internet sources. As supporting materials I shall use different types of empirical data such as drawings, models, texts and built structures. A qualitative methodology of this thesis is underlying the approach to the problem. The cases and examples have been chosen because they can be seen as strategic and pragmatic in order to investigate modern flexible architecture.

In this body of work, I study the unifying principles of flexible architecture throughout history (within the time range of the last century), in order to understand the important factors involved in developing new environments by demand of specific situations. Therefore the assignment is based on analyses of four selected examples of flexible architecture, and my attention will be focused on four contemporary projects, viewed from a historical perspective drawn to parallel cases: *Loftcube* – house for future nomads; *Dynamic Tower* – luxury dwelling of 21st century; *Lilypad* – the floating city; *Red + Housing* – emergency housing.

My case-studies approach is based on and supported by Lytton Strachey's allegation in the preface to *Eminent Victorians* where he wrote that "recent history is difficult, because we know too much about it"<sup>7</sup>, and he advises to "row out over the great ocean of material, and lower down into it, here and there, a little bucket, which will bring up into the light of the day some characteristic specimen"<sup>8</sup>. Peter Blundell Jones himself views the case study as dialogue with the material. He approaches the investigating the physical and cultural context of each building as a better way to disclose general set of laws and principles that may apply to it, rather than "bending the work to fit the rules"<sup>9</sup>.

I have chosen these four examples because they represent different building types and in response to various challenges – thus they offer a wide basis in order to answer the questions related to the problem. Location, space, form, function and use of these samples will be

---

<sup>7</sup> Lytton Strachey, *Eminent Victorians*, 1948, p.6 quoted in Peter Blundell Johns, *Modern Architecture Through Case Studies*, 2002, p.5

<sup>8</sup> Peter Blundell Johns, , 2002, p.5

<sup>9</sup> Ibid

analysed with reference to selected parallel case(s) from 1900-century architectural history. Such parallel analyses and interpretations create room for discussion of the theories that underlie my thesis.

*Loftcube* is a single dwelling entity that was designed by the young German architect Werner Aisling in 2003. The background of the project was the architect's idea of creating a temporary, minimal housing unit that could fit a particular group of people – those who represent the modern urban nomads. In the architect's opinion, *Loftcube* could be an ideal home for people who need to stay in large cities in a short period. The idea is particularly related to the utilization of large quantities of disposable roof in Berlin. Utilization of such unused space is considered as a realistic solution to the problem of housing shortage in big cities. The architect is very keen to use the latest building materials and to combine them with their artistic and experimental approaches.

*Dynamic Tower* is a rotating skyscraper, an exciting project (2008) by David Fisher from Israel. He studied architecture at University of Florence and later taught at the same university. In this specific project he focused on two concepts: a) the industrial approach with prefabricated elements in a project, and b) the dynamic architecture – the concept where in addition to the already established three dimensions a new dimension (time) comes into focus. The architecture of a skyscraper is not static, it moves constantly, "adjusting" itself in relation to the sun, wind, or views. Each floor in buildings can actually be rotated separately, creating Fisher's imposing shape change.

*Lilypad* is the floating city project, a concept design proposed by Vincent Callebaut in 2008. This project is an extension of the architect's previous projects that focused on sea-level rise. His futuristic idea addresses the current global environmental problems and suggests solutions. *Lilypad* is big enough for 50,000 inhabitants and is designed as a floating home with zero emissions. The floating city is using solar, wind, biomass and tidal power to generate energy for their citizens. It also has a surface of titanium to handle the increasing amount of CO<sub>2</sub> in the atmosphere. This project seems as a fantasy today. But the situation humanity finds itself in, where global warming and rising sea levels are real and legitimate issues, it may be tempting to build such mega-structures in the future.

*Red + Housing* is designed by ORBA Architects, an architectural firm from New York. This project is defined as an *emergency architecture*. The project was designed to mark the anniversary of the earthquake in Sichuan in 2008. A full-scale prototype was built and

exhibited in NAMOC (National Art Museum of China) in May 2009 during the exhibition "Aid Houses."

The four chosen projects represent different types of building, and serve different needs in the society. At the same time they express freedom for movement for global nomads, a particular form for social flexibility, flexible building methods and flexible room, concern for natural environment and sustainability, responsibility for consequences of natural and man-made disasters, and boldness of utopian proposals that may as well take place in the future.

## CHAPTER 2

### FLEXIBLE ARCHITECTURE IN MODERNISM

#### Concepts of modernity, modernisation and modernism

To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth, transformation of ourselves and the world – and at the same time, that threatens to destroy everything we have, everything we know, everything we are.

Marshall Berman, *All that is Solid melts into Air. The Experience of Modernity*, 1983, p.15

To disclose the definition and dimensions of meaning of modernity I shall sail through and consult the theories that express distinctively modern concerns.

Modernity is understood differently by many critics. Analyzing modernity in the nineteenth and twentieth centuries, Marshall Berman quotes Marx's description of the modern condition:

All fixed, fast-frozen relations, with their train of ancient and venerable prejudices and opinions, are swept away, all new-formed ones become antiquated before they can ossify. All that is solid melts into air, all that is holy is profaned, and men at last are forced to face the real conditions of their lives and their relations with their fellow men.<sup>10</sup>

Berman points, that the power to transform and change both ourselves and the world defines our modern condition. But the changes that we face bring uncertainty and risk. Our desire for what we can achieve is balanced by the understanding of our capability to devastate. "To be modern, therefore, is to live this life of paradox".<sup>11</sup>

The etymology of the word "modern" is *present*, current. In this meaning term was employed as long ago as Middle Ages. The second meaning is *new* as opposite to the old. The word belongs to the present time and represents distinguishing features of this particular period,

---

<sup>10</sup> Rogers, 1997, p.21-22

<sup>11</sup> Ibid, p.22

which are different from the previous period. This sense of the term began to prevail in the seventeenth century. Yet the third meaning of the term became important in the nineteenth century, which is *momentary*, or the transient, passing briefly. Modernity is also associated with the attitude of breaking of all the orthodox, all traditions, and rejecting the inheritance of the past.<sup>12</sup>

Generally accepted concept of the modern is longing for innovation, rebellion against the pressure of tradition and general drive towards progress. But according to Octavio Paz, modernity stands as an exclusively Western concept that is not found in other civilizations.<sup>13</sup> Thus Western civilization is opposed to static civilizations. This statement can be arguable since there are numerous conservative powers in the “West” and numerous dynamic powers in the “East” or the third world. Modernity nevertheless embraces dynamic concept.

The term *modernization* is used to describe the process of social development, which mainly refers to technological advances, industrialization, urbanization, bureaucratic organization of social life, enormous expansion of mass communication system. The term *modernism* is given to cultural tendencies and artistic movements that proclaim themselves as being in sympathy with the orientation towards the future that will be different from the past and from the present, future of transformation and progress.<sup>14</sup> Progress is associated with harmonious and continuous process of development that brings the advantages to everyone in the society. Le Corbusier’s view on this topic is typical:

A great epoch has begun. There exists a new spirit. There exists a mass of work conceived in the new spirit; it is to be met with particularly in industrial production. [...] Our epoch is determining, day by day, its own style.<sup>15</sup>

Response to the modernism in architectural field is represented by modern architecture, as a part of *modern movement*, “introduced by Nicolaus Pevsner as a description of the joint efforts of a generation of young designers and architects who pursued an architecture that answers to the exigencies of its time in that it is objective, rational, sober and without

---

<sup>12</sup> Hilde Heynen, *Architecture and Modernity*, 1999, p.10

<sup>13</sup> Octavio Paz, *The Children of the Mire: Modern Poetry from Romanticism to the Avant-Garde*, 1974 quoted in Heynen 1999, p.10

<sup>14</sup> The term *modernism* normally has more specialized meaning for each individual discipline. This meaning may also include characteristics of style and specification of the period. The very broad definition coined by Marshall Berman and used here is particularly interesting because it offers a general framework that can throw new light on specific “modernism” in particular disciplines. Quoted in Heynen 1998, p.11 & p.228

<sup>15</sup> Le Corbusier, *Towards a New Architecture*, 1976, p.82, quoted in Heynen, 1999, p.14

ornaments”.<sup>16</sup> Sigfried Giedion stated the similar programmatic idea where he moreover stressed the ideas of social mobility and emancipation that were inherent to modern architecture.<sup>17</sup>

Hubert-Jan Henkel states that modern movement does not have exact and comprehensive definition among the architectural historians. It applies to a wide spectrum of trends with different approaches, which are entirely dependable on the personal opinions, political climate, cultural and social circumstances of the defined time. He therefore suggests that modern movement “is considered to mean social and aesthetic innovation, using state-of-the-art technology and rejecting the values of continuity and tradition in order to shape the present and the new”.<sup>18</sup>

Henkel’s definition again echoes with those explored above, and we can therefore sum up that modernity is often seen as a state of innovation, bringing rapid changes caused by modernization, and manifesting all the progressive activities in modern movement.

### **Theories of flexibility in architecture**

Cities and towns around the world are composed of static dwellings, which are the dominant model for societies and based on the principle that dwellings should be stationary. The classical Vitruvian attributes of architecture identified as *utilitas*, *firmitas* and *venustas* (namely utility, solidity and beauty) confirm this.<sup>19</sup>

In his *The Storm and the Fall* Lebbeus Woods, an American architect and one of the most exciting and original architecture visionaries today, describes how architecture traditionally has had a reassuring role: “The unity and symmetry of monumental architecture refers symbolically to a harmonious and balanced universe in which contending forces are

---

<sup>16</sup> Heynen, “Coda:Engaging Modernism” , in Henket & Heynen, 2002, p.379, with reference to Nikolaus Pevsner, *Pioneers of Modern Design. From William Morris to Walter Gropius*, first published as *Pioneers of the Modern Movement*, 1936.

<sup>17</sup>Sigfried Giedion, *Bauen in Frankreich, Bauen in Eisen, Bauen in Eisenbeton*, Klinkhardt & Biermann, Leipzig, 1928; translated by J. Duncan Berry, with an introduction by Sokratis Georgiadis, Sigfried Giedion, *Building in France, Building in Iron, Building in Concrete*, The Getty Center for the History of Art and the Humanities, Santa Monica (Cal.), 1995, Ibid, same page

<sup>18</sup> Henkel & Heynen, *Back from Utopia. The Challenge of the Modern Movement*, 2002, p.9

<sup>19</sup> Kenneth Frampton, *Modern Architecture*, 2007, p.14

reconciled. The traditional role of architecture has been one of reassuring us that things are under control, that is, stable and static.”<sup>20</sup>

Flexibility on the other hand refers to the idea of accommodating change over time. Lebbeus Woods analyses the relationship between architecture and society in his work *Radical Reconstruction*. To grasp the complicated attitude that he has towards the subject, these lines would be helpful:

Architecture is, first and foremost, a process of creating [...]. Because of this, the making of architecture is a major coalescing activity in society, bringing together many flows into a single complex stream. In classical terms, architecture is a socially significant synthesis of the old antitheses: public/private, art/science, capital/labour. As long as society is dominated by institutions of authority that require a basis external to themselves for their existence [...], monumental, that is, institutional, hierarchical architecture is required to embody objective knowledge. Subjective knowledge is deemed relevant only within the personal sphere, and therefore is embodied in idiosyncratic private work, tolerated publicly as work of art. But when society no longer define itself in classically deterministic, objective term, but only in terms of continuously shifting, dynamic fields of activity, then architecture must forsake the monumental, because there is no hierarchy to valorize anymore, no fixed authority (..) In such society, the classical distinction between art and life disappears. Art and life flow together, inseparable. Architecture then concerns itself with dynamic structures: tissues, networks, matrices, heterarchies.<sup>21</sup>

Woods underlines that dynamic societies create room for dynamic architecture - the type of architecture that is in opposition to stagnancy, and carries characteristics of flexibility. Flexible architecture is a concept within a field of many theories. There are academic theories about different types of flexibility, and theories that frame borders for mobility.

The term ”flexibility” entered the field of architectural terminology around the early 1950s. Walter Gropius stated one of the earliest presumptions of flexibility in 1954: ”(1), the

---

<sup>20</sup> [http://www.sectdesign.nl/pdf/par\\_arch.pdf](http://www.sectdesign.nl/pdf/par_arch.pdf) downloaded 31.03.2013

<sup>21</sup> Lebbeus Woods, *Radical Reconstruction*, 1997, p.14



architects have to conceive building not as a monument, but as a receptacles for the flow of the life which they are to serve, and (2), that his conception should be flexible enough to create a background fit to absorb the dynamic features of our modern life”.<sup>22</sup> Therefore we can assume that social flexibility is in compliance with modernity.

Critical controversies over “flexibility” in 1960s have developed into divisive discussions whether the architect should leave his work unfinished thus to provide with opportunity to develop the final design in the future, or whether the design of the building should be finished, but nevertheless flexible. John Weeks, the English architect was one to defend the “unfinished” solution on the ground that all the big institutions such like airports or hospitals are not able to predict the changes that the building might require after it is taken in use. In strong opposition to this statement came another one from Team X, where they warned about “...the glove that fits all hands, and therefore becomes no hand”.<sup>23</sup>

Yona Friedman, one of the leading architects and theorist in the 1950s and 60s, identified flexibility as a key concept in architecture. In 1958 Friedman published his first manifesto called 'Mobile Architecture', which proposed a new kind of mobility, which he called “general theory of mobility”. His concept of “mobile architecture” implies mobility not of the building, but for the inhabitants, who are given freedom. Friedman describes mobility in this sense as a kind of “natural law”.<sup>24</sup> Friedman claims that architectural knowledge cannot be the exclusive property of professionals and specialists, and suggests providing people with writing guides or manuals, which explain topics and illustrate basic skills, related to architecture and urban planning , in clear and simple terms. His theory provides maximum flexibility through the suspended superstructures over the city, and providing individual freedom for inhabitants to construct their own dwellings within the structures:

The essential for the spatial town is what I call ‘spatial infrastructure’: a multi-level space-frame grid supported by pillars separated by large spans.[...]. This infrastructure represents the *fixed* part of the city; the *mobile* part consists of the walls, floorslabs, partitions, which make possible individually decided space arrangements: the “filling in” within the infrastructure. Thus all elements which are in *direct contact with the user* (i.e. those which he sees,

---

<sup>22</sup> Adrian Forty, *Words and Building. A Vocabulary of Modern Architecture*, 2000, p.142

<sup>23</sup> Ibid

<sup>24</sup> Yona Friedman, *Pro Domo*, p.14

touches, etc.) are mobile, as opposed to the infrastructure which *serves for collective use* and is *fixed*.<sup>25</sup>

Adrian Forty, professor in Architectural History, in *Words and Buildings. A Vocabulary of Modern Architecture* (2000) sees flexibility as a subject that requires long-term thinking in architectural design. He argues that the flexibility becomes part of a wider regime of control when architects are confronted with the predicament that their involvement in a building “ceased at the very moment that occupation began. The incorporation of ‘flexibility’ into the design allowed architects the illusion of projecting their control over the building into the future, beyond the period of their actual responsibility for it.”<sup>26</sup>

Such prominent theories that promote flexibility on different levels (social, geographical, functional, constructional, and planning for the future) shall be in focus of my thesis. Through the chosen case studies – architectural projects that were created in a span of the last century, I would like to trace the different aspects that drive dynamic ideas of architects and designers, and see how today the renaissance of flexible structure reflects the increasing dynamics of modern times.

## **Modern living**

One of important motivations of the Modern Movement was the pioneering view on social matter. Social liberals and visionaries believed that the most important agenda of the day was to improve living and working conditions of the nation. The Modern Movement sought to find a simplified, abstract mode of expression, to develop architectural design into a pure concept, with clear form and free from unnecessary ornaments.

The period after World War I marked a new turning point in architectural world. Europe became the main arena where the revolutionary aspects in architecture and design took place. The artistic movement De Stijl (Dutch for “The Style”) had a utopian and philosophical vision on the design, which was based on the functionalism and simplicity of forms. All the decorative elements were abolished, apart from the bold primary colours. Many special

---

<sup>25</sup> Yona Friedman, *Architecture Mobile*, 1960, quoted in Ruth Eaton, *Ideal Cities: Utopianism and the (Un)built Environment*, 2002, p.221

<sup>26</sup> Forty, 2000, p.143

design elements were introduced in the interior that visually blurred the borders between the furniture and the house. Folding and sliding walls could divide or expand the room volume. Furniture elements such as chairs, desks, tables, cupboards etc. were either folded or slid from the walls and other surfaces. Their approach *salle* provided flexibility by creating multi-purpose space and instant response to personal needs. Schröder House is perhaps the most famous example of De Stijl where free plan liberated the living space and created flexible domestic environment.



Fig.1 Gerrit Rietveld, Schröder House (1924), exterior and interior

Combination of clean lines, simple pure forms, unrestricted by constructional elements plan layouts, ribbon windows, flat usable roofs that defined architecture, became known as International Style. International Modern Style was promoted by and represented among others by Bauhaus. Bauhaus was founded by architect Walter Gropius in 1919, whose main aim was to unify art, design and industry. Bauhaus's vision also was of social and political kind, as it sought to solve the problems of the German working class in the period of depression after World War I. Urban planning, housing, designing of mass production consumer goods were exercised by Bauhaus. The group's vision on buildings of the future was based on the idea of promoting new machine technology as means to create an environment where designers, architects and artists would work together. Bauhaus' motto stated that the building should be the centre of all the arts, and it was expressed in the name Bauhaus (House of Building). The building had to have a feeling of openness, clean lines, simplicity and flexibility.

Le Corbusier was the most prominent architect that contributed to the Modern movement and his Villa Savoye (1930) can be seen as an icon of this movement with its emphasis of proportion, clear composition and aesthetic impact. The building is a product of architect's

concept to offer people a better living environment, with roots in his Dom-ino structural system from 1914. Interlocking living areas of the building were created by merging the spaces via a succession of ramps and volumes and can be seen as essential elements of flexible space.

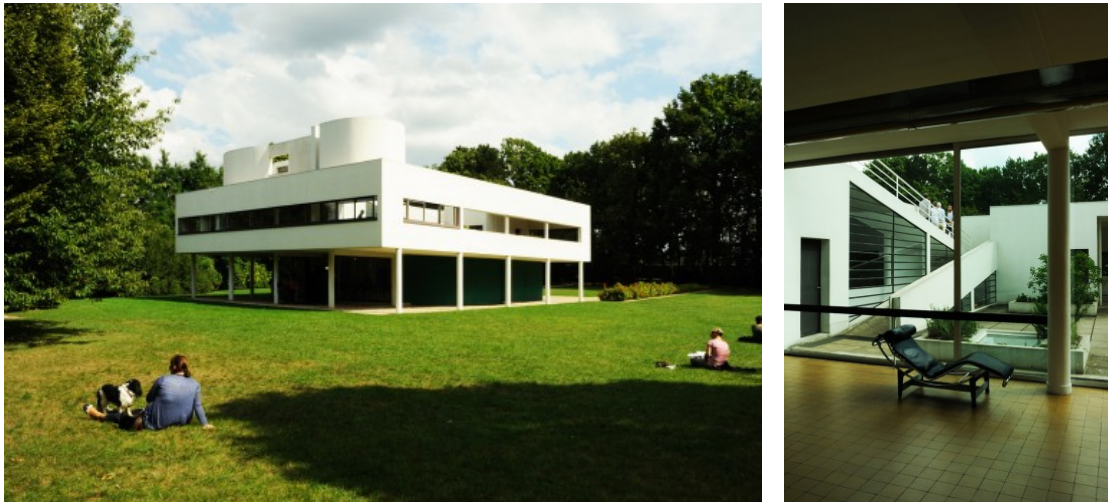


Fig.2 Le Corbusier , Villa Savoye (1930) , exterior and interior

Among many, one of the most influential representatives of the Modern movement that promoted credo of flexibility were the Metabolists. Metabolism was glorious Japanese architectural movement of 20<sup>th</sup> century that had envisioned a new direction for architecture and urbanism. The first Japanese architecture movement after the World War II, it aimed to achieve synthesis and harmony of tradition, technology, human and nature. The Metabolists were established in 1960 by architecture critic Noboru Kawazoe and the five architects, Kiyoshi Awazu, Kiyonori Kikutake, Kisho Kurokawa, Fumihiko Maki, and Masato Otaka. They manifested their pioneering idea that buildings and cities should develop organically, and grow accordingly to the needs of their inhabitants. Their envision for a new direction for future Japanese architecture and urbanism resulted in creation of various architectural projects and urban plans with large, flexible and expandable structures. Kurokawa called the era he lived in “the Age of Life”: “My architecture represents the spirit of the Age of Life Principle, and it aims at the symbiosis between abstraction of modern architecture and cultural identity.”<sup>27</sup>

One of the most distinguishing buildings that became an architectural icon of that era is The Nakagin Capsule Tower.

---

<sup>27</sup> Kisho Kurokawa, *What is the Legacy of Modern Architecture?*, quoted in Henket & Heynen, 2002, p.253



Fig.3 Kurokawa, Nakagin  
Capsule Tower, Tokyo, 1971

The building most precisely represents the Metabolist theory. “The philosophy of metabolic design is based on exchangeability, modular buildings, prefabricated parts and capsules. The units move, change or expand according to the needs of the individual, thereby creating organic growth”<sup>28</sup>. The module was created with the purpose of housing commuting businessmen that worked in central Tokyo during the week. The whole design was a prototype of sustainable architecture, with recycle ability, as all capsules were prefabricated and each module could be plugged in to the central core and replaced or exchanged when necessary.

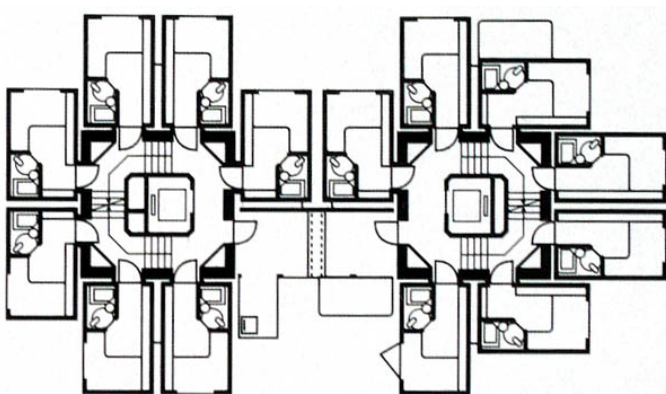


Fig.4 Floor plan of Nakagin Capsule Tower



Fig.5 Interior of the capsule

<sup>28</sup> Pilar Echavarría, *Portable Architecture – and Unpredictable Surroundings* 2005, p.24



Each unit was about 10m<sup>2</sup>, and included all the necessary amenities for modest temporary living – a toilet, a shower, a bed, a desk, a refrigerator, a storage place, a TV.

Metabolists envisioned the cities of the future as flexible and expandable structures that remind the process of growing organisms. In their opinion the traditionally fixed forms and functions were out-dated. Their ideas resulted in expandable city plans such as Arata Isozaki's City in the Air, Kisho Kurokawa's Helix City and Agricultural City, Kiyonori Kikutake's Marine City, Kenzo Tange's masterplan for Tokyo.



Fig.6 Helix City , Kurokawa, 1961

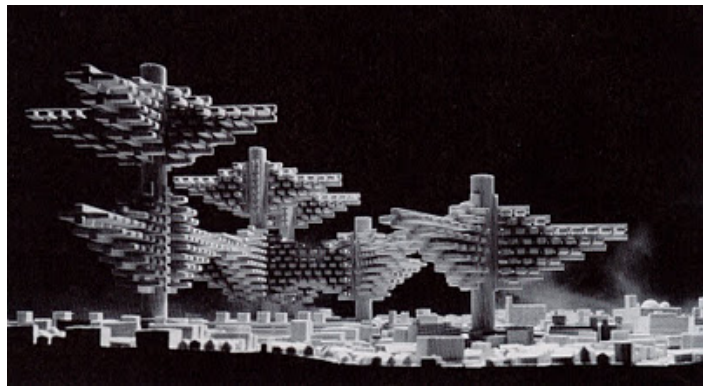


Fig.7 City in the air, Arata Isozaki, 1961

Kikutake's floating cities can be seen as the best poetic visions of Metabolist movement:

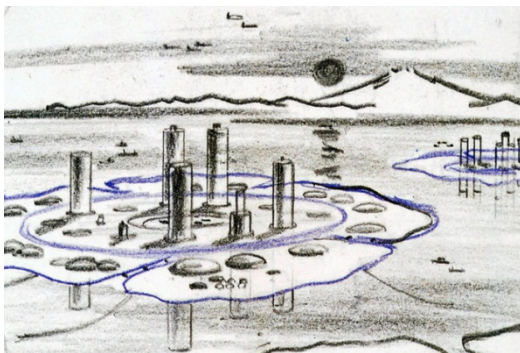


Fig.8 Sketch for Floating City, Kikutake,1960



Fig.9 Model for Floating City, Kikutake, 1962

In modernism, architecture and city become ideal and broad manifestation of utopias. Relationship between contemporary utopian ideas and those of earlier utopias are of renewal rather than redundancy. Mark Lewis voices his opinion on modernist architecture and utopian ideas: “If we accept that we are modern and that we continue to live in the time of modernity, then we know that modernist representational forms have staked their legibility and ‘success’ in the figuring of other futures, necessarily utopian, in the possibilities of modernity.”<sup>29</sup>

Despite the creativity and the effort of Metabolist architects, many of their proposals were never realized. Few of those that were built, stand today as a monument of futuristic architecture that was envisioned during Modernism Movement and in turbulent 1960s. At the same time they remain constant inspiration for the contemporary designers and architects, despite the anticipation and utopian impulse in them.

Kurokawa clearly expressed the value of the architectural legacy: “We call the historical layers of each age, its technologies, materials and spirit, “history” or “tradition”. Only creative architecture that expresses the spirit of its age survives as a part of the greater cultural heritage. Since that is the case, our creative role is – while inheriting our invisible cultural tradition – to employ the most advanced technologies and materials of our own time, to symbolically express the thought and spirit of our age.”<sup>30</sup>

I will further view and explore the chosen topic of flexible architecture in a historical and socio-cultural context, as a process that has cultural significance, both as a visual text and in the way that it is the result of certain needs and desires in society.

## **Principles of Flexible Architecture**

Human beings are incredibly flexible. They move about at will, they manipulate objects, they operate in a wide range of environments, determined to fulfil their desires. People adapt and adopt spaces, and they long for buildings to be adaptable as well. Buildings are exploited by different kinds of people in their own individual ways. Their custom-made space is changing

---

<sup>29</sup> Mark Lewis, “Is Modernity our Antiquity?”, *Afterall*, 14; Autumn/Winter 2006.  
<http://www.afterall.org/journal/issue.14/modernity.our.antiquity>

<sup>30</sup> Kisho Kurokawa, *What is the Legacy of Modern Architecture?*, quoted in Henket & Heynen, 2002, p.257

from space to place, from dwelling to home. And the period of use generates the unique essence of place that is necessary for established architecture to exist.

“Because the outside world of today affects us in the most intense and disparate ways, our way of life is changing more rapidly than in previous times. It goes without saying that our surroundings will undergo corresponding changes. This leads us to layouts, spaces, and buildings of which every part can be altered, which are flexible, and which can be combined in different fashions”<sup>31</sup> – such stated Walter Benjamin necessity of flexibility in architecture. Flexibility became one of the important modernist terms. The concept of *flexible architecture*<sup>32</sup> corresponds with the changes – in place and in time, in size/shape and in purpose, free of borders.

*Flexible architecture* by Kronenburg’s definition is a “fluid architecture that becomes complete once people inhabit it and use it.”<sup>33</sup> Indeed the concept is tightly bound to our living reality, both mental and material. Flexible architecture aims to embrace the changes and challenges of the modern dynamic world. Flexible architecture requires design which is shaped by attitude to integrate the requirements of the present with the possible changes of the future. Different situations, functions, patterns of use, individual users’ requirements for today and for tomorrow - these are main criteria that outline the design of flexible architecture. Kronenburg identifies four key factors that characterize flexible architecture: Adaptation, Mobility, Transformation, Interaction.<sup>34</sup> I will expand on these four factors closer, since I will be using these terms further in my thesis.

## **Adaptation**

Charles Darwin said: “It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change”.<sup>35</sup> One of the most important lessons we can learn from nature is adaptability, it is ability to alter to changes or be changed to fit current circumstances.

---

<sup>31</sup> Benjamin Walter, Theses on the Philosophy of History, in *Illuminations*, p. 254, quoted in Hilde Heynen, *Architecture and Modernity*, 1999, p.47

<sup>32</sup>For my use of the term *flexible* (regarding architecture) I rely upon Robert Kronenburg, *Flexible – Architecture that Responds to Change*, Laurence King Publishing, London, 2007

<sup>33</sup> Kronenburg’s lecture on flexible architecture at the Building Centre in London, 5 March 2011  
source: <http://vimeo.com/21803296>

<sup>34</sup> Robert Kronenburg, 2007, p.89 - 231

<sup>35</sup> <http://littlegreenseed.wordpress.com/2012/04/22/adaptable-nature-adaptable-architecture/>





Fig.10

Chameleon and hermit crab, examples of adaptability in nature.

Adaptability in architecture is defined as an ability to recognise “(..) that the future is not finite, that change is inevitable, but that a framework is an important element in allowing that change to happen”<sup>36</sup>

Adaptable buildings are designed to adjust to the different functions, defined by users’ activities. Buildings, while having one distinct purpose, can operate for all kind of different others. It is architecture that sometimes is called *open building*, with loose-fit space that can be easily accommodated at the later stage. The *open building* strategy considered the most formalized strategy for adaptable architecture. The process of change can be continuous and ongoing, as it involves different participants to interact in the design of desired space and at different times of building existence. This process is seen as the most momentous attribute to adaptable architecture. The flexibility of the possible layouts gives freedom for users and inhabitants to choose own designer, and freedom for the designer to create the desired space the client needs.



Fig.11 Schaulager (Art Store), Bazel, Switzerland, Herzog and De Meuron, 2004, exterior and interior

Schaulager (Art Store) in Basel is example of adaptable building with different facilities – gallery, warehouse and educational space. Adaptable architecture also makes room for all the

<sup>36</sup> Kronenburg, 2007, p.114

technological innovations that can improve the previous installations of the building. Such flexible updating in communication, security and other service systems allow changing layouts and functional specifications of the building. At the same time the technological advances allow for the creation of self-optimizing buildings, rather than merely best-fit compromises.

Adaptability in architecture is also recognised as an essential component in creating sustainable architecture. Preserving and adaptive reuse of a building instead of demolishing it and erecting a new one in its place contributes significantly to the environmental sustainability.



Fig.12 Shipping container is converted to the guest house by Poteet Architects, USA, 2010

Buildings with adaptive systems use less energy, offer more occupant comfort, and feature better overall space efficiency than static building. Adaptable buildings are designed to be changeable, with multi-purpose space, freedom of use.

## **Mobility**

“I’m for portable houses and nomadic furniture. Anything you can’t fold up and take with you is a blight on the environment, and an insult to one’s liberty.”<sup>37</sup> Andrei Codrescu here defines *Mobile architecture* as an architecture that represents physical movement, architecture that changes places within a time range. “Mobility” refers to buildings that can

---

<sup>37</sup> Andrei Codrescu, Jenifer Siegal, *Mobile: the Art of Portable Architecture*, 2002, p.10

physically relocate from one place to another. Kronenburg describes mobile architecture as an architecture that “rolls, floats or flies”<sup>38</sup>.

There's nothing new about mobile architecture. Nowadays there are still plenty of nomadic communities who take their dwellings with them. Mongolian yurts, Bedouin tents and American trailers are among the numerous examples. Many demountable buildings that are produced commercially today are already widely used in a number of fields – in commerce, industry, military, education, health care, housing, where they fulfil their individual roles.

The advantage of such temporary buildings lies in the flexibility and diversity of their purposes, as well as the fact that they can be reused and therefore regarded as non-disposable. The mere fact that they are reusable “means that they can be an efficient use of materials and resources and therefore be designed with care – high quality products tuned to a specific need if not a specific location”.<sup>39</sup> Recycling potential provides the opportunity to experience changes in accordance to needs.

Relocation according to specific needs is the basic idea behind mobile structures all over the world. These mobile structures allow us to compare and understand the effects of different local environments on society and how these produce specific requisites among the people who live in them.

Primarily exemplified by the mobile home, mobile architecture presents a courageous effort in promoting movement, and flexibility of place. The mobile home embodies many shortcomings that often overshadow its advantages. Marketed as a low-income housing option, mobile homes are typically equated with low standards of living. As evidenced by the typical consumption method of the mobile home – prefabrication, delivery, permanent placement – just because something *can* move, doesn't mean it will. Mobile architecture that remains static is ultimately immobile and permanent.

---

<sup>38</sup> Kronenburg's lecture on flexible architecture at the Building Centre in London, 5 March 2011  
source: <http://vimeo.com/21803296>

<sup>39</sup> Robert Kronenburg, 2007, p.11



Fig.13 Mobile home for 50 scientists. Halley VI Antarctic Research Station by London-based Hugh Broughton Architects, project 2005.

Mobile architecture is also linked with the possibility of establishing temporary lodgings in acute and emergency situations; for example in war and conflict areas or in relation to natural disasters. This new direction within architecture, focused on creating futuristic living spaces in unusual environments, often affected by climate change, has the potential to incite projects and ideas that have been unimaginable until now.

## Transformation

“I want to reinvent the built environment in order to extend the reach of consciousness.”<sup>40</sup> In this way Michael Jantzen voiced his idea of transformation. Transformable buildings are able to change their shape, space, appearance by the physical alteration to their structural components, outer shell or internal surfaces. “Truly transformable architecture [...] must enable a dramatic alteration in the character of the whole architectural environment. [...] This is architecture that opens, closes, expands or contracts.”<sup>41</sup>

Introducing transformation characteristics to a stationary building brings something magical about this performance – a building becomes kinetic at a touch of a button. By simple or more complicated operation building changes its form and gives the impression of being alive.

---

<sup>40</sup> <http://www.michaeljantzen.com>

<sup>41</sup> Robert Kronenburg, 2007p.146





Fig.14 Idea of unfolding, transformable modules by Michael Jantzen

At the same time the transformation process may prove to be a challenging issue. The mechanisms used to enable movement have to be reliable, robust, maintenance-minimum, easy operable. Important features of mechanical movements of building parts are opening and closing joints. They have to be designed thoroughly to avoid any unexpected faults. New materials that help to maintain flexibility and integrity over prolonged time and new strategies employed by industries can help to solve this problem.

The important additional aspect of transformable architecture is ability of the building to interact with external environment and respond to climatic situations. Roofs, windows or other parts of the facade can be opened for example for light or closed for any other atmospheric reasons. This kind of control removes the barrier that buildings usually have between inside and outside, and again contributes to environmental sustainability.



Fig.15 Bengt Sjostrom Starlight Theatre, Rockford, Illinois, USA, 2003, Studio Gang Architects  
Example of transforming the interior event into the outside one.

## Interaction

In an architectural world *interactive architecture* positioned as a type of architecture that performs interaction between the building, people and appliances. It merges physical interaction of environment with people and interactive design, where the mind moves through abstract spaces. To a great extent, the interactive design depends on the technological system employed in the creation of the interactive building.

“Intelligent building systems are used to create interactive architecture that responds to users’ requirements in automatic or intuitive ways. It is architecture that is receptive to people’s needs to alter their environment and has mechanisms in place to do so easily.(..)...sensors operate actuators that can trigger a wide range of actions – kinetic systems that physically alter space, services that alter the environment or materials that alter their state.”<sup>42</sup>

Buildings “interact” when they respond to the user’s requirements in automatic or intuitive ways, and when people become participants instead of users.

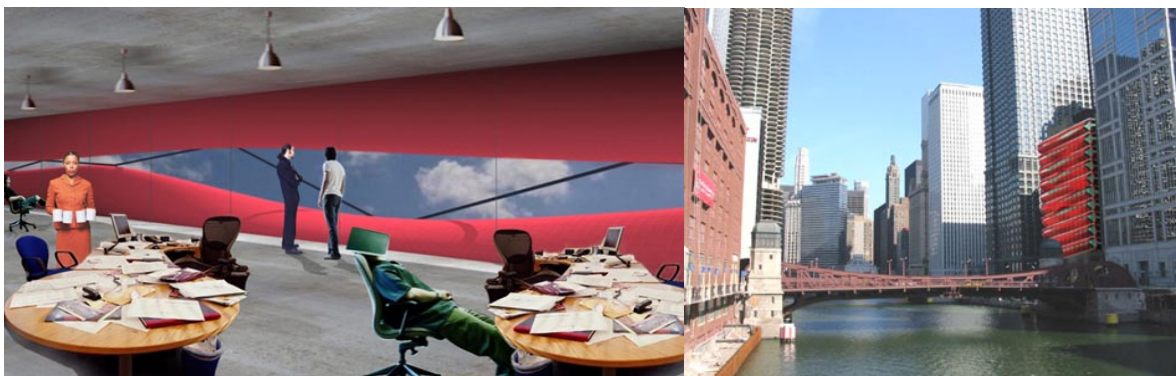


Fig.16 Adaptive Facades, the Netherlands, 2003, Kas Oosterhuis

Facades that are programmed for change represent the process of creating dynamic spaces and objects capable of performing a range of pragmatic and humanistic functions. This type of architecture includes contribution from the world of architecture, industrial design, computer programming, engineering and physical computing.

Interactive architecture is still an up-and-coming design arena. It nevertheless absorbs the inspiration from other industries, such as for example car manufacturing. Developing

---

<sup>42</sup> Kronenburg, 2007, p.210

technologies contribute to the possibility of new and better constructional and operational strategies.

## CHAPTER 3

### PORTABLE ARCHITECTURE

#### *Loftcube*– home retreat for the modern nomads



Fig.17 Werner Aisslinger, Loftcube, 2003

German architect Werner Aisslinger designed *Loftcube* in 2003. The architect used the latest techniques and new materials, combined with artistic and experimental approaches. The idea behind the project is a proposal for the temporary, minimalistic dwelling unit that can be suitable for a particular group of people – people leading a modern nomadic lifestyle. According to the architect's views,<sup>43</sup> *Loftcube* can be an ideal home for those with the need to live in a large and densely populated city for a short period of time. It was designed to be placed on the flat roofs of existing urban architecture in mega polis, offering additional living space. The idea particularly refers to taking advantage of the many flat roofs of post-war high blocks available in Berlin and its suburbs. The use of such undermined spaces is seen as a legitimate solution to housing problems in large cities.

The first time *Loftcube* was exhibited, was at Berlin's design festival "Design May", from May 3rd to May 18<sup>th</sup>, 2003. Two prototypes of this little penthouse, a "living" version and a "home office" version were put on display, with real-life equipment, but without any

---

<sup>43</sup> [www.aislinger.de](http://www.aislinger.de)



connection to utilities.<sup>44</sup> The project was covered in the media and widely discussed by visitors and in the architectural world.

*Loftcube* comes in two proposed sizes – a square plan shape of 6,25m x 6,25m (outer size 7,20m x 7,20m) and a rectangular shape of 8,75m x 6,25m, giving the net room space of 39m<sup>2</sup> and 55m<sup>2</sup> respectively. The sizes of these dwellings are really minimal and may be best suitable for a single occupant or a couple. The unit rises 1,5 m above the ground, and the overall height of the unit is 4,8m. Inside the room height is 2,5m. The total weight of the *Loftcube-39* is 35t, while *Loftcube-55* is 40t.<sup>45</sup>

The shipping of *Loftcube* can be done in a standard shipping container as a self-construction kit. It takes 2-4 days of work on site, and 2-3 people to assemble it. It can also be transported by a helicopter as whole unit.

The main frame of this mobile dwelling has a simple form too – a caravan-like shape of a soft-cornered box. It is made of honeycomb type wooden modules with plastic laminate made from vacuum-formed white laminated polystyrol, the type of material that is used on yachts. Organic frame structures are made of glass reinforced plastics (GRP), suitable for dismantling. The outer walls consist of separate panels of timber frames with full-height glass sheets. The whole little penthouse rests upon four supporting columns located in its corners. The mechanical and other technical installations run through channels provided by the corner columns. The construction of all elements was thoroughly designed; from restrictions in size to provide the possibility of transportation to the use of quick-locking mechanisms for the fixing of glass panels to the main frame. The main frame is made of aluminium to minimize weight. The customized design of the four window spaces provides a choice of transparent, translucent or opaque glazing, serving the needs of the user. The degree of translucence can be adjusted to personal preferences. Such full size windows, from ceiling to floor, create an openness of the inner space. Open volumes of the unit give the impression of spaciousness. The layout of the inner space consists of a separate kitchen, adjacent to a separate bathroom (they take up 1/3 of the floor area), and sitting / sleeping areas. Sliding partitions make the indoor space transformable, adapting to the type of living area desired by the user.

---

<sup>44</sup> Philip Jodidio, *Architecture Now 3*, 2004, p.76-79

<sup>45</sup> based on *Loftcube* fact sheets provided by [www.docstock.com](http://www.docstock.com)



Fig.18 Interior, dual usage of water sink

The simple interior of the dwelling is highly functional, where every single space-saving detail of the interior is of use. The separate kitchen and bathroom use the same tap in both sinks. Also, a shower-head can flip around from the bath side and serve as a water-can for plants on the living area side. By not repeating devices and utilities, such dual usage of living elements helps to maximize space. The living spaces of the unit blend into each other seamlessly, rejecting the traditional division of home spaces. The interior is flooded with light and consists of all the luxury and comfort of the modern deluxe room.



Fig.19 Lofcube, Interior

Werner Aisslinger visualised the idea of utilising available unused flat roofs of high-blocks and developing colonies of *Loftcubes* for temporary urban living. He described these locations as “a treasure of sunny sites in prime urban spaces”. There are special groups of people in focus for such a lifestyle and living standard – young specialists, driven by

ambitions to live metropolitan life and to be in the centre of the action; those who would be thrilled to live in the rooftop communities. Another target group could be comprised by businessmen, who work in changing environments, and who appreciate the “home-feeling” of the *Loftcube*. Each time they re-locate to a new work destination, they come “home”, to the warmth and cosines of the *Loftcube*, instead of the formality of a hotel. “Feel at home – even when you are a far away from home” is Werner Aisslinger’s quintessence.<sup>46</sup> The whole concept was driven not only by the idea of changing the skyline of the metropolitan city, but also the thought of creating new kinds of rooftop communities, which are aimed at being admired and appreciated as a new style of living – a lifestyle with a view, privacy, and the feeling of tranquillity.

Practical issues of infrastructure on the site are clarified with focus on security. The access to the site is via staircase or lift. After securing the rooftop with railings, the rooftop is ready to accommodate the additional weight. The building itself has to be checked for supporting strength. Ideally, *Loftcube* would be designed not to exceed the supporting allowance of the building and at the same time its own weight, but should also be able to withstand the wind force. Such new rooftop communities would require an extension of all the utility supplies of the building. This kind of architecture is also sometimes identified as “*parasitic*” – “as an adaptable, transient and exploitive form of architecture that forces relationships with host buildings in order to complete themselves. Parasites cannot sustain in their own existence without siphoning energy from the surplus supply demonstrated in host buildings.”<sup>47</sup>

*Loftcube* therefore will be dependent on the water/energy supply and sewage system from the main building it nests on.

The architect took on a challenge to design the minimal mobile unit, where modern nomads would find the privacy of the home. And he advises potential clients on how it would work: it either can be container *for sale*, where transportation happens by helicopter, relocation by mobile crane and further transfer by lorry, inland boat or train. Or the container could be dismantled, giving possibilities for various types of transport. Another option is containers *for rent*, when *Loftcube* is permanently located on a decided site, and is rented out through competent companies.

---

<sup>46</sup> [www.aislinger.de](http://www.aislinger.de)

<sup>47</sup> [www.parasitic-architecture.webs.com](http://www.parasitic-architecture.webs.com)

In his interview with Jennifer Hudson, an editor and researcher in the fields of contemporary architecture and design, the architect calls his project “a living vision, that can be helicoptered to unused city rooftops.” He also mentions that “the worldwide response to it was overwhelming – it was included in the 2005 *International Design Yearbook* and it was part of the German *Pavilion* of the 9<sup>th</sup> Biennale in Venice in 2004”<sup>48</sup> *Loftcube* has become one of the most discussed projects in the design world of modular portable dwelling units during the past few years.



Fig.20 Loftcube in Berlin, 2012

According to Aisslingers Studio, those showing interest in *Loftcube* are not only those who have flat roof. Their customers are also owners of houseboats, big gardens or plots, and those who simply want a holiday house. The unit can and is ready to serve a variety of clients’ needs.

But still one of the main ideas behind this project is to create extraordinary communities of modern nomads, with unusual location – flat rooftops. This idea of a new type of community brings me to the discussion of another type of community in historical perspective, one that found place in 1960s, in the blossoming era of modernism and left deep footprint in the western society.

---

<sup>48</sup> Jenifer Hudson, 2006, p.137

## Nomadic Communities – comparison in time perspective

Drop City Community was founded in the beginning of 1960s and is seen today as representative of many of the communes and "intentional communities" of the 1960-s, although in many ways it remains unique. It became known as the first American rural "hippie commune". Drop City Community was a physical space, which was inhabited by free-thinking people who had their own vision of a lifestyle, free of societies, rules and regulations.

There were several other pre-1960 communes in American history: the so-called "Polish Brook Farm" of Helena Modjeska at Anaheim; the raw-food vegan colony called Joyful near Bakersfield; the socialist colony called the Army of Industry at Auburn; Pisgah Grande, a substantial religious colony near Simi Valley; the Thelemic Magic community of Pasadena, founded by devotees of the British occultist Aleister Crowley; Trabuco College, a Vedanta commune at which Aldous Huxley lived for a time; Tuolumne Cooperative Farms, a Quaker-inspired colony near Modesto; and the Ma-Na-Har Cooperative Community at Oakhurst, also founded by Quakers. The list is an extensive one.<sup>49</sup>

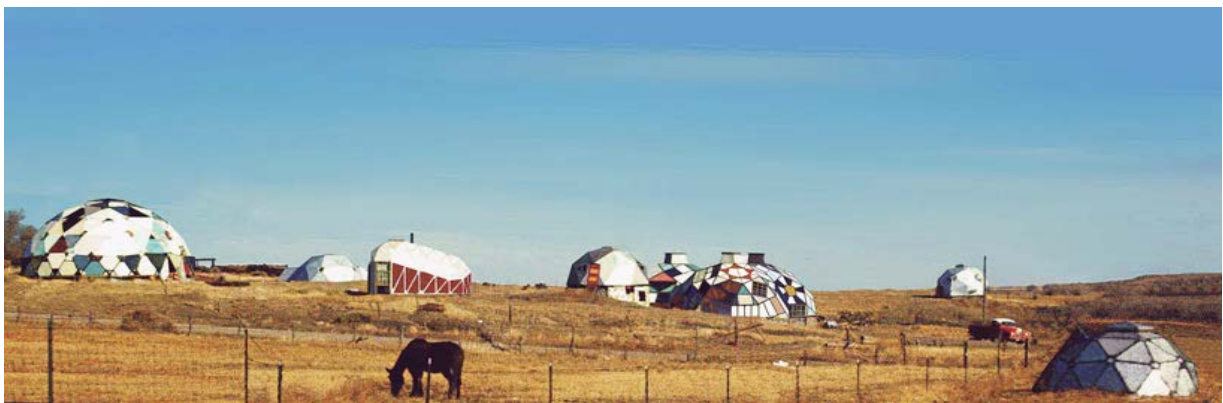


Fig.21 Drop City – pioneering artist community, Trinidad, Colorado, 1965

However, I have chosen to focus on Drop City Community as I think this example, when positioned in comparison to *Loftcube*, most aptly illustrates the contrasts between these two different types of mobile communities, along with their respective societal needs. What they

---

<sup>49</sup> Timothy Miller, "California communes in historical context", Conference "The commune: Histories, Legacies and Prospects in Northern California, Berkeley, December 11, 2004.

definitely have in common is the mobility of their dwellings, and that the inhabitants are most probably young ambitious people. The desire to experience extraordinary style of living can be seen as the binding threads between these communities. In addition they both can be categorized as nomadic communities.

“The Sixties” ( as a term used by historians) or “the cultural decade” was a time of rebellious youth and associated with all the new radical and exciting changes taking place in society, especially the declaration of freedom from social taboos like sexism and racism. It was the time of the rise of feminism and anti-war movements, growing interest in Eastern religions and philosophy. At the time many attempts were made to establish and run different communes, which supported different views, from free love to religious Puritanism. The era of hippies in the 60s and early 70s blossomed together with newly-established communities, which were of the great interest to the media.

Those communes that were not "hip" in some cases also influenced the hippies. Religious communalism, an iconic theme in American history, was a part of the context, with groups focused and dedicated to Catholicism, various Eastern religions, and the Anabaptist tradition. All those secular communities devoted to radical politics, anarchism, sexual freedom, the sharing of labour, creation of arts and crafts, land development, ethnicity, with different contests and views were thriving in the early 1960s.

The appearance of Drop City Community was influenced by a number of collective traditions that left an impact on the founders; such as the collective ideas of Marxism, and the concept of bohemian artists' collectives. However, the core idea of the Drop City was art. The artists who lived here envisioned the development of a radical new civilization – one that rejected conventional economical structures of developed society such as paid work, which gave them the freedom to focus solely on their art.

Drop City was founded by Gene Bernofsky, Jo Ann Bernofsky, Richard Kallweit and Clark Richert, at that time art students and filmmakers from the University of Kansas and the University of Colorado. They bought 28000 m<sup>2</sup> plot near Trinidad, Colorado, with the intention of creating a live-in space– a work of Drop Art - a concept of art they had developed themselves earlier. The founders called themselves Droppers after this concept, and their vision of life-as-art was expressed in their unusually creative artistic dwellings, which were inspired and influenced by Buckminster Fuller's geodesic domes.



The Domes were quite remarkable structures that were built without any working plans. Different kinds of discarded junk were used as a building materials, such as cut-out roof tops hacked out with axes, scrap lumber, auto windshields and others.



Fig.22 Domes covered in car roofs, Drop City, 1965

At the beginning there were four domes built about 8 m in diameter and cost under \$200. They housed a community with the starting population of fourteen. The fifth and the biggest dome of approx. 12m in diameter served as a meeting place and music studio, with interior covered in painting. The shape of the structure helped the dome to provide its own heat in winter, and it's own air conditioning in summer. The compound included other different-shaped buildings such as goat house, chicken coop, tool shed, storage dome and even children's playhouse.

The settled Droppers were writers, artists, film-makers, musicians and others. Each with own abilities and qualities, but with one in common – passion for their produced art, which was part of their life. The passion dream eventually declined as a predictable result of differences of inhabitants' views on art and politics, due to drugs, anarchy, sexual freedom and personality clashes. Drop City was abandoned by 1977, the land was sold, and dwellings left to decay. Many of the founders just went on to establish other new artistic communities in different places.

Tracing the assessments of two parallel communities – The Drop City community and *Loftcube* community, one can say that they exhibit quite different values. Comparison of

visions on *living conditions* in two separate societies shows that Drop City is focused on dwelling as art, minimal luxuries, simplicity and freedom from society's rules, materialism and capitalism. *Loftcube* envisions living conditions that are adapted to the most metropolitan cities, and targeted at people who are seeking the pleasures of the big city. While Drop City wanted to distance itself from mainstream society, *Loftcube* seeks to absorb and enjoy the luxuries of a metropolitan lifestyle.

Obvious contrast in the background or the 'societal soil' from which these two different communities grew from brings us to another point of discussion. We can see the evident differences in the needs, responses and desires that were lodged within the influences of the 60s, and the needs and desires that are present today. The modern nomads of today are more ambitious. It is arguable that people are more engulfed by capitalism, materialism, choice and ambition – there are no limits to ambitions and desires. It seems that this is closely linked to the constant development, economically and technologically, that we find escalating within the Western world. In contrast, the lifestyle of free-thinking and of free love in the 60's was a reaction to man-made conflict. It searched to reconnect with nature – embracing harmony and often simplicity.

We can see these contrasts in the difference in design, symbolism and architecture of these two types of communities. *Loftcube* symbolises solidity – even though it is mobile, it is still a heavy and stable structure. Drop City Community is light, ready to move any time – blowing in the wind - symbolises their values of freedom. *The Loftcube* also offers freedom, but freedom of a different kind – the freedom to pursue goals and ambitions in an action-packed city.

We can also trace differences of privacy. The *Loftcube* community would consist of individual private units, just collected in one place – guarded privacy within a community, whereas Drop City Community could be likened to a big family in which there were no explicit barriers between people.



## CHAPTER 4

### DYNAMIC ARCHITECTURE

#### *Dynamic Tower – the new dimension*

Historically, concepts of balance, stability and proportionality have always been associated with the ideas of classical architecture. Design was based on models of rigidity and balance.

Dynamic movement in architecture suggests a change in this theory, where new views are being introduced in the form of alternative styles that go beyond the traditional way of design and building.

David Fischer's *Dynamic Tower* represents an important and distinctive step towards this sort of future architecture, marking a new era characterized by the concept of buildings in motion. This building design is literally dynamic and quite spectacular. The promotional video for the project presents a computer generated conception of a tower that twirls, creating a captivating effect.



Fig.23 Dynamic Tower, the world's first building in motion, photomontage

David Fisher is an Israeli-born Italian architect with broad experience in the construction field. Over the last three decades he has been involved in project development, construction management, teaching and designing. The *Dynamic Tower*, the first building in motion, was

designed in 2008 and is to be built in Dubai, the home of architectural wonders in recent years and the city of the future, as declared by the worlds press.<sup>50</sup>

Oil transformed Dubai in the 70's. Little more than a bare desert a generation ago, Dubai has recently been attracting much of the world's attention with its rapid development and its new architecture - one luxury project after another.

The *Dynamic Tower* will cost an estimated \$730 million to build. The 420 m tall tower consists of eighty floor plates, approximately triangular in plan, rotating independently around a concrete core. The first 20 floors will be used for offices. Floors from 21 to 35 will be a luxury hotel. Floor 36 through 70 will be residential apartments. The top 10 floors will be luxury villas. Apartments will range in size from 124 m<sup>2</sup> to villas of 1,200 m<sup>2</sup> with a parking space inside the apartment. The cheapest apartments will cost \$3 million and the most expensive about 10 times more.

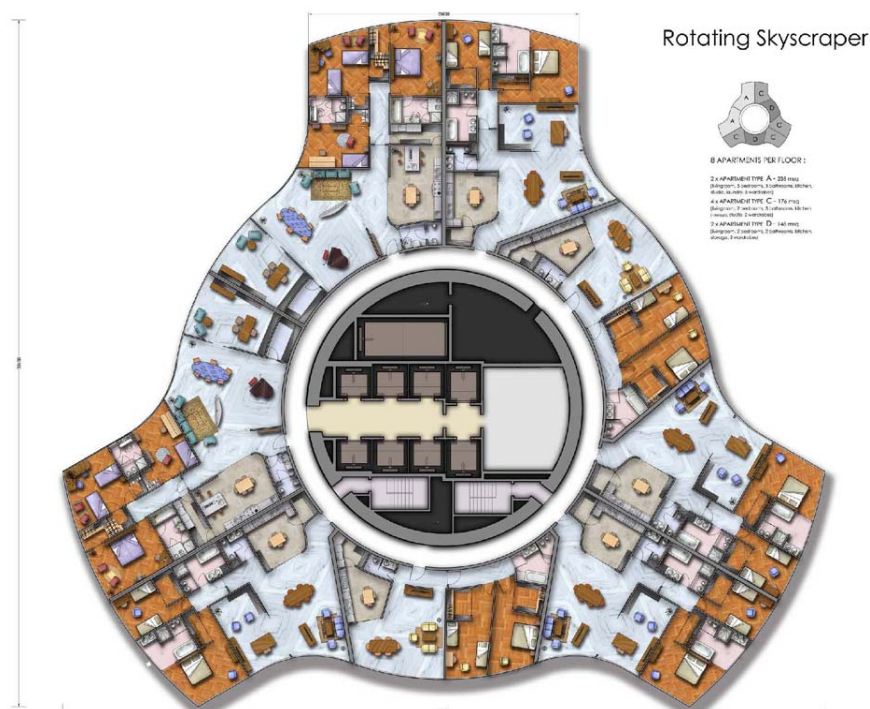


Fig.24 Four apartment floor plan

The main and most revolutionary futuristic aspect of this project that is being introduced for the first time in the architectural world, is the continuously changing shape of the building, which demands a fourth dimension – *time*. “Time is the most powerful dimension of our lives. All our life depends on time,” says Fisher. “Today's life is dynamic, so the space we are

<sup>50</sup> <http://flashydubai.com/8-wonders-of-dubai-amazing/>

living in should be dynamic as well, adjustable to our needs that change continuously, to our concept of design and to our mood”.<sup>51</sup>

Imposed by time and lifestyle, the rotating skyscraper would never appear the same at any given moment. The dream-idea of skyscrapers following the sun, adjusting to the wind, and with constantly changing views is supported by applying the latest modern technology, and thus offering an attractive lifestyle.



Fig. 25. Villa floor plan

Floors will rotate in accordance with a wide selection of proprietary computer programs, with the exception of the luxury apartments, so called villas. Villa residents would be able to control the spin of their apartments as they wish, independently. They would be able to slow, reverse or pause the movement of their homes for the luxury of waking with the morning sun, or to have dinner while enjoying a sunset over the ocean. A full 360° rotation of each floor will take approximately from one and half hours up to three hours.

Another important aspect of the design is *prefabrication*, an innovative method of construction. 90% of the project will be built in factory and then delivered to the construction

<sup>51</sup> <http://www.architects24.com/project/rotating-tower-dubai-uae/overview/340/index.html>

site. This will allow to speed up the building process, which is estimated to take approximately 22 months and thereby reduce the number of necessary workers. Apart from the concrete core, the entire building is to be made of about 2000 completely finished prefabricated units, including water piping, air conditioning, flooring, kitchen, and bathroom fixtures. Steel, aluminium, carbon fibre and other modern building materials will be used to make the units. The whole building is structurally stable and flexible at the same time, giving it high seismic resistance.

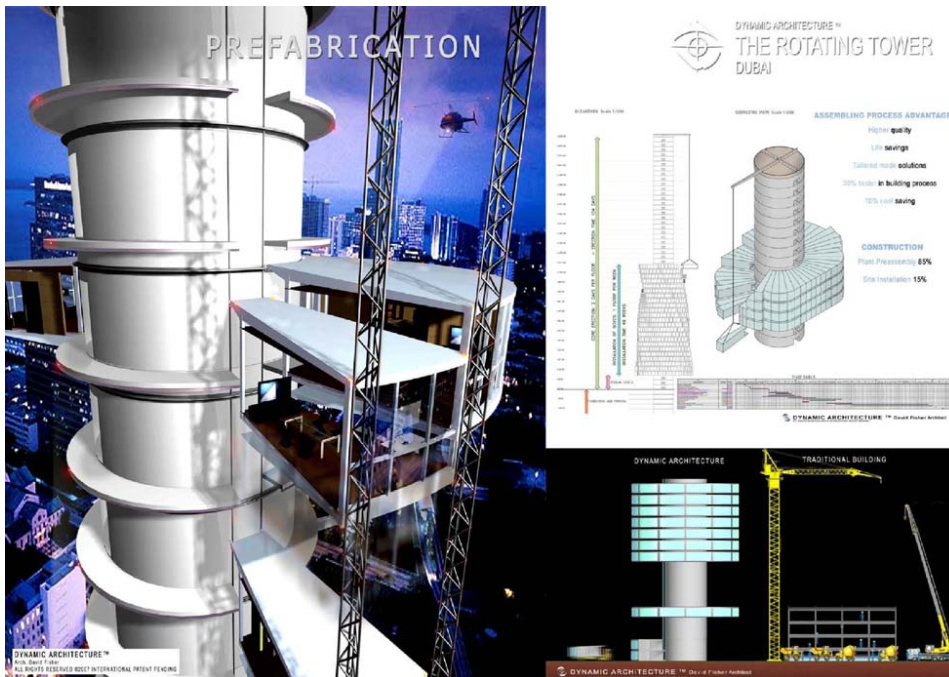


Fig.26 Dynamic Tower, the concept of prefabrication

The large concrete core will function as an axle, around which the floors will revolve. The tubular core itself contains lift shafts, staircases, electrical wiring and plumbing. The core will be the only part of the structure that will require a crane. Once the core is in place, each floor will be assembled in a ring around it, and then lifted up by cables. In such a way the tower will be built from the top and down.

The rotating structure will be one of the most challenging plumbing projects in the world. To ensure the constant supply of the water through moving structure, the architect has suggested the same technology that is used to refuel airplanes in mid-flight, with shut-off valves. Each floor will be served through a single “smart connection” for clean water and another for waste.



The skyscraper is to be completely self sufficient in terms of energy. The units in the building will have sufficient natural light through the large areas of glass. Natural and recyclable materials such as stone, marble, and wood will be used for the interior finishing. The architect states that the tower will be able to generate electricity not only for itself, but also for nearby buildings, provided by wind turbines, mounted horizontally between each floor. The wind turbines will have to be isolated to prevent vibration in living areas, but the architect ensures that unwanted noise from the turbines will be avoided by implementing special shape and special carbon fibre material.



Fig. 27 Dynamic Tower, the ecological concept of the building

In addition, photovoltaic cells will be installed on the outstretched rooftops of each rotating floor to produce solar energy. About 20 per cent of each roof will be exposed to the sun, and it will be sufficient to make the building net energy-positive. Further improvement of energy efficiency of the 420- meter tower will be achieved by using insulated glass and structural insulating panels in the prefabricated floors, which will be connected to the central core.

Together, the skyscraper's horizontally positioned wind turbines and solar panels on its many roofs will produce energy, making the tower the first self-powered building. Thus the *Dynamic Tower*, a unique architectural solution, also becomes a “power station”, producing green energy for the city.

These three main futuristic aspects, the fourth dimension – *time*, the new industrial approach for construction – *prefabrication*, and the *self-sufficiency* of the tower, make the *Dynamic Tower* truly revolutionary. This project represents architecture as part of the environment, where momentary requirements can be adjusted to the sun, wind and the view.

Naturally, such an enormous and untraditional project is bound to be subject to scepticism and criticism in the professional circles of architecture, engineering and economy.

Unforeseen setbacks are expected with any new approach.

The idea of moving buildings is not new. The revolving restaurant is a popular structure around the world, usually located in observation towers in big cities. The BT tower in London, the Tower in Alexander Plats in Berlin, the CN Tower in Toronto, the Black Mountain Tower in Canberra and many others, with revolving cafes and restaurants, have long been known to the public. They serve their purpose as part of a main attraction – a spectacular birds-eye view of the city. Created for leisure, they are normally affordable to all who wish to experience a taste of luxury.

Yet to live in the apartment of a rotating tower on the permanent basis, to call it home – would it really be a desirable property to invest in for the contemporary generation of Dubai's city dwellers? The life in high-rise blocks of flats has been differently viewed around the world throughout the years, but has in fact gained the popularity among today's modern city citizens as a source of a quite enjoyable lifestyle.<sup>52</sup>

### **Glimpse into the history of high rise living**

The desire to live in high blocks has not always been in such demand as it is today. Traditionally the skyscraper is associated with ideas of modernity and progress. The dynamics of capitalism gave space for the innovations that allowed skyscrapers to take shape.

When the first skyscrapers emerged in America over a century ago, they served not only economically space-saving buildings, but became a symbol of modernity and the developing state of society. They were associated with the expression “Americanism”, which was to influence political, economical, and aesthetical values not only in America, but also in

---

<sup>52</sup> <http://www.bbc.co.uk/news/world-20526217> - downloaded 14.0.2013

Europe and other countries in the world. America, the home of many nationalities brought there by waves of immigrations, was the first country to embrace the idea of developing upwards.

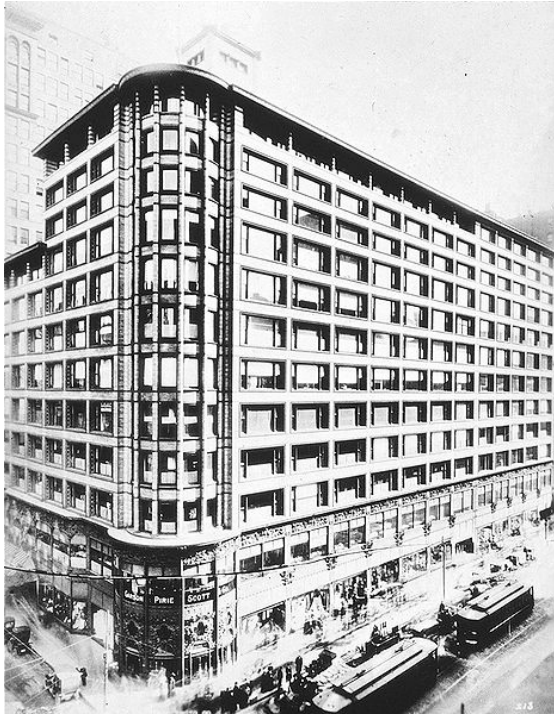


Fig.28

Carson Pirie & Scott Department Store, Chicago: the forerunner of many modern high-rise blocks of the twentieth century.

We can trace the development of the skyscraper back to the beginning of the last century through the work of architects such as Burnham and Root, Dankmar Adler, and Louis Sullivan – the first architects to introduce the skyscraper construction, consisting of a steel frame with applied external masonry. The many buildings in Chicago erected by these architects are considered the forerunners of the whole industry of high-rise blocks in the twentieth century.

Louis Sullivan wrote that the skyscraper “must be tall, every inch of it tall. The force and power of altitude must be in it, the glory and pride of exaltation must be in it. It must be every inch a proud and soaring thing, rising in sheer exultation that from bottom to top it is a unit without a single dissenting line.”<sup>53</sup>

High-rise blocks went on spreading around the world. At the beginning of 20<sup>th</sup> century the attitude towards high blocks (also called towers) became more functional. More and more

---

<sup>53</sup> Louis Sullivan, *The Tall Office Building Artistically Considered*, 1896, accessed via <http://academics.triton.edu/faculty/fheitzman/tallofficebuilding.html>

people became more willing to live in the city, and the growing urban population inevitably led to the lack or limitation of building space. This problem was solved by building upwards, by developing metropolises with skyscrapers. This solution satisfied the demand of many in congested urban environments.

In France Auguste Perret and Tony Garnier were using reinforced concrete in their buildings, which allowed big spans and simpler structures. In the time of the widely popular art nouveau movement in Europe, concrete and stone were used to model details in order to provide texture and the impression of natural organic forms.

Furthermore, the tendency for taller buildings developed in the works of German architect Walter Gropius, who was the founder of Bauhaus School in 1919. While at the Bauhaus, he worked on the educational buildings, and also developed ideas for town planning. His bold designs included models of clusters of slab-built apartment blocks, restaurants and roof-top solariums. The idea of group housing, or unit housing, was reflected in the *Siemenstadt* apartment complex of 1929-30 near Berlin, where the architect took great responsibility for providing many recreational facilities for those working at the Siemens Company.

Many ideas of modern housing were exhibited at the Weissenhof Seidung exhibition of 1927 in Stuttgart, where famous names in architecture presented their work – Ludvig Mies van der Rohe, Mart Stam, Le Corbusier, Hans Poelsing, Walter Gropius were among them. Many of the exhibited projects became forerunners for taller buildings that were eventually built all over Europe and in North-America after Second World War.

After the Second World War the first tower blocks were also constructed in England. They were initially welcomed, being distinguished as a form of housing accommodation in high population density areas, and were drive for post-war housing. By 1950s the dramatic need for new homes found its solution in building high in many parts of the country. They were positively seen as the way to provide a better future for the nation, but were considered a lower standard of living.

Back in France Le Corbusier was creating his *Unite d'Habitation* (1946-52). Located in Marseille, it was a building arranged in 12 stories, consisting of about 300 apartments raised on massive *piloti*, that allowed for circulation, gardens and gathering places below the building.



Le Corbusier's vision for collective living in post-war France was brought together in this single-slab vertical village. The entire infrastructure is located within the building – internal shopping in the middle, barber shops, a hotel, recreational ground and a children's nursery on the top of the roof. Everything was designed for use, everything was built in, and so one could find whatever one might need without venturing far. Five such blocks were built in Europe, and the schemes were seen as some kind of social reform.



Fig.29 Le Corbusier, Unite d'Habitation (1946-52)

The positive attitude towards living in high-rise residential buildings has been noticed in the last decades of the 20<sup>th</sup> century and became a wave for developing new projects. The concept of High-rise now fits all budgets and schemes, it includes ideas and inspirations for those who are already high-rise dwellers and also those inclined to make the move. The high-tower will, in some cases, be considered a city within a city: the tower will be taller and it will include services, shops, entertainment, and even open space. High-rise will be built using new and alternative methods.

Today's great architects are building up and working out a solution for the world's lack of good housing for the masses. Skylines around the world will be changing. High-rise now includes a vast array of apartments and flats, whether remodelled, renovated or restored.

“Looking to the future, the high-rise residential building is at last being reassessed as a very suitable alternative housing element for the twenty-first century and beyond”.<sup>54</sup> The project of David Fisher though, while being a part of high-rise industry, stands out as an exceptional luxury residency for the elite, for the “cream” of the society that have means to afford it.

### **Symbolism of towers**

Towers are special buildings that represent the cultural developments of the nations in which they stand. The individuality of any civilisation is defined by religion, government, culture and art forms. As the world’s tallest buildings soar up into the sky, they represent a symbol of style, prestige, wealth and power. The Symbolic potency of towers increases the desire to use them as a symbol. One might argue that the classic Empire State, the Chrysler, John Hancock Center and the Sears Tower are expressions of the success of American capitalism. They are symbols of a future filled with promise of prosperity for everyone.

The famous Big Ben Clock tower in London remains a symbol of western democracy and is the most famous icon of the city, England and the United Kingdom. The Eifel tower in Paris, ranked as the world’s greatest engineering wonder, became a symbol of mechanical progress. It is the best known landmark in Europe along with a symbol for Paris, reputed to be the most romantic place on earth.

When the Twin Towers were attacked in 2001 in New York, one might argue that it was in fact a symbol of Western modernity that was attacked. And it was taken as given that after their destruction, Twin Towers should be replaced with new ones. Daniel Libeskind’s new Freedom Tower, the centre piece of the re-built Ground Zero, represents the pride of the nation, and is thereby tribute to ‘American resilience’. In this way the tower attempts to show the world that America has been able to remain a strong and united nation. The name of the tower could not be more symbolic; the word freedom in the context of this attack in many ways connotes ideas of escape, defiance and a refusal to live in fear.

---

<sup>54</sup> Andrew Weaving, *High-rise living*, 2004, p.156

## The Tatlin's Tower – utopian symbol of modernity and socialism

"Not the old, not the new, but the necessary"

V. Tatlin<sup>55</sup>



Fig.30 Model of the Tatlin's Tower, 1919

The famous *Tatlin Tower* became a symbol of “Machinery Architecture” in the 20<sup>th</sup> century, mechanical progress, and a new era of modern technology and modern art. It also became a symbol of an unrealised socialist utopia.

The *Tatlin Tower* was never built. It was constructed as a model and sketched by constructivist artist Vladimir Tatlin between 1919 and 1925. It was proposed to be both a monument for the Russian Bolshevik Revolution, and to be a working building; the headquarters for The Third International – the organisation promoting communism internationally. The heroic years of emerging socialist system in Russia after the Revolution of 1917 were filled with nation's enthusiasm to reject and dispose the old “rotten” capitalism and to build “bright future” – communism. In the times of great social changes the culture of dislocation, changing conditions, unsteadiness and instability is part of human existence.

Composition without analogue, unlike any symmetrical vertical towers, the *Tatlin Tower* was of asymmetrical and dynamic form. The structure of iron, steel and glass was 400m high

<sup>55</sup> Richard Andrews, Milena Kalinovska, “Art Into Life: Russian Constructivism 1914-1932, 1990, p.38

(taller than the Eiffel Tower) with three rotating elements inside the main framework, all rotating at different speeds: a cube, a pyramid and a cylinder. The cube, located at the base, was supposed to house the “Soviet of the People’s Commissars” (*Sovnarkom*) and turn at the rate of one rotation a year.

The pyramid in the middle, housing the executive and administrative committees of the Third International, would rotate once a month. The topmost cylinder, intended to be a centre for information and propaganda, would complete one rotation daily. The building included an information centre, exhibition space, meeting rooms, offices and a radio transmitter.

Symbolically, radio waves would extend the tower into the sky. The Dynamic form of the tower oriented towards the cosmos: “the monument did not merely defy the hierarchy of traditional architectural and sculptural styles, but the force of gravity itself. The dramatically open spiral shape of the tower represented the “movement of the liberation of humanity,” challenging the old-fashioned figurative allegory of the Statue of Liberty.”<sup>56</sup>

Tatlin suggested that the revolution actually began in 1914, and called it artistic transformation, that was followed by political revolution in 1917. Tatlin himself was one of the leaders of this art revolution, of Russian Constructivism. The Tower represents the allegory of the original meaning of the word revolution (rotating and repetition). *Tatlin Tower* was meant to be radically anti-monumental and challenged the perfect verticality of the Eiffel Tower by choosing the spiral form and leaning to one side. The art historian Nikolai Punin described the monument as the anti-ruin *par excellence*. In his view, Tatlin’s revolutionary architecture reduced the Classical and Renaissance tradition to ashes, and the “charred ruins of Europe are now being cleared.”<sup>57</sup>

Failure to build Tatlin’s structure was not just due to engineering complicity, high costs and questions of feasibility. It appeared to be a project too modern for its time. Architectural trends and the propaganda of the Soviet regime made it look like a utopian architectural

---

<sup>56</sup> Svetlana Boym, “Tatlin, or, Ruinophilia”, *Cabinet Magazine*, issue 28, winter 2007/2008

<sup>57</sup> Nikolai Punin, *Pamiatnik Tret’emu Internatsionalu, Proekt xudozhnika V.E. Tatlina* (Petrograd: Otdel IZO Narkompressa, 1921, p. 1.

structure, resembling the Tower of Babel in its form. Leon Trotsky said that Tatlin's project gave "an impression of scaffolding which someone has forgotten to take away."<sup>58</sup>

Tatlin, being faithful to avant-garde "technique," argued against the "tyranny of forms born by technology without the participation of artists". His revolutionary thinking is reflected in his own slogan "Art into Technology!" that was suggesting the widening of horizons of imagination and going beyond mechanistic clichés of constructivism.

Both towers, Tatlin's and Fisher's, imply a sense of feasibility of the construction; and both are great examples of mobility and dynamics. They mirror the futuristic dreams and the utopian desire of architecture to improve the future. An exercise of wonder and of revolutionary ideas frames these two great projects, separated in time by decades and united by an aspiration to develop and fulfil revolutionary ideas.

*Tatlin Tower* was designed in the times of great social changes, in the culture of dislocation, unsteadiness and instability. The changing conditions are part of human existence and drive for development in the dynamic society. Architecture in such a culture had to be mobile too, if only because "the very idea of movement represents great interest for development".<sup>59</sup>

*Dynamic Tower* on the contrary was the product of designer's idea of enriching living conditions of elite in a developed and a very wealthy society. The dynamic concept is used to promote the new architectural wonder and propel it as an icon of futuristic architecture.

---

<sup>58</sup> Leon Trotsky, *Literature and Revolution* [1924]. Quoted in Troels Andersen, *Vladimir Tatlin, Stockholm, Moderna Museet, 1968, p. 62.*

<sup>59</sup> G.T.Kruglikov, "Krugloe i polukrugloezhilishche", *StP* no.9 (1927), p.618, quoted in Vladimir Paperny, "Architecture in the age of Stalin", 2002, p.32

## CHAPTER 5

### FLOATING ARCHITECTURE

#### **Floating home – living on water**

In this chapter I will discuss and analyse architectural projects that deploy the concept of mobility in order to adapt to environments disturbed by climate change. The drastic climate changes, that are taking place today, have created new demands and global societal needs. Designers such as Vincent Callebaut, who has envisioned The *Lilypad*; a floating city for climate refugees – are contending with these contemporary requirements. This project and other similar responsive architectural efforts from the past will be the focus of my analysis. In order to fully understand the background for these endeavours, one must first understand the detrimental effects and concerns that climate change is generating.

According to the statistics, today's world finds itself in the middle of increasing global warming. It has become one of the most complicated modern-time issues to deal with. Global warming is defined as the increase of the average temperature on Earth. Both ocean and land temperature have risen, on global average 0.8C since the 1970s. While global warming is the cause, climate change is the effect.

Almost all regions of the planet are affected. Floods, draughts, hurricanes, tsunamis, heat waves and freezing periods with unusually low temperature – all these forces of nature happening around the globe are widely and frequently reported by media. Both the thermal expansion of sea water and the melting of ice contribute similar shares to sea level rise, although the melting polar ice sheets considered as a main contributor.

Evidences of global warming taking place come from the scientific studies researching on the climate changes and the changes of environmental systems.

Such studies prove that global warming to huge extent is indeed caused by human activities – the main factor responsible for the dramatic changes that affect our planet. It is estimated that

cities today consume about 75% of global energy and produce a similar proportion of waste, thus contributing directly to more than 60% of green house gas emissions.<sup>60</sup>

### **Adaptation or migration?**

There are two options usually taken into consideration when architects and planners discuss the response of the society to the climate change: *adaptation* and *migration*.

*Adaptation* is the art of survival. It is about analysing, questioning and managing the risk of disastrous events. At the same time it is about dealing with the increasing problems connected to extreme events and societal vulnerability. While Europe and another western countries have a financial capacity to cope with the extreme events, more remote regions are much more exposed and vulnerable. Adaptation has to identify priority areas, priority needs and priority actions. The role of the development of new adaptable architecture is therefore crucial in modern urban planning.

*Migration* on the other hand is very often the last chance for those threatened by the impacts of the climate changes or other dangerous situation. Migration also occurs when adaptation fails.

Taking the choice of adaptation into focus, one realises that the success of this direction is to the huge extent dictated by ability of the society to implement and support all the necessary changes involved in the process, and in such a way that lifestyle of the citizens would be functional and worthy. Supporting proposed adaptation-orientated projects is a political and economical challenge for world's leaders.

Many countries in the world are already taking climate change seriously, and consider planned adaptation as a good precaution against upcoming consequences of climate change. As an example of such consideration are the coastal defence plans of the Netherlands, where the rising sea level is seen as a major problem. A different example is the controlled drainage of a Tsoho Rolpa glacial lake in Nepal to avoid a catastrophic flood outburst. Such early planning with proper foresight is less risky and cheaper than a “wait-and-see” approach,

---

<sup>60</sup> David Archer and Stefan Rahmstorf, *The Climate Crisis – an introductory Guide to Climate Change*, 2010, p.62 - 67

which would cause the need for costly retro-fitting of dykes and other long-term infrastructure in response to climate change.<sup>61</sup>

Since the worst potential effect of global warming will be connected to melting of ice, resulting in the rising sea level and flood, it will be the major problems to face for many low-lying areas of the world including cosmopolitan cities and agricultural areas. The waterfront has become an important issue and important location for developing new architectural projects, enveloping residential, industrial, recreational purposes. “Building on water” as it is called today, develops important relationship with water and became increasingly dominating factor in different urban metropolitan projects. Accepting the challenges of that global warming requires overcoming inertia and developing successful and daring schemes in response to growing environmental needs.



Fig. 31 Housing on the water, Amsterdam 2012

To exemplify such successful development of response to environmental needs we can look at Dutch approach to deal with the threatening rising waters. For Holland, a low-lying country with 20% country’s surface below the sea level and among the countries most at risk from rising sea levels, flood waters have long been of a great concern. The Dutch have always been great at engineering works to stop the flood water. But lately, after many years of battling to keep the sea out, the direction has been changed towards the new way of interaction with water. This new concept involves adaptation to the rising waters, living with it rather than fighting it. Dutch architects are in the process of re-designing the entire

---

<sup>61</sup> Archer & Rahmstorf, 2010, p.186



country, smartly preparing for climate change. This new concept in flood protection has been developed and is a reality today – a floating house.

Holland is probably to be the first floating country, in which the notion of housing is transforming into amphibious homes. Floating structures are already part of country's urban planning.

To see the old boat turned into a house on the channels of Amsterdam is not uncommon scene – some are even provided with terraces or small gardens. But further along the Amstel River one could find real design houses floating on the water.



Fig.32 Floating houses, Netherland

Dutch water architects and engineers aim to alter preconceptions on a broader scale. They state that the key task for climate-change generation will be accepting to work with water, rather than against it. Floating architecture could help to deal with major problems facing the world such as rising seas, growing urbanization and planet's overpopulation. It is estimated that by the year 2050 the number of the earth's citizens is to reach 9 billion, and more housing will be in great demand.

The Dutch are not the only one building on the water. Dubai is famously known for its two biggest artificial islands, one formed in the shape of a huge palm tree and the other as the map of the world. Sand from the Persian Gulf was used to build them. These extensions to the main land, with their stylish residence areas became the icon of wealth and luxury.

Another project is undertaken by Dutch water-development company Docklands in cooperation with Maldives, a country of over a thousand islets. Together they plan to initiate

the building of a floating golf course along with convention centre and 43 private islands in the Indian Ocean.



Fig. 33 Model of floating private icelands designed by Dutch Docklands

The entire project is planned to start in 2012 and to be finished in 2015. After that the company has even more ambitious projects to develop – a floating city, with 20,000 affordable homes for Maldivians. Floating architecture becomes a contemporary reality. Distinguishing ideas of the innovative designers stretch from a floating house to a floating city.

To explore these mobile visions further, I have chosen to analyse a particular case in which mobility is implemented not only for one household, but for the population of small city.

### ***Lilypad*– floating city for climate change refugees**



Fig. 34 Vincent Callebaut, *Lilypad*, designed 2003

In 2008 an award-winning Belgian architect Vincent Callebaut designed a floating city named *Lilypad*. This unique project, thought to be not only an ultimate and long-term tenable solution to the water rising level, but above all the housing for potential flood victims and ecological refugees – those whose homeland (in the distant future of 100 years span) is wiped out by the rising sea level.

This project is of particular interest, as those intended to live on the *Lilypad* will be utilizing a space that is adapted as a response to climate change, whilst simultaneously resorting to migration. Therefore, this project reveals how adaptation and migration can in fact be combined, and in this way comprise a more complex method of survival.

Keeping in mind the concerns about the fate global warming can bring and how completely the map of the earth may change, the humanity is faced with the challenges in every aspect of daily life. However, it is the consequences that must be dealt with. Architect Callebaut comes up with what he sees as the ultimate solution to the problem, and believes that the *Lilypad* project is to be in demand and become a reality by the year 2100.

The floating structure and the shape of the *Lilypad* city were inspired by exotic lily pads found in the Amazon, Victoria Regia. This plant is native to the basin of Amazon river. It has huge green round leaves that float on the surface of the water.



Fig.35 Amazonia Victoria Regia (surface, bottom)

The leaf of this giant water lily measures up to 3 meters in diameter, with a stalk about 6-8 meters. The leaf is highly ribbed on the underside with massive leaf-veins, and despite looking delicate is able to support quite a high weight, (up to 30 kg) due to its structure.



Fig. 36 Lilypad flower

The flowers are night blooming; white when they open the first night and then gradually becoming pink purple when they are pollinated. They are about 40 cm in diameter, and blossom only for three days.

The floating *Lilypad City* is designed as a self-sustainable city, 500 000 m<sup>2</sup> in size, and able to house 50 000 inhabitants. The architect presents it as a really dramatic display of the most impressive green inventions: “New biotechnological prototype of ecologic resilience dedicated to the nomadism and the urban ecology at the sea”<sup>62</sup>

The *Lilypad*, a true amphibian half-aquatic and half terrestrial city, travels on the ocean stream around the world, from the equator to the pole as an independent and fully self-sustainable home. The architect has not yet estimated a cost for his design, but states that the goal of his creation is to arrange coexistence of humans and nature in harmony.

The artificial island includes a lake, mountains, shopping malls and a housing sector and drifts on the ocean currents. The city is established around “the lake” – a central lagoon that lies below the water line, thus providing ballast for the structure. The lagoon is designed to collect and purify rain water for drinking, in quantities sufficient for the population of the floating city. The housing sector along with commercial and recreational space will be provided in three “mountains” that surround the freshwater lake and at the same time offer the inhabitants a change of scenery from the seascape. The multifunctional lifestyle is based on three criteria – work, shops, and entertainment. There are no cars and no roads to drive them. The whole city is covered by plants growing in suspended gardens, which are crossed by a network of pedestrian streets and alleyways.

Providing energy for such grand project seems quite challenging. Callebaut's solution for powering this floating Ecopolis includes active use of probably all renewable energy sources available – solar, hydraulic, thermal, tidal, osmotic, wind energy and biomass. He states that each *Lilypad city* would generate more energy than actually needed, although he admits that *lilypadians* would have to cultivate and harvest marine aquaculture in order to provide enough food.

---

<sup>62</sup> <http://vincent.callebaut.org/>



Called in the media “21-st century Noah’s Ark”, the project steered out emotions and hot discussions around different issues, which we can survey further. Leaving the technical values of the project aside, one can look at other, more sensitive questions that arise right from the very core of the whole concept. The first point that attracts attention is the issue of societal life on the *Lilypad*. It is interesting to explore whether the *Lilypad* is designed as a temporary dwelling or a more permanent habitat. Although the architect intends the *Lilypad* to be a more permanent solution, however when we look closer, we might discern it to be more of an abstract proposal. For example, the exclusivity of citizenship is not taken into consideration. While the architect claims that this is a vessel for refugees in need, it seems as though the *Lilypad* is designed as rather a luxurious and costly metropolis, almost to the point of resembling an oversized fancy cruise ship on its way to a Florida – a vacation fantasyland. The benevolence of this project seems undermined by an architectural anticipation of a privileged and lavish lifestyle. But the *Lilypad* is meant to serve migration-orientated purposes, and migration is a term signifying traumatic displacement. Nevertheless it may actually function as a peaceful and scheduled relocation of the citizens of affected areas rather than an overloaded emergency vessel.

The potential lilypadians’ standard of living also comes into focus when considering their inhabitancy. The architect appears to have concrete ideas of what sort of factors must be in place to ensure the citizens well-being; such as work and leisure. However, he fails to address in what way what kind of life is to be lived on the new “land”, whether it would be much different from what it used to be, and for better or worse. Responsibility for financing, governing and maintaining the city as a self-sustainable unit is the major task that has to be addressed and thought about in order to make well-being inclusive for everyone. One recognizable glitch is the need of resources. It seems that the city would be absolutely dependant on the importation of products, as it would have no natural resources of its own with which to manufacture goods. One may very well wonder how citizens would pay for these imported goods, as the means of earning a living would be scarce with such limited choices of activities. Based on the Lilypadian scheme as it stands now, the creation of a floating civilization that could actually feed and power itself is arguably unviable.

Another interesting point is the characteristics of the society and citizens themselves. The proposed standard of living seems modelled on Western attributes and values, rather than addressing the variables of different cultural needs. Perhaps a new type of economy and

social system are to be introduced on this island, in which case there are many complexities to evaluate and consider.

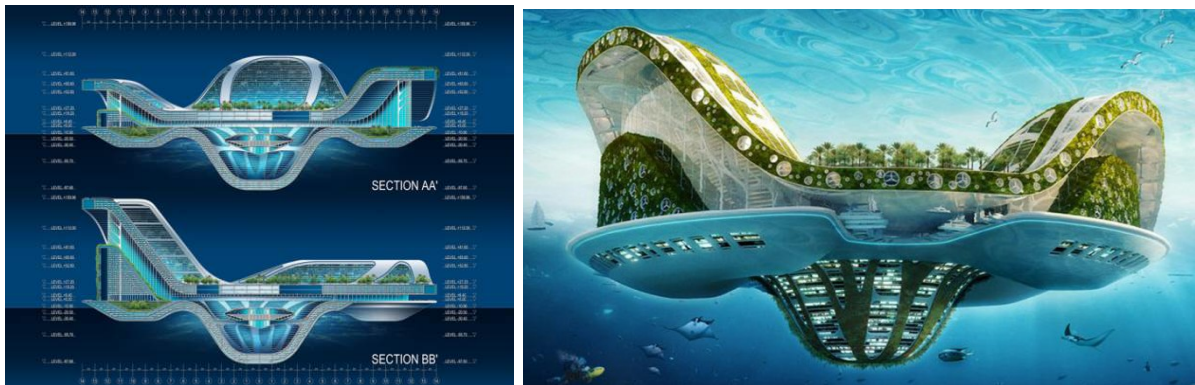


Fig.37 *Lilypad*, computer images

While effectively impressive pictures of the project are widely presented on the architect's website, no glimpse of how it feels to live there is given. No interior or exterior perspectives on a human eye level are shown. We see the futuristic images of *Lilypad* taken from effective angles and bird views, with the resemblance of the fantasy world of Jules Verne's fictions. But the view is not brought down to a human scale, where one could get a feeling of the life standard in the city's many dwellings, or to an idea of the citizen's occupations. The City's landscape looks neat and simple, but without placing life into it, the whole volume feels hollow and comatose.

Aesthetical issues such as these and many other questions arise in the debate circles surrounding this project and certainly would demand answers before such project can be turned into a reality.

Perhaps, for the time being, the *Lilypad* must remain a visual dream only. For now, the *Lilypad* city is just a concept; an idea that has fascinated many designers in recent years. It is probable that it would take decades before this fantastical project becomes a reality, until the time comes when the technology to build such constructions will be available. The process would be difficult, and this is only to be expected when the metropolis we built and live in is to be reinvented. Indeed this project suggests that a new type of economy and social system are to be introduced on the island, in which case there are many complexities to evaluate and consider, such as the ones I have mentioned earlier in this chapter.

However, while it is important to dwell on these significant concerns, it is important to recognise that although these gaps in the *Lilypad's* design distance it from tangible

realisation, the questions and ideas that arise from this lack also serve to challenge the normative way in which we perceive society and our own ways of life. So while the *Lilypad* may not be an instant solution, this may not be the project's ultimate prerogative. Utopian projects such as the *Lilypad* show that such visions are not necessarily intended as an end, but a means. By challenging our preconceptions of living and thinking, they manifest themselves as catalysts for further creativity, deeper reflection, and positive change. So arguably the *Lilypad* and other such projects may very well bring us closer to a tangible utopia in the future. "For the innovative is not per se something eruptive. The pursuit of the new, even when interpreted by its protagonists as the break with the old, draws consciously or unconsciously on what has gone before."<sup>63</sup>

### **Utopia repeated**

*Lilypad* is far from the first utopian project to have challenged societal ways of living through the employment of mobility. In this section I will discuss another utopian project that, similar to *Lilypad*, was considered a radical vision of architecture within its time. This project was named *The Walking City*, and was developed in England in the 1960s by the architectural group Archigram. I wish to examine the ways in which the concept of mobility was applied through both projects and analyse the potential similarities and differences.

A great range of "mobility – systems" have been developed during the last century. Novel characteristic were introduced to everyday life through such inventions as car systems, global telephone infrastructures, air travel, high-speed trains, mobile phones and networks of computers technology. The dynamic network of social and technical relationships, driven by mobility within, has linked communities, countries and continents, giving room to generate a new understanding of production, transformation and the maintaining of economic and social values. The globalization of technological, economical and communicative assets is one of the most distinguishing features of modern times, and increasingly conducted "on the move" or away from the "home". Ever since the idea of mobility on a huge scale was introduced to the modern world, utopian ideas of moving dwellings and whole cities always fascinated hot-

---

<sup>63</sup> Franziska Bollerey, "Innovation or Nothing New under the Sun" in Henket & Heynen (ed.), 2002, p.276

brained designers over the world. Innovative thinking and striking visions of life in the future are concepts not only of today, but go well back to the turn of 20<sup>th</sup> century.

The avant-garde architectural group Archigram ( an abbreviation for “*architectural telegram*” ) was established in the early 60-s by a group of young London architects – Warren Chalk, Peter Cook, Dennis Crompton, David Greene, Ron Herron and Michael Webb. Archigram enjoyed the great but brief trend all over the world during sixties and early seventies and was to some degree a cultural phenomenon of their time. The group has shaken the rigid foundations of architectural modernism by boldly promoting their provocative unconventional ideas. Playful, pop-inspired visions of a technocratic future dominated their projects, which were solely expressed through hypothetical designs. Their works offered a seductive vision of a glamorous future machine age.

The group’s imagining projects became part of many techno-utopias that were promoted during the sixties and early seventies, based on and supported by theories of Buckminster Fuller, a technologically- inclined architect, who strongly believed that reason and technology were sufficient to solve all world’s problems: “Making the world’s available resources serve one hundred percent of an exploding population can only be accomplished by a boldly accelerated design revolution.” – stated Buckminster Fuller. Peace and prosperity of humankind in his opinion could be achieved through research, responsible engineering and increased industrialization.<sup>64</sup>

Driven by his philosophy of “more for less”, Buckminster Fuller manifested his practice of exploration, discovery, invention and teaching with his intention “to make the world work for 100% of humanity, in the shortest possible time, through spontaneous cooperation without ecological offense or disadvantage of anyone.” Fuller had unique views on how the world could function and be saved. Archigram embraced and absorbed the ideology of technical revolution. The idea of exciting the public about the architecture of the future prevailed all theirs designs.

*Walking City* became one of Archigram best known images. . The idea was proposed by Ron Heron in 1964, as an article in the Archigram’s journal. The project consisted of huge robotic structures, with their own artificially intelligent minds. “Smart buildings”, appearing as huge

---

<sup>64</sup> RichardG. Weingardt, *Engineering Legends – Great American Civil Engineers*, 2005, page 110



ship vessels on walking stilts, could freely roam around the world. The world was visualised as post-apocalyptic, after a nuclear war.

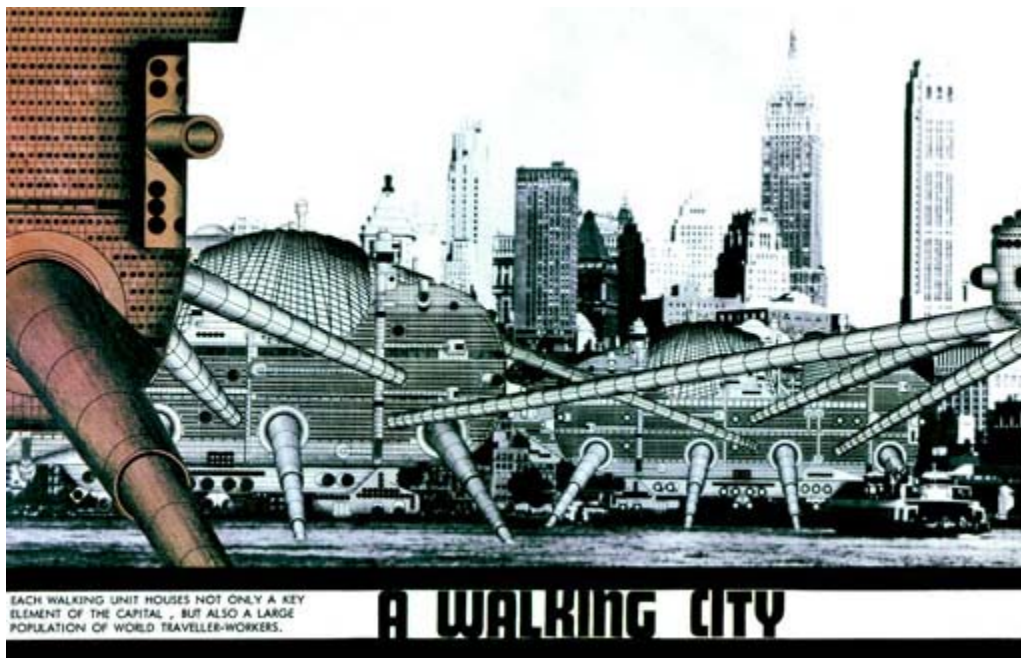


Fig. 38 Archigram, Walking City

The form of the city resembled a combination of insect and machinery and was a reflection of Le Corbusier's idea of a house as a machine. Few walking cities could interconnect with each other to form larger "walking metropolises".

The mobile structures of the *Walking City* share the same concepts of the floating city *Lilypad* such as autonomy and self-sufficiency, ability to interact with another city of that kind, and they both intend to function in borderless surroundings. "Walking City imagines a future in which borders and boundaries are abandoned in favor of a nomadic lifestyle among groups of people worldwide."<sup>65</sup>

Both projects refer to the distressed situation of the displacement of large masses of people, different on a time-line and different of a kind, but collectively considering mobility as a means for freedom, and as a way of adaptation to the new lifestyle in accordance with new circumstances. Yet while Archigram was promoting propaganda for choice, obsessed with

---

<sup>65</sup> Peter Blake, Architectural Forum, Archigram Archive, 1968

nomadic fantasies with its clearly democratic visions, Callebaut puts the needs of climate-change refugees on the agenda, with a clear emphasis on necessity and inevitability. The inventiveness of the *Lilypad* project also parallels with a much greater focus on sustainability, and closeness to the natural resources. However, while there are differences in the rationale behind each respective utopia, they both use the concept of mobility as a medium with which to criticize and offer alternatives to the challenges of civilization.

Aesthetically, we also see that these projects display stark contrasts. The *Walking City* exudes the technological advancement and post-apocalyptic abstractions glorified by its creators in its visual rhetoric. The cold affects of machinery are reflected in the brutalistic metal structures, with their jagged lines and hard exteriors. The towering metropolises seem to resemble insects of some kind – walking over barren land on their eight rigid ‘legs’. An allusion to a crawling insect – an animal often associated with dirt and soil, and that often connotes unpleasantness – brings an element of pessimism to the project. In contrast, the entire structure of the *Lilypad* is modelled on a symbol of the water lily – a flower that is closely entwined with notions of harmony, peace and new beginnings.

Although such massive projects seem problematic in terms of reality, they do promote high-tech movements and feed the imagination of many contemporary designers. Archigram’s utopian ideas have never left paper, but they tremendously influenced the architects of the next decades, resulting in new projects, which actually were built.



Fig. 39

Walking City served as an inspiration for futuristic architecture that actually took shape in the reality, for example *Futuro House* designed by Finnish architect Matti Suuronen in 1968.

The Futuro House by Finnish was famous for its alien appearance and for its cult following. Around 100 *Futuros* were manufactured in the decade between 1968 and 1978, as the building captured public imagination. It was produced by the Finnish plastic company Polykem. The house consisted of sixteen radial pieces, that could be transported by track or helicopter, and assembled together in a couple of days. Although the house was of short-lived architectural movement, mainly linked to aesthetics of futuristic science fiction, it became a

subject of importance to investigate the role of plastic materials applied in prefabricated housing.<sup>66</sup>

*The Futuro* was a single saucer-shaped volume made entirely of fibreglass reinforced polyester plastic, about 3,5m high in the middle and 8m in diameter, which rested on the supporting steel structure. Originally it was designed as a ski lodge to be located in Janakkala in central Finland. The hatch door in the lower part of the part unfolds with a retractable staircase, similar to those in small airplanes. The interior was furnished with six plastic bed-chairs, fire place in the middle, little kitchen corner, bedroom and a bathroom. The dwelling could accommodate up to 8 people.



Fig. 40 The Futuro airlifted in Sweden, October 1969      Fig. 41 Inside the Futuro house

*Futuro*, a portable holiday hideaway became the most striking samples of Utopian space-age design and the icon of futuristic architecture.

This case study has shown two distinct representations that have both had influenced design procedures and the evaluation of technology. These Utopian architectural ideas were dreamed up by different architects, decades apart, but in a sense, united by their enthusiasm to contribute to the wellbeing of the world and solve its problems. Their thoughts and visions were emitted beyond what was possible: “They (protagonists of a Modern Movement)

<sup>66</sup> Barry Bergdoll & Peter Christensen, “*Home Delivery. Fabricating the Modern Dwelling*”, 2008, p.140

allowed themselves the utopian vision as the driving force towards the attainment of a “better world”, an “ideal future”<sup>67</sup>

The examples analysed above demonstrate that utopian projects while not always successful or realistic, are nevertheless extremely vital in stimulating inspiration and thereby leading to other projects that *do* materialize. Such realised idea as Futuro House may have been inspiration for later nomadic and mobile projects like, for example, *Loftcube*.

---

<sup>67</sup> Bollerey, in Henket & Heynen (ed.), 2002, p.288

## CHAPTER 6

### INSTANT ARCHITECTURE

#### *Red+Housing* - Architecture on the Edge of Survival



Fig. 42 OBRA Architects, *Red+Housing*, 2009

*Red+Housing* is an emergency sheltering prototype which was designed by OBRA Architects, an international design studio based in New York and Beijing. It was constructed full-scale and opened at the exhibition “Crossing: Dialogues for Emergency Architecture” in the National Art Museum of China in May 2009. The exhibition was organized by the United Nations Programmer, the Bureau of Arts at Chinese Ministry of Culture of the People’s Republic of China and the National Art Museum of China, and supported by the School of Architecture at the Central Academy of Fine Arts. It was dedicated to acknowledging the 1<sup>st</sup> year anniversary of deadly Sichuan earthquake that occurred in Sichuan province in China in May 2008. The affected area was as long as 400 km. Nearly 90,000 people were dead or missing and 400,000 injured. Earthquake fault zone of damages and devastation left 12 million people homeless.

One can see why, after recovery from the aftermath of the Wenchuan earthquake, the Chinese society’s need to reflect on past disasters and to prepare for those to come became evident and urgent. The exhibition aimed to review, discuss and research post-disaster emergency architecture worldwide. The exhibition invited 17 domestic and internationally renowned architectural teams to design feasible, efficient, safe, beautiful and user-friendly



emergency shelters for the victims of different natural disasters (such as earthquakes and hurricanes) and social disasters (such as epidemic diseases). By inviting international architects from different nations, the exhibition sought to spark a dialogue between architects across the world, and inspire more professionals to contribute to disaster relief research and design.

The exhibited unit *Red+Housing* represents an extreme form of architecture; a type of architecture also referred to by the media as “architecture on the edge of survival “. I have chosen to employ this term, as I believe that it aptly demonstrates the core characteristics that define this type of architecture; namely that it involves an instant reaction to a urgent and often life-threatening situations.

*Instant* can be defined as immediate, quick, urgent. It refers to the point in which something happens on the spot, instantaneously – without any delay. The demand for fast response in disaster-areas is what *Red+Housing* aimed to relieve. In order to do this, the project had to consider many important points that arise when combining architectural design with urgency and potentially extreme environments.



Fig. 43 Aerial view of *Red+Housing*

These points can be categorized as visual characteristics (symbolism), economical production, ease of assembly and transportation, room for development and functionality over longer periods of time.

The visual characteristics are especially interesting in terms of the projects symbolic nature. With the shape of cross in plan and with roof covering material in red the shelter stands out as a symbolic signal of an emergency and aid. It is especially eye-catching from above and easily identifying for example for those delivering help supply by plane or helicopter.

The project intends to be highly economical by using local low-cost building materials. Varying available local materials in different locations are also thought to be replaceable and chosen to their best performance. Bamboo plywood, widely on the market in China was used to create this shelter. The dome shape of the roof is supported by bended bamboo plywood strips that ensure the structural strength. Covering fabric for the roof is proposed to be made of waterproof bamboo fibres. The chosen red colour completes the symbol of Red Cross, internationally recognised sign for aid.

The production process is economically and time-consuming highly effective as simple-shaped parts of the project are all digitally prefabricated. The precision of prefabrication makes it easy to assemble. All parts of the building are foldable, and ready packed flat for transportation. On the site they are quite easy to assemble with uncomplicated joints.

*Red+Housing* project aims to be universally applicable. By simple modifications applied to the building, it would be possible to use it anywhere in the world. For cold climate one can just add the insulation and stove, for tropical climates, remove doors and windows. Local building materials can be used according to availability. Temporary emergency housing doesn't provide any otherwise every day facilities, such as running water supply or sewage. It focuses primarily only on situations of emergency, designing the sheltering environment for living temporarily on the edge of surviving. The shelter can be furnished with basic furniture that is also designed by OBRA Architects – with the same pattern of digital prefabrication. Beds and chairs are foldable flat, easily transportable and can be assembled with no effort. It can definitely be delivered to the site as the set, as a “survival dwelling kit”.

*Red + Housing* was developed as a universal concept. In summary, the unit is a cross in plan, and is shaped like a dome that gives effective performance. It used cross fine strips of bamboo to support the dome. The red colour on the dome's surface gives the accommodation

a symbolic expression. The dome's environmental adaptability is evident by the examples of removing its doors and windows to accommodate a tropical climate, or by installing an oven and a little insulation to accommodate a cold climate. The project proposes the use of cheap building materials. All parts are collapsible and easy to transport. It covers the necessary need for emergency shelters in areas where natural or human-made disasters occur, and can be quickly erected anywhere in the world.



Fig. 44 OBRA Architects, foldable furniture

The design is questionable in terms of any reason and benefits to be used as replacement of a simple tent. Tents are usually used as first relief shelters for those affected by disaster. They are lighter, quicker to set up, and furthermore can be delivered to the site instantly.

The benefits of particular design and its weakness can be explored within concept itself. The shelter is solid, more stable and windproof than a tent. Probably with the addition of a special external coating it can most likely be waterproof as well as fireproof. Generally the concept can go steps further with the development of additional improvements that would give possibility to convert the unit to more permanent dwelling. It can be considered as a “skeleton” for the new house, use of which can be prolonged further. Quite often refugee camps have need to house people longer than intended, and quite often those refugee camps are growing in sizes too. To provide numerous victims with “proper” housing or relocate them could be problematic for relief organisations and governments. The design then enables a conversion an emergency accommodation into one less temporary and more permanent. The shelter could step by step follow the process of improving, where the occupants could for example change the fabric roof with more robust and lasting material (at the same time



getting rid of what can be rather irritating reddish colour inside). Other techniques that could help the unit look and function closer to a traditional house such as insulating walls, connecting water supply or establishing rain water collection (depending on the conditions and location) could also contribute to coping with the disaster's aftermath for those affected.

The shape of the house allows dividing the shelter into areas with different functions. It can be used to house families where bedroom/ kitchen/ sitting areas are provided. Alternatively it can be used as classrooms for children of different age, nurseries for young children, hospital wards, offices and accommodation for different kinds of workers on site. The skills of medical doctors and engineers are especially needed in the immediate post-crisis situations to treat the wounded and traumatized. War and architecture have a long and close relationship – rebuilding hospitals and health centres, rebuilding cities and ensuring the essential services of everyday life.

In a vast display of projects recently flooding into the field labelled as “architecture for humanity”, *Red+Housing* project in my opinion deserves credits of attention and appreciation for the interesting innovative ideas to cover basic needs of the dislocated people. It approaches the problem of fast-response in the disaster area with practicality in focus, methods that allow quick and mass production, minimum waste and easy transportation. At the same time this eco-friendly housing unit combines contribution to slower response, such as reconstruction of the affected areas. First and foremost the project is a great contribution for the process of coping with traumatic displacement, and is also example of architecture for migrants.

### **Principles of prefabrication**

An Architecture for migrants is characterized by the “tediously administrative misery to be found in *Nissen* huts, shantytowns and refugee camps, in paper wrecks and cardboard boxes with peepholes, or the suffering of shopping-cart existences and metro-shaft dwellers”<sup>68</sup> The forming structure of the *Red+Housing* might indeed have been inspired by the shape of *Nissen Hut*, as it mirrors its basic half-cylinder contour. Different types of building materials were suggested to be used in these two shelters. Both projects are examples of prefabricated

---

<sup>68</sup> Stephen Cairns, *Drifting: Architecture and Migrancy*, 2004, p.23

method of building, which is seen as an essential method to achieve effectiveness in the demand-supply emergency situations.

Prefabrication as a building method always associates with a production of different buildings' components "off-site", in a controlled area, then delivering and assembling them on the building site. This alternative method of construction is becoming more popular and common, as it has many attractive advantages. Prefabricated building can be assembled and occupied in a matter of days and sometimes hours. Building time becomes significantly reduced, speeding up the construction process and reducing its cost. But this method is not only seen as way of saving time and money at the project. It can also solve the most complicated structural situations, such as fold-up and fold-down systems, curved structure elements or other challenging building components. With technological advances it allows to manipulate very light weight materials. At the same time this method contributes to one very important issue of modern time – halting the environmental crisis and helping to achieve a sustainable environment. Effective employment of prefabricated products enables standardisation process, improving quality control and reducing material waste and at the same time prefabricated products themselves become subject to reusing and recirculation.



Fig.45 Nissen Hut, 1916

*Nissen Hut* was invented in 1916 by Major Peter N. Nissen (1871–1930), the British engineer and was extensively used under World War I for military use. Around 100,000 of these portable and economical units were produced during that time. The shelters were extensively

used further under World War II, for variable purposes including accommodation, barracks and bomb stores. The United Kingdom used innovative technologies of that time. Tunnel-shaped prefabricated huts were originally made from curved corrugated steel sheeting, but in the Second World War some were of asbestos cement sheets. The roofing was supported on wooden joists that were carried on arched steel ribs set at 6ft (1.8m) intervals. However, there was no standard model of *Nissen Huts*, as the design was never static but changed according to demand (Mitchell 1999).

The erection sequence was:

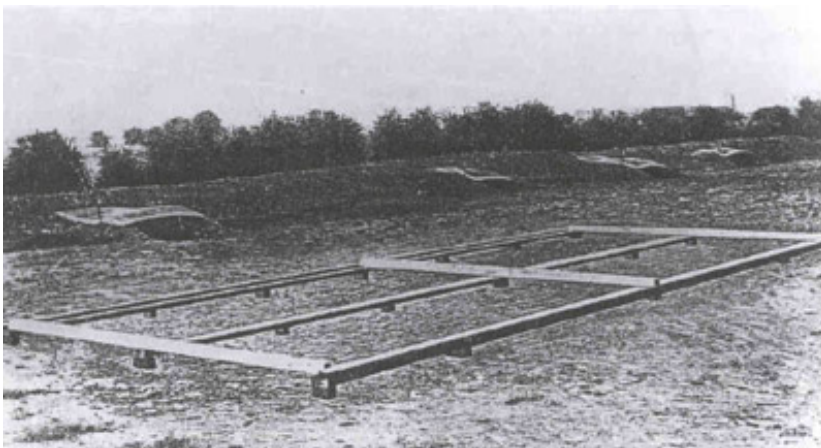


Fig.46 Stage1. Wooden bearers were laid on level ground, usually on brick supports.

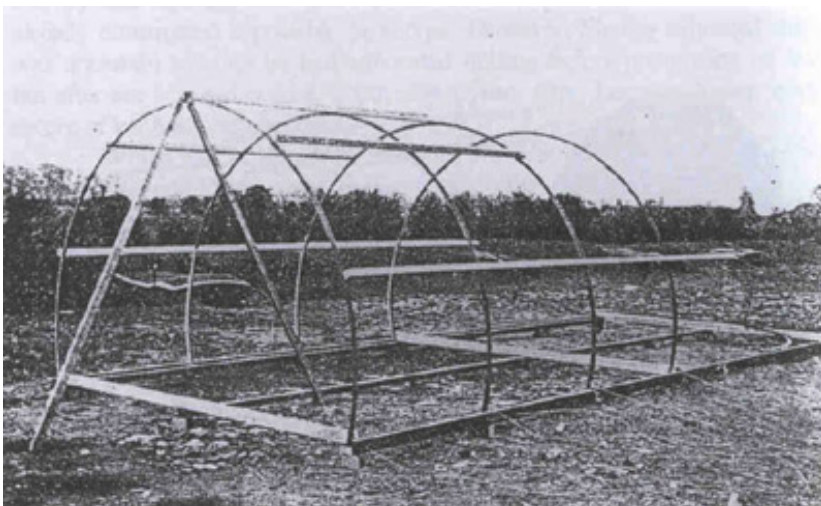


Fig.47 Stage 2. The steel bows or ribs were bolted to the bearers and the timber purlin attached to the rib using hook-bolts.



Fig.48 Stage 3. Wooden floor joists were screwed to the bearers to receive timber floor panels.

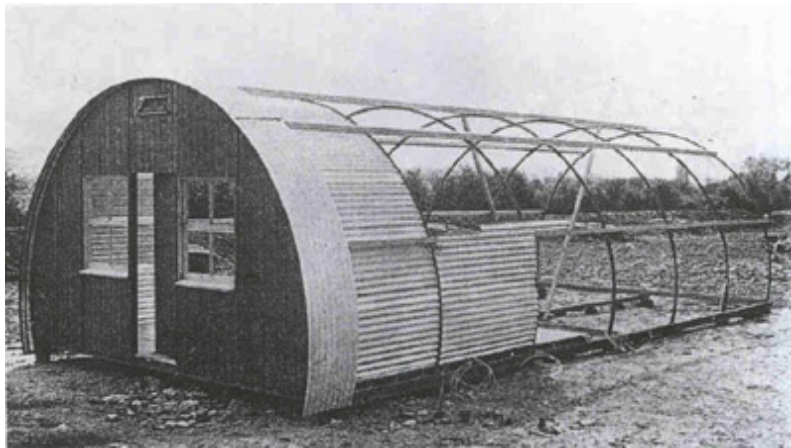


Fig.49 Stage 4 End panels were fixed into position and the internal lining added. The exterior corrugated iron skin was fixed.

Erection was normally carried out by six men over a period of 4 hours. The record time for erecting a hut was 1 hour 27 minutes.<sup>69</sup>

Generally the interior of a Nissen Hut was quite modest:

The interior was always cold, damp and gloomy. The windows were covered by thick blackout curtains, the overhead light bulbs, two to a hut, gave scant lighting. As a result, the time spent in the hut was mostly for sleeping. Off duty time was largely spent at the officer's club where there was a fireplace which gave off some warmth, if you stood close enough (...) The hut provided quarters for up to twelve men but my hut usually housed ten. There were no

<sup>69</sup> Hamish Mitchel, "Nissen Around", *Civil Engineering Surveyor Magazine*, May 1999

chairs, no table. Men in lower bunks could sit down, but men in upper bunks were disadvantaged.<sup>70</sup>

The oil drum was adapted for heating of the shelter, with two holes in it and a smoke stack. This device was known as a Canadian stove and was fed on green wood. Still such frugal accommodation was sufficient and practical under the circumstances. It provided much needed shelter for the war-stricken country. After the First World War *Nissen Huts* helped with housing shortages, and many were converted to agricultural or other functions. *Nissen Hut* and *Red+Housing* share not only the same form but also factors that influenced their designs – the building is economical in its use of materials, and is portable. These factors are extremely important considering wartime/post-disaster shortage of building material, shortage of shipping space and demand for accommodation. Primarily they both were designed to serve the same need – to relieve the emergency needs of misplaced people. Both units are also fully convertible from serving as an emergency dwelling to become more permanently established buildings that could accommodate different activities of every day's life – become medical units, offices, churches, schools or agricultural buildings. While accounts of life in the *Nissen Huts* generally were not positive, associated mostly with a Spartan kind of dormitory and far from cosy, *Red+Housing* aims to provide more privacy for displaced people, and feeling of home.

The idea of a construction that serves the purpose of fast response was also developed by one of the greatest architects of the Modern Movement; Le Corbusier. It is of interest to compare his rapid-construction housing system of 1914 to that of *Red+Housing*.

Le Corbusier, the eventual leader of Modern Movement of the 1920s, quickly realised that “beginning of The First War in 1914 could mean the end of an order and could create a room for a world where modern architecture would be central.”<sup>71</sup> The war in his opinion would last few months, and then there will be need for rebuilding and reconstruction in devastated areas. With that in mind he proposed a rapid construction housing system, based on cheap and standardized concrete skeleton.

---

<sup>70</sup> Ken Blakebrough, from unpublished book *A Copilot Remembers*.  
([http://www.457thbombgroup.org/New/Recollections/The\\_Cave/Nissen.html](http://www.457thbombgroup.org/New/Recollections/The_Cave/Nissen.html))

<sup>71</sup> William J.R. Curtis, *Le Corbusier, Ideas and Forms*, 1986, p.42

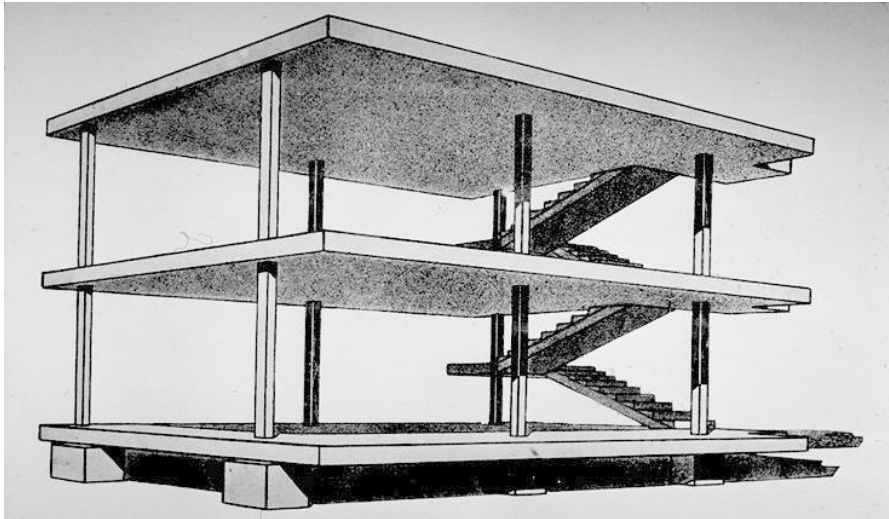


Fig.50 Le Corbusier, Perspective view of the Dom-ino system, 1914

He named this system Dom-ino (from the Latin *domus*, “house”, and *ino*, abbreviation of “innovation”). The system was formed of three rectangular horizontal slabs supported on six slender stanchions, each square in plan. The bottom slab rested on blocks; staircase linked the levels. There were no capitals or beams: the slabs were smooth above and below. They are made of pot-tile with steel reinforcing, and to be constructed with the aid of movable shuttering supported on on steel T-beams. Rubble was used for infill walls, mass-produced windows, doors and fixtures. The houses would have rectangular volumes, with linear cornices and simple apertures.<sup>72</sup>

We can trace rationalism and idealism in this project. Le Corbusier created a flexible construction system with the dramatically reduced building process and new developments in concrete construction thus enabling to satisfy demand for urgent housing. This system became ever-present form of construction in many developing countries. Le Corbusier’s *Maison Dom-ino* launched a new way of thinking about architectural space. “If we wrest from our hearts and minds static conceptions of the house and consider the question from a critical and objective point of view, we will come to the house tool, the mass-production house that is healthy (morally too) and beautiful from the aesthetic of the work tools that accompany our existence”<sup>73</sup>

In this sense the Domino principle is the best reflection on the Le Corbusier’s motto “Architecture or Revolution”. As many architects of the Modern Movement he believed in

<sup>72</sup> William J.R. Curtis, *Le Corbusier, Ideas and Forms*, 1986, p.42

<sup>73</sup> Le Corbusier, “Mass Production Housing”, in “*Toward an Architecture* “ ( *Vers une Architecture* 1923), 2007, p.259-260

the social role of architecture. He saw it as an instrument to be used to settle social unrest. “It is the question of building which lies at the root of the social unrest of today; architecture or revolution”<sup>74</sup>

Later Le Corbusier’s urban projects were linked to the same idea of finding way to infusing the low-cost housing, its efficiency in mass production into development of a contemporary city of a new international order, finding one single workable prototype for his urban theories. Le Corbusier was preaching the virtues of mass-production dwellings and the vision of a transformed modern city. Le Corbusier’s image of an ideal city celebrated the work-place, the collective dwellings, the movement of the cars and planes, physical and spiritual recreation in parks.

All the three projects discussed in this chapter are bonded with the common building technology – prefabrication. While they apply this technology in different emergency or need- situations, they show that concept of flexibility is very important in such situations, and can be life-saving. They also prove that concept of flexibility is extremely useful.

---

<sup>74</sup> Le Corbusier, “*Towards a New Architecture*”,( *Vers une Architecture 1923*), 1989, p.269



## CHAPTER 7

### CONCLUSION

#### **Flexible architecture and the future**

The focus of this thesis has been on some of the architectural and social issues of 20<sup>th</sup> century, which are part of flexible design in the dynamic societies. By studying some examples of the Modernist Movement in architecture and projects of several contemporary practicing architects, the aim was to answer the question of what is the modern flexible architecture is and which criteria unify and differ the case. In order to achieve this goal, I analysed four cases: *Loftcube*, *Lilypad*, *Dynamic Tower* and *Red+Housing*, investigating their different approaches to flexible architecture. My findings showed a variety of tendencies and features; at times utopian and visionary, and at other times more focused on active and tangible responses to acute needs connected to societal and environmental issues.

My analysis sought to mark out the criteria that unify and also problematize the concept of flexible architecture within a span of 20<sup>th</sup> century. By contrasting cases of early and late Modernism with contemporary cases of mobile architecture, and placing this analysis within a larger historical and socio-cultural context, I have shown that although the materials, technologies and needs of society have experienced a continual transformation, there are many parallels to be found within the structure, ideas, motivations and logic behind the architectural projects.

My discussion shows that both Modernist and contemporary architects make use of visual rhetoric within the design and characteristics of their structures in order to express specific symbolic attributes. These are often linked to the purpose and aspirations of the building and thereby it's meaning for potential inhabitants and society itself.

Having assessed the described chosen cases we can see that architectural design is always connected to the future. Whenever the architect makes his design, it is with the view that it will take place in the range of the time in the future, with the assumption that this future will be "better" than the present, and presumably because this particular proposal will materialise itself. Will *Lillypad* ever be built? The explicit evaluation of significant implications of the findings described earlier brings us up to the point where visions and images of the future remain unclear: "The architectural world has proved completely incapable of suggesting what the future may hold; can one still believe in the shiny renders of the corporate architectural

complex when this world has replaced a vision of the future with an image of the future?”<sup>75</sup> It may be difficult to predict the architecture of the future, as it is strongly connected to the societies’ social, cultural and political future. Flexible architecture is therefore most likely to remain tuned to apparent needs of the societies and respond to them.

Throughout the twentieth century many captivating designs were focusing on concepts of flexibility as means to create innovative architecture. Modern architecture is based on the contemporary culture that takes roots in believing in the positive ideology of progress. It can be seen as a main drive that thrust the designer’s ideas forward and at the same time ensures the dynamics of the world.

Le Corbusier had an intrinsic ideology that the machine would make a better world. The same visions were shared by Archigram and other modernist avant-garde architects. Although my thesis has shown that fascination with the potentials of machinery has long been present, it also shows how the contemporary state of architecture differs to Modernism's in that technology and machinery has greatly accelerated with the last few decades. Contemporary industries contribute to equipping today’s designers with a vast array of technical skills and broad possibilities. While at the beginning of the century Le Corbusier had the properties of reinforced concrete to envision his Dom-ino system, almost a century later Aisslinger and Gallebaut had in their hands the power of new light building materials such as plastic laminate, polysterol and glass reinforced plastics to envision the idea of *Loftcube* and *Lilypad*. This pivotal advancement has opened the door to more possibilities than ever before within the scope of mobile architecture, and in this way contemporary architecture has been revolutionised.

Ultimately, my thesis demonstrates that flexible architecture constantly reflects, and restructures the way in which we perceive the possibilities and norms for living. Flexible architecture aims to meet the needs of the present epoch, with its time-specific reality, such as social, cultural, political, environmental issues. It also attempts to propel architecture into a more efficient and sustainable cultural product for a dynamic society. I believe that the increasing demands of dynamic societies ensure that flexible architecture will continue to hold a solid and significant place in the scheme of future architecture.

---

<sup>75</sup> Nick Clear, “ Architecture of the Near Future”, *Architectural Design*, September/ October 2009, p.6

## **Where to now? Suggestions for future research**

Flexible architecture consists of building with design-in adaptability and responds to change of circumstances and needs. The benefits of this form of design can be extensive. Buildings could remain in use longer. By changing the activities offered by adaptable design, they could fit their purpose better. Such buildings could accommodate users experience and intervention, and at the same time remain relevant to cultural and societal needs. Flexible architecture promotes employing the latest technical innovations that bring advantage for the user. By using the latest technologies and reusable building materials, buildings could be economically and ecologically more viable. Flexible architecture can be also life- saving, by offering the instant solution of sheltering in the emergency situations. Concept of flexibility in architecture is always useful.

By showing the evolvement of flexible architecture within a socio-historical framework, my thesis has hopefully contributed to viewing architecture as having cultural significance both as a visual text and in terms of it being the product of collectively changing needs, and had demonstrated the similarities between some modernism's and present day's flexible architectural designs.

While my study hopefully has been beneficial in providing a comprehensive analysis of flexible architecture within the last century, it has focused specifically on the transitioning “bridge” between Modernism to contemporary architecture. Further research might focus on a wider time-frame and consider other architectural movements or periods.

I have also focused mostly on architecture created by architects from the developed “western” world. Further research might be interesting to examine flexible architecture in other cultures and developing societies to see how they might compare. Due to the limitations of my thesis I was only able to do four case studies. Future research providing a wider range of examples might contribute more nuanced representation of varying aspects of mobile architecture.

## Bibliography

Andersen, Troels, *Vladimir Tatlin*, Stockholm, Moderna Museet, 1968

Archeological Project Services, *Historic Building Survey of Nissen Hut, Hartwel Lodge, Moorlane, Roughton, Lincolnshire*, report compiled by Gary Taylor BA (Hons) MA MSc, Lincolnshire County Council, June 2009. Source:

<http://archaeologydataservice.ac.uk/catalogue/adsdata/arch-1045->

[1/dissemination/pdf/BR\\_NissenHut\\_HartwellLodge\\_MoorLane\\_Roughton.pdf](http://archaeologydataservice.ac.uk/catalogue/adsdata/arch-1045-1/dissemination/pdf/BR_NissenHut_HartwellLodge_MoorLane_Roughton.pdf)

Archer, David & Rahmstorf, Stefan, *The Climate Crisis – an introductory Guide to Climate Change*, Cambridge University Press 2010

Bahamon, Alejandro (ed.), *PreFab – Adaptable, Modular, Dismountable, Light, Mobile Architecture*, Loft Publications S.L. and HBI, an imprint of Harper Collins Publishers, New York, 2002

Barraza, Hansy Better, *Where are the Utopian Visionaries? Architecture of Social Exchange*, Periscope Publishing, Pittsburgh, 2012

Bergdoll, Barry & Christensen, Peter, *Home Delivery. Fabricating the Modern Dwelling*, The Museum of Modern Arts, New York, 2008

Berman, Marshall, *All That is Solid Melts Into Air. The Experience Of Modernity*, Verso, New York and London, 1983

Boym, Svetlana, “Tatlin, or, Ruinophilia”, *Cabinet Magazine*, issue 28, winter 2007/2008

Brooks, H.Allen (ed.), *Le Corbusier*, Princeton University Press, 1987

Cairns, Stephen, *Drifting: Architecture and Migrancy*, Routledge, London, 2004

Charlesworth, Esther, *Architects without Frontiers – War, Reconstruction and Design Responsibility*, Architectural Press, Elsevier Ltd, Oxford, 2006

Clear, Nick (ed.) “Architecture of the Near Future”, special issue of *Architectural Design*, vol.79, No.5 (September / October 2009)

Cresswell, Tim & Merriman, Peter, *Geographies of Mobilities: Practices, Spaces, Subjects*, Ashgate Publishing Ltd, Farnham, 2011

Curtis, William J.R., *Le Corbusier, Ideas and Forms*, Phaidon Press Limited, Oxford, 1986

Dahl, Torben, *Climate and Architecture*, The Royal Danish Academy of Fine Arts, School of Architecture Publishers, 2010

Eaton, Ruth, *Ideal Cities. Utopianism and the (Un)Built Environment*, Thames & Hudson, London, 2002

Echarria, Pilar, *Portable Architecture – and Unpredictable Surroundings*, Links International, Barcelona, 2005

Flowers, Benjamin, *Skyscraper. The Politics and Power of Building New York City in the Twentieth Century*, University of Pennsylvania Press, Philadelphia, 2009

Forty, Adrian, *Words and Building. A Vocabulary of Modern Architecture*, Thames & Hudson, New York, 2000

Frampton, Kenneth, *Modern Architecture: A Critical History*, Oxford University Press, Oxford, 1980

Freadman, Yona, *Pro Domo*, Actar, Barcelona, 2006

Giedion, Sigfried, *Building in France, Building in Iron, Building in Ferroconcrete (Bauen in Frankreich, Bauen in Eisen, Bauen in Eisenbeton*, Klinkhardt & Biermann, Leipzig, 1928), trans. J. Duncan Berry, with an introduction by Sokratis Georgiadis The Getty Center for the History of Art and the Humanities, Santa Monica (Cal.), 1995

Hagan, Susannah, *Taking Shape. A new Contract between Architecture and Nature*, Architectural Press, Oxford, 2001

Henket, Hubert Jan & Heynen, Hilde (ed.), *Back from Utopia, The Challenge of the Modern Movement*, 010 Publishers, Rotterdam 2002

Herwig, Oliver, *Featherweights. Light, Mobile and Floating Architecture*, Prestel Publishing Ltd. London 2003

- Heynen, Hilde, *Architecture and Modernity*, Massachusetts Institute of Technology, 1999
- Horden Richard, *Micro Architecture, Lightweight, Mobile and Ecological Buildings for the Future*, Thames & Hudson, London, 2008
- Hudson, Jennifer, *1000 New Designs and Where to Find Them*, Laurence King Publishing Ltd, London, 2006
- Jodidio, Philip, *Architecture Now3*, Taschen GMB, Cologne, 2004
- Jones Peter Blundell, *Modern Architecture Through Case Studies*, Architecture Press, Oxford, 2002
- Kahn, Lloyd, *Tiny Homes: Simple Shelter, Scaling back in the 21 Century*, Shelter Publications, Inc, California, 2012
- Klanten, Robert & Feireiss, Lukas, *Utopia Forever: Visions of Architecture and Urbanism*, Berlin 2011
- Krauel, Jacobo (ed), *Cabins: Small Wood Houses*, Carles Broto i Comerma, Barcelona, 2008
- Kronenburg, Robert, *Houses in Motion: The Genesis, History and Development of the Portable Building*, 2<sup>nd</sup> edition, Wiley-Academy, Great Britain, 2002
- Kronenburg, Robert, *Portable Architecture. Design and Technology*, Birkhauser Verlag AG, Basel, 2008
- Kuismanen, Kimmo, *Eco House North*, Pohjois-Pohjanmaan Liitto, Oulu, 2007
- Le Corbusier, *Towards a New Architecture (Vers une Architecture 1923)*, trans. Frederick Etchells, Butterworth Architecture, London, 1989
- Le Corbusier, *Toward an Architecture (Vers une Architecture 1923)*, trans. John Goodman, Getty Research Institute, Los Angeles, 2007
- Lenin, Vladimir, *Partijnaja organizacia i partijnaja literatura* (November 13, 1905.) – omnibus edition, 5th ed., volume 12, Progress, Moskva, 1982

Lyotard, Jean Francois, *The Inhuman – Domus & Megalopolis*, Stanford University Press, California, 1998

Mitchel, Hamish “Nissen Around”, *Civil Engineering Surveyor Magazine*, Institution of Civil Engineering Surveyors, May 1999

Mornement, Adam, *Extensions*, Laurence King Publishing Ltd, London 2007

Nappo, Donato & Vairelli, Stefania, *Homes on the Move*, Tandem Verlag GmbH, Italy, 2010

Office of The United Nations Disaster Relief Co-ordinator, *Shelter after Disaster. Guidelines for Assistance*, Geneva; United Nations, New York, 1982, Source:

<http://reliefweb.int/sites/reliefweb.int/files/resources/E4FE896AFFF16709C1256CB10056558E-undro-shelter1-jul82.pdf>

Paperny, Vladimir, *Architecture in the age of Stalin*, Cambridge University Press, Cambridge, UK, 2002

Pawley, Martin, *20th Century Architecture*, Architectural Press, Oxford, 2000

Power, Carla, “Liquid Assets”, *Time*, September 12, 2011

Rawling, Irene & Abel, Mary, *Portable Houses*, Gibbs Smith Publisher, Salt Lake City, 2004

Rogers, Richard, *Cities for a small Planet*, Butler and Tanner Ltd, London, 1997

Sant’Elia, Antonio, *Manifesto of Futuristic Architecture*, published in two parts in *Lacerba* (Florence), 15 March 1914 and 1 April 1914, and as a leaflet by Direzione del Movimento Futurista, 18 March 1914. Source: <http://hts3.files.wordpress.com/2010/12/manifesto-of-futurist-architecture-1914.pdf>

Schwartz-Clauss, Mathias *Living in Motion: Design and Architecture for Flexible welling*, Vitra Design Museum, Weil and Rhein, 2002

Siegal Jennifer, *Mobile : The Art of Portable Architecture*, Princeton Architectural Press, New York, 2002.



Stratford, Oli, “Farewell to the Futuro: an interview with Marko Home and Mika Taanila”, *Disegno. Daily*, 10 September 2012. Source: <http://disegnodaily.com/interview/farewell-to-the-futuro-an-interview-with-marko-home-and-mika-taanila>

Schneider, Tatjana & Till, Jeremy, “Flexible housing: opportunities and limits”, *Cambridge Journals*, p.157-165, no.2, 2005, downloaded 25.08.2011  
<http://www.journals.cambridge.org>

Smith, Ryan E., *Prefab Architecture. A Guide to Modular Design and Construction*, John Wiley & Sons Inc., New Jersey, USA, 2010

Sullivan, Louis, *The Tall Office Building Artistically Considered*, 1896, accessed via <http://academics.triton.edu/faculty/fheitzman/tallofficebuilding.html>

Taylor, Ian (ed.), “Floating Home, an amphibious haven for climate refugees”, *Focus BBC Magazine*, Des. 2008, Bristol, England, p. 44-52

Traganou, Jilly & Mitrasinovic, Miodrag, *Travel, Space, Architecture*, Ashgate Publishing Limited, England, 2009

Washington, Robin, “Futuro Cabin. A back to the future getaway”, *Cabin Life Magazine*, p.66, February 2009

Weaving, Andrew, *High Rise Living*, Gibbs Smith Publisher, Layton, Utah, 2004

Weingardt, RichardG. “Engineering Legends – Great American Civil Engineers”, *American Society of Civil Engineers*, USA, 2005, page 110

Woods, Lebbeus, *Radical Reconstruction*, Princeton Architectural Press, 1997

## **Internett Sources**

[www.adaptivebuildings.com](http://www.adaptivebuildings.com)

<http://www.aisslinger.de>

<http://brbl-archive.library.yale.edu/exhibitions/utopia/intro.html>

<http://arthistory.ucdavis.edu/people/faculty/publications/Drop%20City%20Revisited.pdf>

<http://www.buildingcentre.co.uk/adaptivearchitecture/adaptive.html>

<http://built4change.vancouverplanning.ca/built-for-change-2/kronenburg-lecture-adaptability/>

<http://www.cabinetmagazine.org/issues/28/boym2.php>

<http://www.designmuseum.org/design/archigram>

DROP CITY - a documentary film by Joan Grossman and Tom McCourt,

<http://www.kickstarter.com/projects/680363404/drop-city-a-documentary-film>

<http://www.dynamicarchitecture.net/>

<http://flashydubai.com>

<http://www.interactivearchitecture.org>

<http://www.loftcube.net>

<http://moundsandcircles.blogspot.no/2011/08/turn-on-tune-in-drop-art.html>

<http://www.obraarchitects.com>

[www.reacclimate.org](http://www.reacclimate.org)

<http://www.reuters.com/article/2012/10/09/us-dutch-architect-water-idUSBRE8980GB20121009>

[http://www.strangebuildings.thegrumpyoldlimey.com/2011/09/futuro-house-info-photos-maps\\_102.html](http://www.strangebuildings.thegrumpyoldlimey.com/2011/09/futuro-house-info-photos-maps_102.html)

<http://sheltercentre.org>

<http://vimeo.com/21803296> (Kronenburg's lecture on flexible architecture at the Building Centre in London, 5 March 2011)

<http://vincent.callebaut.org/>

<http://www.waterstudio.nl/>

<http://032c.com/2004/architecture-yona-friedman/>

## List of Illustrations

Cover photo Vincent Callebaut, Lilypad, designed 2003, aerial view, copyright Vincent

Callebaut, Source: <http://www.eikongraphia.com>

Figure 1 Gerrit Rietveld, Schröder House (1924), Source: [www.archdaily.com](http://www.archdaily.com) downloaded 25.04.20013

Figure 2 Le Corbusier , Villa Savoye (1930) photos by Flavio Bragaia.

Source: [www.archdaily.com](http://www.archdaily.com) downloaded 25.04.2013

Figure 3 Kurokawa, Nakagin Capsule Tower, Tokyo, 1971, photo by Arcspace.

Source: [www.archdaily.com](http://www.archdaily.com) downloaded 27.03.2013

Figure 4 Plan of the Nakagin Capsule Tower. Source: [www.japanpropertycentral.com](http://www.japanpropertycentral.com)

Figure 5 Interior of the capsule. Source: [www.pinterest.com](http://www.pinterest.com)

Figure 6 Helix City , Kurokawa, 1961, Source: <http://www.kisho.co>

Figure 7 City in the air, Arata Isozaki, 1961,

Source: <http://www.architecturalmoleskine.blogspot.no>

Figure 8 Sketch for Floating City, Kikutake, 1960

Source: <http://www.japanfocus.org>

Figure 9 Model for Floating City, Kikutake, 1962, Source:

<http://littlegreenseed.wordpress.com/2012/04/22/adaptable-nature->

Figure 10 Chameleon and hermit crab, examples of adaptability in nature.

Source: <http://littlegreenseed.files.wordpress.com/2012/04/nature.jpg>

Figure 11 Schaulager (Art Store), Basel, Switzerland, Herzog and De Meuron, 2004,

Source: [www.commonswikimedia.org](http://www.commonswikimedia.org) and [www.departures-international.com](http://www.departures-international.com)

Figure 12 Shipping container is converted to the guest house by Poteet Architects, USA, 2010, Images by Chris Cooper, source [www.archdaily.com](http://www.archdaily.com)

Figure 13 Halley VI Antarctic Research Station by London-based Hugh Broughton Architects, project 2005. Images are courtesy of the British Antarctic Survey (BAS) source: [www.designboom.com](http://www.designboom.com)

Figure 14 Idea of unfolding, transformable modules by Michael Jantzen  
Source: [www.designboom.com](http://www.designboom.com)

Figure 15 Bengt Sjostrom Starlight Theatre, Rockford, Illinois, USA, 2003, Studio Gang Architects, Photos by Greg Morphy, source: [www.archdaily.com](http://www.archdaily.com)

Figure 16 Adaptive Facades, the Netherlands, 2003, Kas Oosterhuis,  
Source: [www.archdaily.com](http://www.archdaily.com)

Figure 17 Loftcube, Source: <http://www.loftcube.net>

Figures 18-19 Loftcube, interior, <http://www.loftcube.net>

Figure 20 Loftcube in Berlin, Photo by Larissa Acharya, 2012

Figure 21 Drop City – pioneering artist community, Trinidad, Colorado, 1965  
Source: [www.dropcitydoc.com](http://www.dropcitydoc.com)

Figure 22 Domes covered in car roofs, 1965,  
Source: <http://seedbankdesign.com/?tag=drop-city>

Figure 23 The world's first building in motion. Image is courtesy of Dynamic Architecture™ all rights reserved to Dr. David Fisher,  
source: Source: [www.dynamicarchitecture.net](http://www.dynamicarchitecture.net)

Figure 24 Dynamic Tower, four apartment floor plan, Source:  
<http://www.skyscrapercity.com/showthread.php?t=651041>

Figure 25 Dynamic Tower, villa floor plan, Source:  
<http://www.skyscrapercity.com/showthread.php?t=651041>

Figure 26 Dynamic Tower, the concept of prefabrication,  
Source: <http://www.skyscrapercity.com/showthread.php?t=651041>

Figure 27 Ecological concept of the building, s source

Source: <http://www.skyscrapercity.com/showthread.php?t=651041>

Figure 28 Carson Pirie & Scott Department Store, Chicago: the forerunner of many modern high-rise blocks of the twentieth century.

Source: <http://upload.wikimedia.org>

Figure 29 Le Corbusier, Unite d'Habitation (1946-52)

Source: <http://upload.wikimedia.org/wikipedia/commons>

Figure 30 Model of Tatlin's Tower, 1919. Courtesy David King Collection

Source: <http://cabinetmagazine.org/issues/28/boym2.php>

Figure 31 Housing on the water, Amsterdam 2012, photo by Larissa Acharya

Figure 32 Floating houses, Netherland,

Source: <http://serbert.wordpress.com/2011/06/15/floating-architecture-in-netherlands/>

Figure 33 Model of floating private icelands designed by Dutch Docklands, images are cortesy of Dutch Docklands, [www.dutchdocklands.com](http://www.dutchdocklands.com)

Source: [www.gizmag.com](http://www.gizmag.com) and [www.fastcoexist.com](http://www.fastcoexist.com)

Figure 34 Vincent Callebaut, Lilypad, designed 2003, aerial view, copyright Vincent

Callebaut, Source: <http://www.eikongraphia.com/?p=2490>

Figure 35 Amazonia Victoria Regia (surface, bottom), Source:

[http://commons.wikimedia.org/wiki/File:Victoria\\_amazonica\\_back\\_side.jpg](http://commons.wikimedia.org/wiki/File:Victoria_amazonica_back_side.jpg)

and <http://en.wikipedia.org/wiki/File:Victoriacruzianaleaves>

Figure 36 Lilypad flower, Source:[http://en.wikipedia.org/wiki/Victoria\\_amazonica](http://en.wikipedia.org/wiki/Victoria_amazonica)

Figure 37 Lilypad, computer images , Source: [www.gizmag.com](http://www.gizmag.com) and [www.oceanosgroup.com](http://www.oceanosgroup.com)

Figure 38 Archigram, Walking City, Source: [http://designmuseum.org/entry/4509?style=design\\_image\\_popup](http://designmuseum.org/entry/4509?style=design_image_popup)

Figure 39 Matti Suuronen, Futuro house, 1968, source: [www.arcspace.com](http://www.arcspace.com)

Figures 40-41 Matti Suuronen, Futuro House, 1968, Source: [www.arcspace.com](http://www.arcspace.com)

Figure 42 OBRA Architects, *Red+Housing*, 2009, Image is courtesy of OBRA Architects, Source: [www.archdaily.com](http://www.archdaily.com)

Figure 43 OBRA Architects, Aerial view of Red+Housing, photo are courtesy of OBRA Architects, Source: [www.archdaily.com](http://www.archdaily.com)

Figure 44 OBRA Architects, Red+Housing, foldable furniture, photo are courtesy of OBRA Architects, Source: [www.archdaily.com](http://www.archdaily.com)

Figure 45 Nissen Hut, 1916, Source: [www.nissens.co.uk](http://www.nissens.co.uk)

Figures 46-49 Erection sequence of Nissen Hut, Source: [www.nissens.co.uk](http://www.nissens.co.uk)

Figure 50 Le Corbusier, Dom-ino system , 1914 , Source: Le Corbusier and Pierre Jeanneret, *OEuvre Complète Volume 1, 1910–1929*, Les Editions d'Architecture Artemis, Zürich, 1964 via [www.domusweb.it](http://www.domusweb.it)



