論文 / 著書情報
Article / Book Information

題目(和文)	
Title(English)	Applicability, Changeability and Inhabitability in the Concept of Capsule Architecture
著者(和文)	DereznichenkoVolodymyr
Author(English)	Volodymyr Dereznichenko
出典(和文)	学位:博士(学術), 学位授与機関:東京工業大学, 報告番号:甲第12252号, 授与年月日:2022年9月22日, 学位の種別:課程博士, 審査員:塩崎 太伸,安田 幸一,奥山 信一,塚本 由晴,山﨑 鯛介
Citation(English)	Degree:Doctor (Academic), Conferring organization: Tokyo Institute of Technology, Report number:甲第12252号, Conferred date:2022/9/22, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Type(English)	Doctoral Thesis

Applicability, Changeability and Inhabitability in the Concept of Capsule Architecture

Shiozaki Laboratory

Volodymyr Dereznichenko

Chapter 1. Introduction

Section 1 Background and aim of research

1.1 Background of research

1.2 Aim of research

Section 2 Methodology of research

2.1 Explanation of gathered data

2.2 Explanation of methodology

Section 3 Connections to previous studies

Section 4 Structure of research

Section 1 Background and aim of research

The typology called capsule architecture can be referred both to a single capsule and the agglomeration of capsules. The development of capsule architecture spans across the 20th and 21st centuries, and Modernism and Postmodernism movements, with the main contributors as Metabolists in Japan, Archigram from UK, megastructuralist movement and architects practicing in prefabrication and modularity. The typology is argued to include cases of so-called container architecture and capsule hotels. The typology deals with introvert closed environments and has a deep theoretical background in defining spatial characteristics of space, functionality and meaning of home. Usually, the typology of capsule architecture is limited to the period of 1960s in a period of radical ideas in urban planning - a new swing of theoretical discourse of modernism if cities can be in a shape of megastructures where capsules served a role of a slave (operational or living unit). Due to a big scale of projects almost all such ideas remain on paper what leave unanswered the practicability of using capsules in real architectural design. This thesis brings in this practical approach in regard to a concept of capsule architecture and reviews its capacities from three viewpoints: its applicability, changeability and inhabitability. These three aspects of a concept are thought to fully explain not only the theoretical background and idea of capsules as an architectural object but its practicability and implementation of a concept on practice: from intentions of architects to use capsules in the first place, the inherent feature of capsules and capsular buildings to change over time and social role of a capsule in provision of transportable and closed living or functional space. The research uses the definition of a capsule in order to select and study various cases of capsule architecture. The capsules by various definitions can be described from the following four aspects: 1) smallness which in its way enables 2) mobility of a capsule, which should for this reason to be 3) closed and complete environment, which 4) have to be able to connect to supporting both structural and technical infrastructure.

1.1 Background of research

Nakagin Capsule Tower

This research begins in 2017 by following the case of Nakagin Capsule Tower (Fig.1) on a verge of the possibility of demolition at the time. The capsular building nesting 140 capsules and built in 1972 brings in and finalizes two influential architectural practices

during the 1960s – Metabolism architectural movement from Japan, and Archigram from the Great Britain as well as it connects two notions – ‘capsule’ and ‘megastructure’. Architect Fumihiko Maki belonging to Metabolists in his ‘Investigation in Collective Form’ in 1964 provides a definition for a Mega-Structure – the large man-made spatial landscape, and in the same year Warren Chalk from Archigram labels the functional blocks in the free space inside the megastructure as capsules[1)]. Nakagin Capsule Tower is a good representative of such new avant-guarde relationship between infrastructure and individual functional units which is differ from surrounding environment[2)], although the proper naming for this typology would be ‘capsule architecture’ since there is a cluster of separate capsules which are spatially, visually or functionally combined together. Apart of clarity of this definition[3)], the development of capsule architecture spans across the 20th and 21st centuries, and Modernism and Postmodernism movements what provides various capsular structures which are generalized in this thesis as capsule architecture and can be described as an architectural typology of buildings including in its structure separate spatial blocks, that is, capsules[4) 5)].

The abovementioned structural relationship of Nakagin Capsule Tower allows viewing such buildings as constantly changing entities which shape and lifespan may be prolonged due to manipulation and replacement of capsules. Nakagin Capsule Tower is a rare built example of its kind, however, failed one unable to change what led to the threat of eventual demolition.

Fig.1. Nakagin Capsule Tower, Kisho Kurokawa architects and associates, 1972

From April 12, 2022 the building after long-lasting struggle to survive is being demolished[6)]. The initial plan by its architect and member of Metabolists - Kisho Kurokawa was to exchange all capsules at once after the period of 25-35 years, however, due to mainly economic reasons the plans of capsules’ exchange were rejected[7)]. The limits occurred in

such architectural manipulation and following news about the decision to demolish the building sparked architectural debate what coincided with the reoccurring interest in modernist movements. Apart of technical, researchers point out the specific factors like economy and paradigm change. Lin specifies on changes in land prices in Japan over time, what makes renovation or redevelopment of the tower unfeasible[8]. Sugai and Yokota refer to the pursue of Kurokawa to realize a working prototype of Metabolists what actually led to limitation in providing other means of change or capsules' replacements due to its design[9]. Hosoya narrows this case to the scale of Tokyo, comparing Metabolism in architecture to the rapid Tokyo urban metabolism swallowing many modernist buildings nowadays what, because of its fluid unpredictability, greatly exceeds the strict 25-years plan of Kurokawa to replace the capsules[10].

In the case of Nakagin Capsule Tower, the change may be described as a method and connected to the preservation what equally represents metabolic changeability. Following is how Ishida addresses this issue:

> "Japan is one of the few countries to designate the title National Living Treasure" to a living person practicing a craft. Like the Ise Shrine[11], there is more value placed on the process associated with making an artifact than the artifacts themselves. Had the renewal of the capsules taken place after 25 years in accordance with the Metabolist principles, the Nakagin building's preservation method may have been what made it deserving of a landmark status. Should preservation of buildings be specific to its culture, and if so, how?[12]"

Lin similarly views the precedent of the capsule tower in the scope of modern Japan:

> "On a more fundamental level, however, the intensified conflict between redevelopment and conservation is emblematic of a particular pattern of urban transformation and regeneration characteristic of contemporary Japanese cities, and must be examined in its specific architectural and cultural context.[13]"

Not only change of capsules but further growth (or shrinkage) (Fig 2) is inherent for capsular structures. However, in the case of Nakagin Capsule Tower the building structure is

nowhere to evolve. The surrounding plots are taken and, if deliberately empty, they cost thousands of US dollars per square meter[14]. Tightened by physical and conditional restrains building may remain in its domain if only grow up, however, Ginza district where the building is located, being a historically important district itself implements its own height restrictions, thus, the capsule tower is mostly limited to its present shape. Thus, the building is overwhelmed by urban-scale metabolic cycle and limited in a single-building scale, and the only change occurs inside the capsules themselves as residents adjust capsules' interiors or exteriors to their identity and lifestyle[15].

Fig.2. Nakagin Capsule Tower growth study, Kisho Kurokawa architectural bureau

Nakagin Capsule Tower is a residential building, or, to be more exact, originally it was provided as a second house and was advertised as "Business capsule" (equivalent to Small Office Home Office (SOHO)[16]. The target clients were Japanese businessmen coming from suburbs to the very center of Tokyo and spending there weekdays, after what they would return to their families for weekend. Such lifestyle of people on-the-move is described by Kurokawa in his Capsule Declaration article in 1969 as 'homo-movens' – people symbolizing the busy modern society[17]. The building and the model presenting the grown structure above was not designed as a building but as many unrealized Metabolists' designs was an urban form with distinguishable social order[18]. The similar image of the new society was depicted in the project of New Babylon by Constant Niewenhuis in 1964. This Situationists'[19] city was a place of co-creativity where another race of 'homo-ludens' would continuously create micro-worlds for leisure and play[20]. Social aspect plays a significant role in capsule architecture with the direct relation who capsules are provided for. Nakagin Capsule Tower and threat of demolition for several years created a unique kind of society of its residents and architecture lovers which deferred from the original concept of Kurokawa. Yet it can be considered as another kind of metamorphosis and representation of metabolism idea.

The case of Nakagin Capsule Tower is a well-known example of the typology of capsular buildings. Even being an experimental architecture, the building not only show how the concept of a capsule and capsular structures can be realized but it also tests the inherent aspect of changeability through time, as well as a strong social aspect which are to be studied in this thesis.

Revisiting modernist architectural movements

Metabolism is considered the last of few big modernisms architectural movements having their own manifestos and followed the similar western architectural practices producing capsules[21)]. The 20th century was an era of modernism in variety of fields which experienced drastic changes in surrounding world – globalization, the world wars, the space race, urbanization, increasing of mobility and common cultural change to the new type of society, probably, the one radical enough to accept capsules as a part of celebration of the brave new world. With fresh ideas and views on current state of architecture starting from Italian Futurists, Russian Constructivists, Le Corbusier claiming houses as machines for living, pioneering projects of prefabrication by Walter Gropius, Konrad Wachsmann, Jean Prouve, and many other independent practices spinning up the architectural discourse, the 20th century became the time of experimentation with the urban realm, what led eventually to the creation of the new city material – megastructures with separate realized examples.

Nowadays, there is a new surge of interest regarding both Metabolism and modernist architectural movements as a whole[22)]. The search of modern 'sustainability' is being conducted in the more resilient practices to create urban surroundings from the recent past. Schalk states that the generic architecture envisioned by Metabolists may have a key to understand and trace modern inquiry of sustainability usually presented ahistorically[23)]:

> "What knowledge can we gain from the historical case of Metabolism for a contemporary discussion on sustainable architecture? The search for resilient environments and sustainable architecture is not new, and, though the terminology did not exist in the 1960s, new tools, terms, and images were formed then. Revisiting the Metabolist visions of a resilient world reveals several contemporary, urgent issues. The current debate on how to design sustainable cities is driven by similar challenges—land scarcity, unequal development, pressure on infrastructures, and democratic issues in

planning—yet recent waves of sustainable architecture have not led to the emergence of more resilient cities, and may never.[24)]"

Russel highlights the dilemma of Metabolists seeking to shift from mechanical model to "biological one in which buildings' parts, like living cells, could come to live and die while the entire organism goes on living[25)]", but is captured in the same technocratic era. Olivera addresses Metabolism by asking: "How can the optimism and collective willpower of the 60s resonate in today's severed societies and individualistic behaviours[26)]?" This question particularly highlights activities of architects working after the collapse of CIAM in 1959[27)] and concentrates on radical suggestions towards the future relationship between a man and environment. The topics of necessity to further blend modernity with the broad heritage of the national culture and create a built environment that could also promote the harmonization and foster the cooperation of the different and various aspects of the contemporary society studied under Metabolism and other independent practices are of a great importance[28)]. Nowadays, the countries experiencing rapid urbanization and economic growth struggle with the same issues which Japanese and other architects of modernism tried to find countermeasures to. Thus, this appears to be obvious that some new kinds of capsules are being promoted as if updated versions of their predecessors from the 60s. This creates a connection between two time periods sharing the common features and spectating similar developments in construction and architecture. In this regard, we can borrow from the Metabolists and modernist thinking not only their acceptance of change, adaptation, and uncertainty but also of the holistic and of the role of technology in the construction of cities[29)]. With new developments in building technics, materials and understanding the current paradigm shift in society it is possible to reconsider modernism movements by refusing outdated way of thinking and adopting refreshed principles of sustainability in a way similar to the one described by Metabolists themselves – out with the old, in with the new.

Recent developments in prefabrication and modularity

In modern times of postmodernist architectural practices there is a recurrent raise of interest towards modularity in architecture and, additionally prefabrication architecture seeking to improve its image of low-cost bad quality housing back from the 20s century[30)]. A capsule as a temporary unit in ever-changing urban tissue and, hence, recyclable finds its

new formation in a shape of a shipping container – stackable, easy and quick to put into construction, and, most of all, environmentally friendly. The history of modular prefabrication provides good examples of long-standing businesses and firm production chains in America, Europe and Japan[31)] while another existed for shoft period of time for capsules of Nakagin Capsule Tower, and which were manufactured by Daimaru Engineering Department specializing in shipping equipment and finishing[32)]. Developing since the 1950s, shipping containers were put into practice as living units from late 1980s[33)] and gained a full scale at the beginning of 2000s. 'Container city I' constructed in 2001 and followed by the second stage a year later is the first big scale project built from these unified elements featuring many similar aspects regarding a capsule's image (Fig 3).

Fig. 3. Container city I, Urban Space Management Ltd, 2001

Ten years later together with the expansion of cheap hotels – hostels, capsule hotels originating from the abovementioned Nakagin Capsule Tower and 'capsule architect'[34)] Kurokawa, became popular outside Japan and brought a new wave of interior capsules. As cabins for a brief rest modern capsules are also installed in airports or transportation hubs as an intermediate living space during a journey. In the modern time of cheap flight tickets and strengthened globalization, the people on-the-move described by Kisho Kurokawa seem do require capsules. The noteworthy example of modern capsule hotels is a network called 9h (9 hours), explicitly asserting on passing-by nature of the shelter they provide. 9 hours specified in the name of the company correspond to 1 hour being enough time to take a shower and prepare oneself, 1 hour for eating a meal and 7 hours for sleep inside minimalist and futuristic capsule of size 1x2 meters (Fig 4.).

Fig. 4. 9 hours Shinjuku, 9 hours ltd., 2008

The ideal of an infinitely flexible, changeable system that can expand, contract, grow and die like a living organism could not be realized with the technology available at the time of Metabolists[35]. Mechanically controlled massive megastructures predicted by modernist architects yet find its continuation in modern practice as well; however, nowadays they may be viewed as biological machines, already combining within itself sustainability principles and green technology. One of such example is Eco Pod – a massive urban structure, controlled by robotic arms rearranging this complex due to computer commands. Being still a concept the design reflects dissatisfaction by current urban realm, and proposes, similarly as it was done by Arata Isozaki back in 1963, to ignore the existing building environment by building something extraordinary over it[36] (Fig 5).

Fig. 5. Eco Pod, Squared Design Lab., 2012

Currently, independent capsule studies are also being conducted by individual architectural practices which echoes similar developments of plastic houses during 1950s in western world[37]. These modern capsules are usually interconnected with a trend of micro houses devoted to a minimal living and nomadic lifestyle. Such capsules are still prone to plug-in or congregate into structures, but often they commonly being put alone in contrast to the surrounding urban environment. In this case, a capsule symbolizes an ‘anti-value’ or

‘other architecture’ nested or attached to a main conventional building or structure[38]. Yet it symbolizes a concept of sustainable architecture with replaceable parts of the building towards the environment in general by transforming buildings lifespan into a way of change over time. The fitting example is ‘Living roof’ capsule by Nau (Fig.6) who suggested placing the independent capsules onto rooftops of buildings serving as the material to clip on or attach to. The capsule itself is self-sustaining, and stereotypically has solar panels to produce more electricity than it consumes. In comparison to original capsules from the post-CIAM swinging 1960s[39] with playful capsules of Archigram or Metabolist capsules from Japan, the modern capsules lost megastructures to which they belonged and, thus, gained more independence and enhanced the meaning of urban nomadism or leisure lifestyle contrasted to common social patterns.

Fig. 6. Living roof capsule, Nau Architects, 2011

The modern generation of capsules does share some common features and principles as the same architectural objects from modernism. Considering the new wave of technological development observed in construction, the prefabrication of living units and their management is possible to implement on demand. This demand follows the increased people’s mobility and continuous urbanization, seek for achieving sustainability and better control of personal space and surrounding environment, as well as, a hideout from information overflow. The particular quality of a capsule being a movable and temporary shelter allows its usage in emergency cases as a prompt method to provide living space for those in need. As an evaluation tool a capsule architecture brings in the topic of reevaluation of home and the predictability of conventional architecture together with its critical role in relation to society[40].

1.2 Aim of research

The real image of capsule architecture appeared during EXPO 70 in Osaka what featured the image of Metabolist city with several built capsular examples as Takara Beautilion and separate capsule homes attached to a Big Roof (megastructure) designed by Kenzo Tange[41]. Even before that during EXPO 67 in Montreal still existing Habitat'67 by Moshe Safdie presented a megastructure of independent housing units combined[42]. Yet the EXPO 70 and following built examples by Kurokawa provided the practical and technological solutions to preceding years of architectural theory on capsular structures, especially how capsules would clip in and out and circulate inside such urban realm. What yet is still troubling in the aspect of implementation of capsule architecture is the methods of operation and preservation such as proper building maintenance, flexibility and changeability. This aspect together with the examination of capsule's concept and its typology is important in the discourse of resilience and flexibility of architectural objects. Moreover there is long-lasting trend of capsular structures covering both modernism and postmodernism where capsules are present, thusly, the comprehensive picture on such developments is needed. Moreover, there is a long-lasting trend of capsular structures covering both modernism and postmodernism where capsules are present, thusly, a comprehensive picture of such developments is needed. The examples of implemented capsular structures above show the importance of practical information about how to build and later utilize the capacities of capsule architecture in terms of mobility, technical aspects of manipulation with capsules and their transportation, as well as the closed nature of the capsular environment for creating isolated spaces in real architectural practice. The research sets a goal to study the concept of capsule architecture and define its main applications.

Section 2 Methodology of research

2.1 Explanation of methodology

The methodology applied in the research can be summarized in a single framework: 1. By studying literature sources the study extract the definition of a capsule, and defines scope of the research and timeframe applicable to study the typology. 2. Next, during the defined timeframe the study collects examples of capsule architecture and examines them from three following aspects: applicability (why architects use capsules), changeability (why and how capsule architecture can practically change), and social aspect (how practically utilize capsules for actual living). As it is understood from the background and aim of research, it concerns the possibilities to design, build and use capsule architecture from the viewpoint of the application, change over time, and social aspect. The practical approach becoming topical for this research studies both capacities and limits in a transition from design to an actual build example of capsule architecture, therefore, both built and unbuilt examples are included.

The type of analysis applied in the research ranges from 1) directly collecting the required information either from literature and texts by architects or studying graphic materials (drawings, etc.). Also, the data requiring grouping is organized by using KJ method. In Chapter 4, the questionnaire among residents is organized due to difficulty to analyze the aspect of living in a capsule without correspondence with actual residents themselves. Although, the communication with the respondents had its limits, the acquired information become crucial and considered the optimal way for data gathering in the corresponding chapter.

In Chapter 2 the analysis applied in this research consists of collecting the required data, its classification, and division into study groups. The 265 selected study cases are examples of capsule architecture over a span of the 20th and 21st centuries (in years: from 1930 bringing in Dymaxion house (later, Wichita House) by Buckminster Fuller as a first development of movable and detachable architecture coming close to a capsule's definition) and finishing by 2019. Cases' selection is also not restricted geographically. This is done in order to, on the one hand, compare different architectural studies on capsule architecture and, on the other hand, to create a comprehensive picture of a capsule and capsule architecture. Also, the study is followed by comparison between two designated time periods of 1930s-1970s and 1980s-2010s, together with the extraction of particular notions regarding the motivation of architects to choose capsules in their projects.

In Chapter 3 the chosen cases are studied from another viewpoint including notions of mobility and changeability of capsule architecture. All cases are searched through the mentions of change over time. Additionally, in built cases which are undergone renovations instead of implementing the original concept of change, the renovation approaches are studied and grouped.

In Chapter 4 primary the residential capsules or spaces of short residency (such as capsules in capsule hotels) are studied and include 186 cases in the section related to living in a capsular space. The study defines 15 characteristics required for a comfortable residency by studying the corresponding literature and projects them to selected capsule architecture. Next, the questionnaire is organized among residents of selected 15 cases of capsule architecture. The means of contacting are email and social networks (Instagram, Facebook, LinkedIn, Line). The research is organized in a form of a questionnaire as a Google Form with 15 compulsory and 4 arbitrary questions and divided into 3 parts - Resident, Use of a Capsule, and Circumstances of Moving in. The questionnaire is available in English and Japanese. Lastly, the research proceeds on highlighting the features of communities in capsule architecture by picking 9 cases of active communities and organizing case studies' reports regarding community and sense of space.

All the data is sorted and organized correspondingly to each study included in this research, that is, year of design (or construction) of the investigated cases, their affiliation to either built or unbuilt category, the fact either a studied case is renovated, demolished or remains within its initial condition, as well as, characteristics of capsules used in a given structure and type of relationship between capsules and this structure. In Section 4 in study on communities additional parameters regarding building's management, activity of residents and outreach are included.

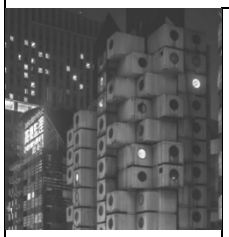
2.2 Explanation of gathered data

Data for the research is not restricted by a region or timeframe and represents an expanded set of cases of capsule architecture and related cases falling under the designation of a capsule. This definition is explained in Chapter 2 which is devoted to the historical development, concept and physical characteristics of capsule architecture. The gathered cases also include unbuilt projects falling under the separate section. That is done due to a significant number of unbuilt projects, which, however, bear notable ideas which should be

also added for a better understanding of a capsule's concept. Moreover, noted independently, the cases of capsule hotels and container architecture are also included as capsules inside interiors and stackable capsules done from shipping containers correspondingly. The cases are particularly selected as long as they satisfy the root meaning of a capsule described in Section 2 of this thesis.

Aiming to create a comprehensive picture of the development of capsule architecture over time, this research includes 265 cases in total with 115 unbuilt and 150 built examples. The sources for data gathering vary from books and periodicals to exhibition reviews and internet journals as long as they contain explanation of basic properties of a given example like measurements of capsules, their characteristics, relation to a core structure, basic concept applied to the building's shape, way of renovation and community if such information is available (i.e. building is built and undergone a renovation and is currently operational). Case study example summarized in a table is provided below (Fig. 7):

Chapter 2. Concept and Physical Characteristics of Capsule Architecture



No.	87
Name	Nakagin Capsule Tower
Year	1972
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept / Built / Being renovated
Way of arrangement	③
No. of capsules	140
Shape	Rectangular
Function	Multipurpose
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Growing –** Kurokawa developed the technology to install the capsule units into a concrete core with only 4 high-tension bolts, as well as making the units detachable and replaceable. kisho.co.jp **Mobile –** Capsules were manufactured offsite and delivered by a truck being 90% complete Hidaka J. Nakagin Capsule Tower Building," UIA. 2011 **Mental -** <...> Its design embodies the Metabolists' urban and social ideals: a city of mobility and flexibility, and a system adapted to the needs of a fast-paced, constantly changing society. The building celebrates the idea of interchangeability and flexibility through the capsule<...>. iconichouses.org, fastcompany

Chapter 3. Concept of changeability of Capsule Architecture and Actual renovation

○Concept of change:

"Kurokawa developed the technology to install the capsule units into a concrete core with only 4 high-tension bolts, as well as making the units detachable and replaceable.［**A. Capsules' replacement/removal**］

<…> connecting units can also accommodate a family."［**D. Capsules' joint/fusion**］

- Kisho Kurokawa architect & associates

<…> therefore, capsule can be detached from it and circulate outside in metabolism way and, eventually, creating the new city."［**B.**

●Renovation:

nakagincapsuletower.com［**(i). Preservation**］

Cases of renovated capsules. Shigetoshi I. et al., Nakagin Capsule Tower Building,［**(vi)(F.2). Interior renovations**］［**(vii)(F.1). Adapt function**］

Capsules’ addition/expansion］［**E. Capsules’ mobility/movability**］［**G. Recyclability/Reuse**］

- Hidaka J.: Nakagin Capsule Tower

Chapter 4. Social Aspect of Capsule Architecture, its Residents and Communities

Type of capsule: Leisure (Mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

COMMUNITY:

Inside activity: Local chat, parties, meetings;

Building’s management: Renovation works, sell-buy of capsules, resident’s building management association with right to vote, engagements with business sector and authorities

Outreach: Media engagement, tours, exhibitions; SNS, public page, personal blogs, books’ print, merchandise, crowdfunding, social projects, petitions

Fig. 7. Case study analysis

Section 3 Connections to previous studies

The typology of a capsule and capsular structures is poorly investigated and occupies several other typologies and architectural practices as mobile homes, prefabricated houses, transportable environments, megastructures and urbanistic studies. As for a major separate study on capsule as a typology, this research refers to the book by Peter Senk called "Capsules. Typology of other architecture" summarizing various architectural activities regarding capsules' typology in the past and those conducted nowadays. In his book Senk notes the changes in the regard of treating a capsule as a slave of megastructures first and as a tool of independence and emergency shelter in the present. He claims capsule typology as architecture of resistance against conformity between institutions and living environments, as well as freedom from the fear of imagining alternative possibilities in architecture for better future[43)]. In the book, the author does not put an aim to provide a full view onto the majority of existing cases of capsule architecture but clarifies that most of them are prototypes to redefine home and to put new principles of functionalism into practice. This doctoral thesis, on the other hand, aims to expand the concept of a capsule on a timescale, concentrating on abilities of capsules as a group made form spatial and temporal connections in order to survive as an architectural organism, without omitting properties of a capsule as an independent object.

"Capsular civilization" by Lieven De Cauter emphases on the term of 'capsularity' presenting in modern society by introducing a multidisciplinary discourse on economic, political, technocratic and socio-cultural aspects. He provides various allegories of capsular spaces in terms of division, mobility and control in which so-called capsular civilization exists. Such spaces represent circular and closed environments as theme-parks, airports, military objects, space capsules (so-called real capsules), as well as virtual capsules as Walkmans, mobile phones, computer screens, etc. Such comparison and classification highlights a strong social aspect of capsular spaces which can be scaled to the level of the whole city (or generic city as the author puts it referring to Koolhaas)[44)]. De Cauter also describes so-called Heterotopias as opposite to Utopias, and which would have a regime different to what is presented outside, and what is another probe to define a capsular space and envision the society which might exist inside. In general, the book makes the notion of a capsule more familiar by extending the definition of a capsule in architecture to urban study and sociology. Author presenting the modern generic city and its society as a network of space made of connections (communication means) and capsules (homes, public squares, vehicles, etc.).

"Metabolism in Architecture" by Kisho Kurokawa is a source providing information on a concept of a capsule, especially, a 'capsule declaration' section firstly published in SD'69-3 journal which also include a detailed classification of capsules in several lines from A to E starting from mostly architectural capsules as (A1) – space capsule or (A3) living capsule, and expanding it to other forms of extensions and encapsulated spaces as (D5) music capsule (jukebox or may be iPod nowadays) or (E6) education capsule (cybernetic helmet or what could be named VR headset nowadays). Also the role of a capsule and its concept in view of Kurokawa is explained by eight articles with references to mentality, lifestyle, and relationship between a man and a capsule[45)]. The book is another study on capsules and Metabolism with the regard of the notion of change in Metabolist architecture, and the independent practice of Kurokawa. The book also touches the topic of the relationship between Japanese society, its culture and religion in regard to the Japanese modernist movement in the 20th century.

"Project Japan, Metabolism Talks" by Rem Koolhaas and Hans Ulrich Obrist is a comprehensive overview on Metabolism movement with a wide background and separation to each actors belonging to the group. It follows the background before the World War II in Japan with representatives Kenzo Tange and Kunio Maekawa, and later the drastic changes of post-war Japan and seeking for means to rebuilt the country and society by means of architecture and the concept of Metabolic cycles of change with references to tradition and religion. The book is also provides comparisons, links and roots to Japanese Metabolism and western modernist practices at the time[46)].

"Megastructure: Urban Futures of the Recent Past" by Reyner Banham depicts the movement of megastructuralists and their architectural discourse. Among presenting the typical examples of megastructures of post-CIAM time like Archigram or Paolo Soleri the book covers the background of these typologies, its academic aspect, geography and analyses the built examples. Although megastructures do not always assume installation of capsules they do provide the strict and diverse functional relationship of frame or infrastructure and utilitarian units. Thusly, the book is a source various unrealized and built cases of capsule architecture from the viewpoint of typological image of megastructures[47)].

Study of Reina Kagohara entitled "A Temporary House That Will Disappear in the Future: The Value of Living in Nakagin Capsule Tower" follows the changes in lifestyle and social values of residents of Nakagin Capsule Tower before and after moving into the building. The study extracts paradoxical nature of values originating from the capsular

environment as “small but large” or “inconvenient but convenient” what reflects simultaneous smallness and coziness, or ordinary and special lifestyle which living in capsules provides. The study consists of surveying several residents of the building and is a good source on social aspect of capsular dwellings[48)].

“Adaptable Architecture, Theory and Practice” by Robert Schmidt and Simon Austin” is a comprehensive study on adaptability in architecture what is connected to the section on changeability and renovation of this research (Section 3). The book provides a set of parameters influencing building’s design or operation as well as design strategies to create adaptable buildings. The study shows different scales and types of possible interventions through time and broadly discusses the nature of change over time in architecture[49)].

“Prefab Architecture, A Guide to Modular Design and Construction” by Ryan E. Smith concentrates on examples of mass housing production and difficulties of sustainability existing in previous business models by a historical overview. The study correlates with many cases of capsule homes, which meant to be produced in masses to either supply bearing structures of capsular buildings or used separately. The book explains the required tuning of industrial, economic, regulatory and construction fields on order to be able to satisfy the demand of mass house prefabrication[50)]. Another closely related study “Prefab Housing and the Future of Building: Product to Process” by Mathew Aitchison also specifies the importance of a resilient industrial approach in producing modular homes rather than a product itself by providing both failed and successful examples of companies producing prefabricated houses over a large span of time[51)].

“Portable Architecture, Design and Technology” by Robert Kronenburg is a narrow study on closed capsular spaces and environments with the insight to typology, materials and technology used[52)].

Section 4 Structure of research

The research consists of 6 chapters. Chapter 1. Introduction defines the scope and framework of the whole study. The chapter defines the approach to exploring the concept of capsule architecture from a practical viewpoint. From the studied literature sources the concept of the typology can be divided into three viewpoints: applicability and its reflection on spatial and physical characteristics, changeability which allows to either prolong the lifespan of capsule architecture or lead to periodical technical transformation, and lastly, social aspect highlighting the role of a capsule in a relation to society. By analyzing the concept of capsule architecture from these 3 points of view, it becomes possible to provide a clear definition of capsule architecture and test its real capacities in a practical realm.

Chapter 2 thoroughly explains the concept of a capsule, as well as its expanded meaning outside the field of architecture. Such definition and classification of capsule's basic forms are based on the reviewed literature and own interpretation by the architects using capsules what, in overall, is supported by the collected set of examples to solidify, yet, an uncertain figure of capsule architecture within other existing architectural typologies. This section also puts the selected examples onto the timeline in order to observe the distribution of time of building or design. This distribution then is connected to the historical study in order to trace the development of capsule architecture over the given timeline.

Next, the chapter concentrates on the study of characteristics of capsules regarding their dominant shapes, basic functions, materials, and size, as well as, the properties of the structures they create, that is the relationship between capsules and the bearing structure together with a number of capsules arranged within a single building. This facilitates the deeper understanding of common applications of capsules and their primary physical parameters.

Lastly, the chapter compares two selected time periods of 1930-1970s and 1980s-2010s because of an actual gap occurring in emerging of new cases of capsule architecture due to paradigm change from modernism to postmodernism. The study in this chapter aims to trace differences between early developments of capsules, capsules of fully developed mature modernism narrative from the 1960s and the modern examples in order to understand the major trends of change in the conceptual and technical part capsule architecture over time.

Chapter 3 studies both the unbuilt and built examples of capsule architecture. The built examples then are subdivided into categories by means of change as proposed by an architect. In the built cases it is observed whether the building was demolished, and whether the initial means of changeability were realized on practice in existing cases (technical change according to the initial concept). Also, it is observed whether the built case was undergone renovation different from the original concept. If the concept clarifies the change of the building or its renewal over time due to manipulation with the capsules, the case is labeled as having a definite concept of change. If the same case is renovated, the renovation method is compared to the original concept in order to extract differences between them. Next, the similar concepts of change are grouped into several categories and the same is done with renovation techniques in order to trace the pattern of transition from different concepts to different actual renovations.

Chapter 4 studies social aspect of a capsule starting from literature review and extracting common notions for who a capsule is provided for and what social value it contains. From various notions the main types of capsules are extracted as follows: leisure, nomadic and urban capsules. Next, the study proceeds with the analysis of a capsule as means for living and habitation and studies both built and unbuilt residential capsules, SOHO, or capsules of a temporary staying (as capsules in capsule hotels or resorts) from a set of parameters in order to clarify features and standards of living in a capsular space. In the next section the questionnaire among residents of capsule architecture worldwide is conducted. From 15 study cases 47 responses were obtained (majority of respondents are from Nakagin Capsule Tower) and included a lot of commentary regarding the residents' lifestyle and their attitude towards their experiences. Lastly, in the selected nine cases of capsule architecture the research on existing communities in the buildings.

Chapter 5 "Theory and Practice of Capsule Architecture" summarizes the concept from the studied three aspects. The chapter observes application of capsule architecture and argues if a definition of a capsule and capsule architecture can be expanded considering its practical aspect.

Chapter 6 - Conclusion - summaries the chapters above and unify the collected results. The chapter again brings together the notion of change inherent for capsule architecture and compares it to the meaning of renovation in modern cities as one of the practical tools in order to tune urban environment for the sake of future sustainable cities together with the importance of social aspect in design of capsular buildings. Nakagin

Capsule tower standing as a good example of such transition shows a gap between the original concept of change described by Kisho Kurokawa and the real renovation method currently applied. As an endnote, the collected international experience in a shape of case studies provides several possible ways applicable to Nakagin Capsule Tower to preserve it. The chapter also includes the project of actual renovation of one of the capsules inside the building under the framework provided by one of the actual renovation methods currently existing in this building.

The composition of the research is shown below (Fig. 8).

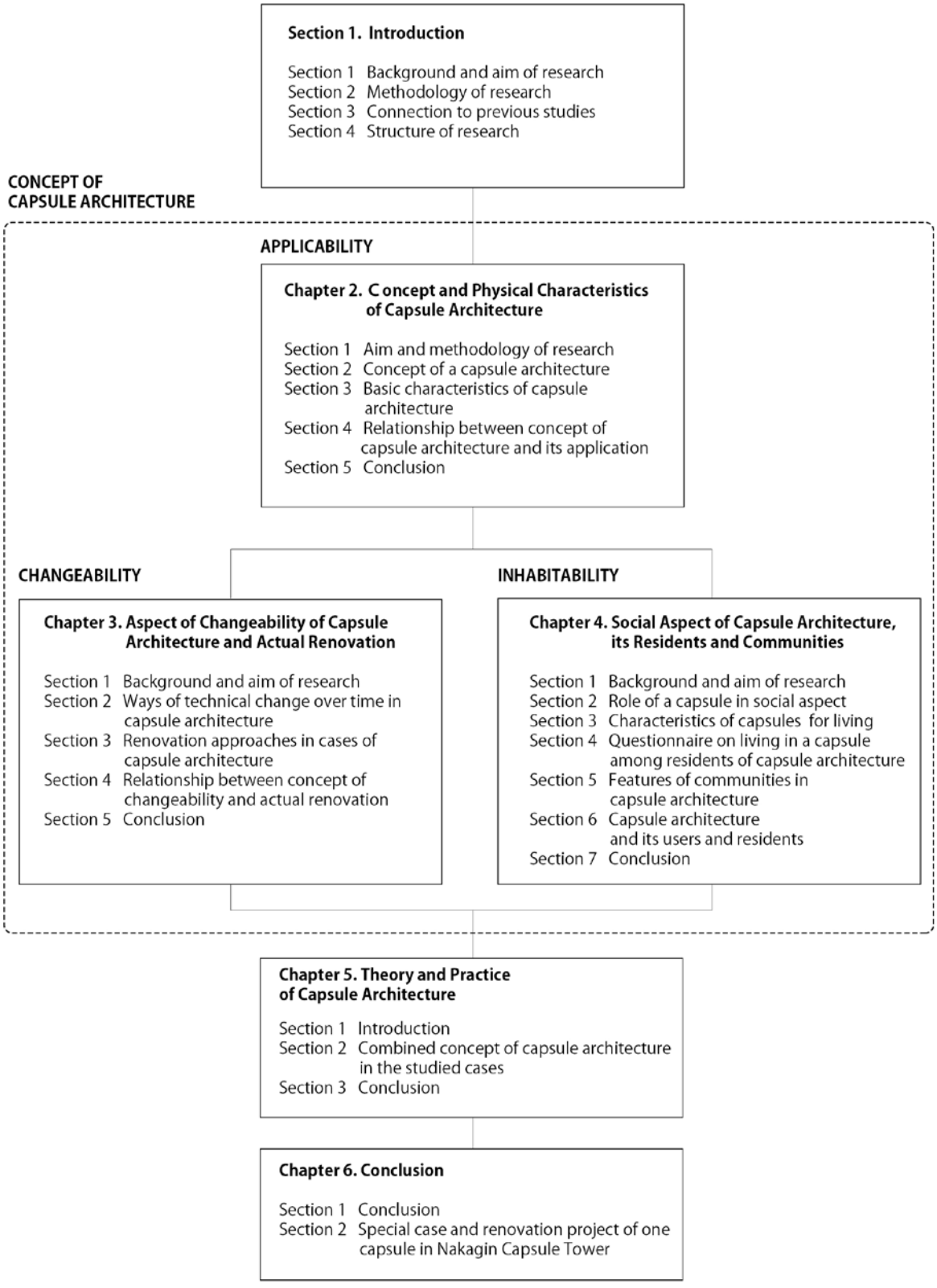


Fig 8. Structure of research

List of study cases

No.	Year	Name	Architect/bureau
1	1930, 1945	Dymaxion House	Buckminster Fuller
2	1940	Mechanical Wing	Buckminster Fuller
3	1945-1980	Structural Blocks Housing	USSR Block Construction Research Institutes
4	1945	Rotel	Rotel
5	1956	House of the Future	Alison Smithon
6	1956	Mobile Hotel Cabin	Ionel Schein
7	1956	Plastic House	Ionel Schein
8	1960	Futuro House	Matti Suuronen
9	1960	Spatial City	Yona Friedman
10	1960	Stackable Multipurpose Cells	Jean Louis Rey (Chaneac)
11	1960	Residential Area	Pascal Hausermann
12	1960	Hanging Hotel	Takiz Zenetos
13	1960	Cable City	Takiz Zenetos
14	1961	Ball House	Johann Wilhelm Ludowici
15	1961	Helix city	Kisho Kurokawa
16	1961	Urban Area Reconstruction Plan	Yukio Otani
17	1962	Plastic Sky Lodge	Kenji Ekuan
18	1962	Clusters in the Air	Arata Isozaki
19	1962	Ikebukuro Plan	Kiyonori Kikutake
20	1962	Prefabricated Box-type Apartments	Kisho Kurokawa
21	1962	Tree Housing Tower	Arthur Quarmby
22	1962	Emergency Mass Housing Units	Arthur Quarmby
23	1963	Prefabricated Plastic Cells	Paul Maymont
24	1963	Marine City	Kiyonori Kikutake
25	1964	Pumpkin House	Kenji Ekuan
26	1964	Dwelling City	Kenji Ekuan
27	1964	Village Housing	Kenji Ekuan
28	1964	Tortoise House	Kenji Ekuan
29	1964	Potteries Thinkbelt	Archigram
30	1964	Office Towers in Plug-in City	Archigram
31	1964	Plug-in City	Archigram
32	1964	Capsule Homes	Archigram
33	1964	Multi-purpose Cell Prototype	Jean Louis Rey (Chaneac)
34	1965	Gasket House	Archigram
35	1965	Plug-in University Node	Archigram
36	1965	Fly’s Eye	Buckminster Fuller
37	1965	The Environment Bubble	Francois Dallegret
38	1966	Blow-out Village	Archigram
39	1966	Living Pod	Archigram
40	1966	Paddington East	Archigram
41	1966	Hornsey Housing Study	Archigram
42	1966	Cylindrical Building	Guy Dessauges
43	1966	Novery Space Houses	Pascal Hausermann

No.	Year	Name	Architect/bureau
44	1967	Hotel in Menorca	Pascal Hausermann
45	1967	Cylindrical Houses	Guy Dessauges
46	1967	Bubble House	Jean Maneval
47	1967	Pneumacosm	Haus-Rucker-Co
48	1967	House of Stacked Units	Wolfgang Doring
49	1967	Shizuoka Press and Broadcasting Center	Kenzo Tange
50	1967	Japan Architect: 1967 Housing Design Competition 1st Place	Kunihiko Harakawa et al
51	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention	Takamizawa Shingo et al
52	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention 2	Sadao Tanaka
53	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention 3	Hiroshi Inagaki et al
54	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention 4	Nobuyoshi Fujimoto et al
55	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention 5	Kuniaki Suda et al
56	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention 6	Robert Esnard, Robert Markisz
57	1967	Japan Architect: 1967 Housing Design Competition Honorable Mention 7	Kazuo Tamama et al
58	1968	Cellules Prasites	Jean Louis Rey (Chaneac)
59	1968	Hexacube	Georges Candilis, Anja Blamsfeld
60	1968-1971	Plastic Modular Home	Wigth Plastics Limited
61	1968	Residence of M. Ginet	Pascal Hausermann
62	1968	Drive-in House	Michael Webb
63	1968	Habitat Puerto Rico	Moshe Safdie
64	1969	Plastic Cells	Pascal Hausermann
65	1969	Mobile Theatre	Pascal Hausermann
66	1969	Inflatable Mobile Unit	Hans Hollein
67	1969	Yadokari Hermit Crab Capsule Lodge	Kenji Ekuan
68	1969	K67	Sasa J. Machtig
69	1969	Capsule Houses	Wolfgang Doring
70	1970	Modular and Floating Leisure Habitat	Jacques Beufe
71	1970	The Pirate Bubble	Jean Louis Rey (Chaneac)
72	1969	Experiment 70	Luigi Colani
73	1970	Total Housing Unit	Luigi Colani
74	1970	Expo Tower	Kiyonori Kikutake
75	1970	Takara Beautilion	Kisho Kurokawa
76	1970	Capsule for Living	Kisho Kurokawa
77	1970	Steinhaym	New Metal Production Japan
78	1970	Tektite II Habitat	Alaska Fisheries Science Center
79	1971	Venturo House	Matti Suuronen
80	1970-1971	Do-Bausystem-Plastic House	Jean-Claude Ventalon, Ana Sklenar
81	1971	Domobiles	Pascal Hausermann
82	1972	AZM Offices	Laurens Bisscheroux
83	1972	Oase N7	Haus-Rucker-Co
84	1972	Tetrodon	AUA
85	1972	Microhouse	Ken Isaak
86	1972	Tower of Youth	Suga Yoshitomi

No.	Year	Name	Architect/bureau
87	1972	Nakagin Capsule Tower	Kisho Kurokawa
88	1972	Capsule Village	Kisho Kurokawa
89	1973	Capsule House-K	Kisho Kurokawa
90	1973	Interpod Tower I	William Morgan
91	1973	Residence Gamma	Jacques Mermet, Agence Parisot
92	1974	SIHR – Option 75. 144 sq.m prototype	Claude Prouve
93	1974	SIHR – Option 75. 144 sq.m prototype	Claude Prouve
94	1974	Metastadt Building System	Richard J. Dietrich
95	1974	Koito Building	Kisho Kurokawa
96	1975	Um Al Khanazeer Island and Tourist Development	Kisho Kurokawa
97	1976	Sony Tower	Kisho Kurokawa
98	1976	Conservatorie De Montreuil	Claude le Goas
99	1979	Capsule Inn Osaka	Kisho Kurokawa
100	1980	Capsule Inn in Sapporo	Ask Gate Group
101	1984	Globe House	Experimental Housing Development Program
102	1989	7^{th} km	7^{th} km Ltd
103	1991	The Egg of The Winds	Toyo Ito
104	1992	Industrialized Housing	Richard Rogers, Laurie Abbott
105	1995	Residential Buildings in Project Venus	Jacque Fresco
106	2000	Mixer	Lot-Ek
107	2000	Morton Loft	Lot-Ek
108	2001	Tree Village	Micro Compact Home Ltd
109	2001	Torino Porta SusaStation	Lot-Ek
110	2001-2002	Container City	Urban Space Management Ltd
111	2001	Cave	Toru Murakami Architectural Design Office
112	2001-2002	Research to Challenge Space Architecture	Shuichi Matsumura, University of Tokyo + KeishiUniversity Ikeda Satoshi Laboratory
113	2003	House in Azeitao	Aires Mateus
114	2003	DST Pod	Cannata & Fernandes
115	2003	Mobile Dwelling Unit	Lot-Ek
116	2004	Loft Cube	Werner Aisslinger
117	2004	Rotor House	Luigi Colani
118	2005	Rucksack-House	Stefan Eberstadt
119	2005	Riverside Building	Container City tm
120	2005	3:1 Expandable 20-foot ISO Shelter	AAR
121	2005-2013	Halley VI British Antarctic Research Station	Hugh Broughton Architects
122	2005	Symbolic Living Machine	Gentaro Shimada, Philipp Kuhne
123	2006	Huik Own Home and Office	Sculp Architecten
124	2006	Freitag Individual Recycled Freeway Shop	Yves Netzhammer
125	2006	Papertainer Museum	Shigeru Ban Architects
126	2007	Nomadic Museum Tokyo	Shigeru Ban Architects
127	2007	DH1 Disaster House	Gregg Fleishman
128	2007	Barier	G-Wood
129	2007	Yotel Air London Gatwick Hotel	Yo! Company
130	2007	Lafayette Tower	Lot-Ek

No.	Year	Name	Architect/bureau
131	2002-2007(2009)	Hotel Everland	Sabina Lang and Daniel Baumann
132	2007	Single Hauz	Front Architects
133	2008	Puma City	Lot-Ek
134	2008	Sky-Village	Adept
135	2009	Bayside Marina Hotel	Yasutaka Yoshimura Architects
136	2009	Platoon Kunsthalle	Graft Architects
137	2009	Contained Calls	Aedas
138	2009	Pocket of Active Resistance	Stephane Malka
139	2009	9h Kyoto	Design Studio S
140	2009	Sleepbox	Arch Group
141	2009	Paco	Schemata Architects
142	2009	The Box Office	Joe Haskett
143	2009	Treehouse	Terri Chiao
144	2009	Diogene	Renzo Piano
145	2009	Urban Transducer Skyscraper	Daniel Nelson
146	2009	Subway Cell	Aaron Berman
147	2010	Lookhotels	Lookhotels Ltd
148	2010	Pier 57 – Superpier Market	Lot-Ek
149	2010	Tubohotel	T3ARC
150	2010	Plug-in Housing Development	Tay Yee Wei
151	2010	Capsule Hotel in Netherlands	Denis Oudendijk
152	2010	Cite a Docks	Cattani Architects
153	2010	Sergo Marketing Suite	Container City tm
154	2010	Container Cities for Haiti Housing Relief	Richard Moreta
155	2010	Immersive Cocoon	Nau Architects
156	2010	Inbox Capsule Hotel	Inbox Capsule Hotel Ltd
157	2010	Bubble Suite de Sonolge	Gites Insolites de Solonge Camp
158	2010	Skylodge Adventure Suites	Naturavive
159	2011	42/5	Lot-Ek
160	2003	Spacebox Studios	TU Delft
161	2011	Genussregal Exhibition	BWM Architekten & partner
162	2011	Living Roof Capsule	Nau Architects
163	2011	Nomad Skyscraper	Luca D'Amico, Luca Tesio
164	2011	Blox Home	M3House + UAO Creations
165	2011	Suguroku Office	Daiken Met
166	2012	Portishead Quays	Container City tm
167	2012	BBC Broadcasting Studios	Container City tm
168	2012	Boxpark Shoreditch	BDP
169	2012	After Light	Interrupt
170	2006	Das Park Hotel	Das Park Hotel Ltd
171	2012	Free Spirit Spheres	Free Spirit Spheres Ltd
172	2012	World of Chorophyll	IAMZ Design Studio
173	2012	Eco-Pod	Squared Design Lab
174	2012	Mangal City	Chimera
175	2012	Xi'an Youth Capsule Hotel	Unknown
176	2012	City Hub Amsterdam	City Hub
177	2012	New Bivouac Gervasutti	Leapfactory
178	2012	Uplift Concept	Basecampzero

No.	Year	Name	Architect/bureau
179	2012	Egg Microhouse	Hiteca
180	2012	Vertical Community	Baichuan Song
181	2012	Suburbia Tower	Aaron Berman
182	2012	Mobile Suburbia	Aaron Berman
183	2012	Interchangeable Habitation	Jonas Erssoni
184	2013	Moving City	Manuel Dominguez
185	2013	Toretore Village	Toretore Village Ltd
186	2013	T2	SUS Corporation
187	2013	Office Complex Bogota	Unknown
188	2013	Aether Apparel - PROXY	Envelope A+D
189	2013	Swiss Tubes	TCS Camping Company
190	2013	A-Kamp47	Stephane Malka
191	2013	Pengheng Space Capsules Hotel	Pengheng Space Capsules Hotel
192	2013	Micro House in Tsinghua	Studio Liu Lubin
193	2013	Pop-up Neighborhood	James Alfandre
194	2013	Archipod	Archipod Ltd
195	2012	Eagle Concept	Agueda Concept
196	2014	The Hut Factory	Haseef Rafiei
197	2014	EBA51	Holzer Kobler Ltd
198	2014	Modular Home Prototype	Garrison Architects
199	2014	Mill Junction	CITIQ
200	2014	Rotating Plug-in Capsules	Bojing Qu
201	2014	Attrap'Reves Bubble Hotel	Attrap'Reves Ltd
202	2014	Songpa Microhousing	SSD Architecture
203	2014	Hive-inn	OVA Studio
204	2014	Pont9 New Bridge	Stephane Malka
205	2014	Unit Fusion	Y Design Office
206	2014	Casa Futebol	Alex de Stampa, Sylvain Macaux
207	2014	Wow Pod	IDEO Design Consultancy
208	2014	B-And-Bee	B-And-Bee Project
209	2015	Containerville	Scott Kyson
210	2015	Container Skyscraper	SRG Architects
211	2015	Clipper House	Container City tm
212	2015	Sleeping Pod	Yazdani Studio
213	2016	Common Ground	Urbantainer
214	2011	Living Roof Capsule	Nau Architects
215	2015	Shiftpod	Christian Weber
216	2015	Eco-Capsule	Eco-Capsule Ltd
217	2015	VACT Sleeppod	VACT
218	2015	Container Skyscraper	Ganti+Associates
219	2015	Prouve House	Richard Rogers & Partners
220	2015	Lifepod	Michael R Weekes
221	2015	Creative Space	Skog&Stuveback
222	2015	Living Roof Capsule 2	Nau Architects
223	2015	Exo	Michael McDaniel
224	2015	Sleeperoo	Langefreunde Design Studio
225	2016	BA Head Office City	Container City tm
226	2016	Kasita	Kasita
227	2016	QUO Container Center	BZZ Arquitectura

No.	Year	Name	Architect/bureau
228	2019	Tsukiji First Cabin	First Cabin Ltd
229	2016	Tree House	Richard Rogers
230	2016	Campera Bubble Suite	Capmera Hotel
231	2016	Fuselage	Tree Tents Company
232	2016	Xpod	Denoldervleugels
233	2016	3d Printed Office Unit	Winsun Global
234	2016	Container Market	Siyabonga Gondwe
235	2017	Shipping Container Home on Amazon	Mods International
236	2017	Quadrum-Gudauri	Quadrum Ski & Yoga Resort
237	2017	Drivelines Studios	Lot-Ek
238	2014	Coodo	Coodo Ltd
239	2017	Mobile Podcast Studio	Dn&Co and Fathom Architects
240	2017	3 Living Units	Ofis Architects
241	2017	Pod Vending Machine Skyscraper	Haseef Rafiel
242	2017	Shelter with Dignity	Framlab
243	2017	Ras Abu Aboud Stadium	Fenwick Iribarren Architects
244	2017	Heal-Berg	Luca Beltrame, Saba Nabavi Tafreshi
245	2017	The Capsule Hotel	The Capsule Hotel
246	2017	Container Hostel	Kinzo Architekten
247	2017	Snoozebox	Snoozebox Hotel
248	2017	Bed And Boarding	Carlotta Tartarone and Studiotre of Naples
249	2017	Inn The Park	Inn The Park Company
250	2017	Matices Hotel de Barricas	Matices Hotel de Barricas
251	2017	Common Space Which Blowing the Building Out	Chidai Keisuke
252	2017	Cozy Box	S&T Architects
253	2018	Kaohsiung Stereo Container Inn	ML Architect
254	2018	Starbucks in Taiwan	Kengo Kuma and Associates
255	2018	Albang Capsule	Yoon Space + Song Pyoung
256	2018	Silver Bullet	Airstream
257	2017	Sphere Hotel	Huisten Bos (HTB) Company
258	2018	Opod Tube Housing	James Law Cybertechture
259	2018	9h Akasaka	Design Studio S
260	2006	Keetwonen	Tempohousing Company
261	2018	Cocoon Modules	Nastazia Spyropolou
262	2018	Stackt Market	Stackt Market
263	2018	Home Coming Home	Shota Minakami, Daiki Kadota
264	2018	Rubner House	Paolo Scoglio, Cesare Griffa
265	2019	Capsule Hotel Lucerne	Hirschengraben Coworking + Innovarion

Notes:

1 Senk P. *Capsules. Typology of other architecture;* Routledge, 2017, 3

2 "The concept of the capsule, explicitly naming compact, minimal, completely furnished and equipped living units, has generally been presented in architectural history in relation to the trend of megastructures and utopian radical architectural experiments with uncritical faith in technological and scientific progress of the 1960s", Senk P. *The Concept of Capsule Architecture as Experiment. Origins and Manifestations with Selected Examples from Slovenia and Croatia;* Prostor 2[46] 21[2013], 352.

3 See a capsule's definition in the Section 2 (2.2 Concept of a capsule and its application)

4 "Nakagin building is not only an iconic work of Kurokawa and one of the masterpieces of postwar modern architecture in Japan, but more significantly, it represents a rare and arguably the finest built work resulting from the historic Metabolist movement", Lin Z. *Nakagin Capsule Tower and the Metabolist Movement. Revisited;* 98th ACSA Annual Meeting Proceedings, Rebuilding, 514.

5 "Japan Architect dedicated an entire issue in October 1972 to capsule architecture, featuring Kurokawa's building and optimistically reflecting the potential development of capsule architecture in the future. As the world's first capsule architecture put into actual use, Nakagin building in fact introduced a number of revolutionary ideas in practice."; Ibid. 518.

6 Frew S. *Obituary: Saying Goodbye to Kisho Kurokawa's Metabolist Icon* architizer.com/blog/inspiration/stories/rip-kisho-kurokawa-nakagin-capsule-tower

7 Hidaka J. *Nakagin Capsule Tower*; UIA 2011 Tokyo Design 2050, 12-16 (Japanese title:中銀カプセルタワービル」)

8 Lin Z. *Nakagin Capsule Tower and the Metabolist Movement. Revisited;* 98th ACSA Annual Meeting Proceedings, Rebuilding, 515, 518.

9 Sugai T., Yokote Yo. *Study on the Sustainability of Nakagin Capsule Tower Building in Kisho Kurokawa's Metabolism thought*, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, History and Theory of Architecture, pp. 757-758, 2014. 7

10 Hosoya H,, Schaefer M. *Tokyo Metabolism;* Taschen, Project On The City 2, 749

11 To mark the importance of the circle of life, every 20 years the Shikinen Sengu divine palace within the shrine precinct is demolished.

12 Ishida A. *Paradox of a Landmark that is not: the life of the Nakagin Capsule Tower;* EAAC 2015, 109.

13 Lin Z. *Nakagin Capsule Tower and the Metabolist Movement. Revisited;* 98th ACSA Annual Meeting Proceedings, Rebuilding, 515.

14 Based on the survey held in 2018 by Ministry of Land, Infrastructure, Transport, and Tourism of Japan. Approximately, 400,000 USD per square meter depending on the exact location.

15 *DIY social renovation in a tattered room.* Internet source: yadokari.net/special-feature/35189

16 Business capsule pamphlet with description about original usage of capsules and their specifications (Japanese name:中銀カプセルマンシオン《銀座》)

17 Kurokawa K. *Oh! The Code of the Cyborg;* SD–Space Design (03/1969), 50.

18 Lin Z. Metabolist Utopias and Their Global Influence: Three Paradigms of Urbanism. Journal of Urban History, Vol. 42(3), pp.605-609, 2016

19 Kyriacouhe E. *The Situationists - Drawing of the city as a series of situations*. Internet source: medium.com/@eleenakyriacou/the-situationists-drawing-of-the-city-as-a-series-of-situations-b2a8aef3faf3

20 Banham R. *Megastructure: Urban Futures of the Recent Past*; London Thames&Hudson, p.87, 1976

21 Koolhaas et al. *Project Japan, Metabolism Talks;* Taschen, 2011, 19

22 Lemes de Olivera F. *Of Metabolism: future cities for our contemporary world;* NSCO, 14; 77

23 Schalk M. *The Architecture of Metabolism. Inventing a Culture of Resilience*; Arts, 3; 279

24 Ibid. 293

25 Russell S. *Metabolism Revisited: Prefabrication and Modularity in 21st Century Urbanism;* Without a Hitch - New Directions in Prefabricated Architecture, 247

26 Lemes de Olivera F. *Of Metabolism: future cities for our contemporary world;* NSCO, 14; 77

27 *Architectural Theory: Congrès Internationaux d'Architecture Moderne*. RTF ARCHITECTURAL REVIEWS. Internet source: re-thinkingthefuture.com/rtf-architectural-reviews/a3207-architectural-theory-congres-internationaux-darchitecture-moderne

28 Pernice R. *Metabolism Reconsidered. Its Role In the Architectural Context of the World;* Journal of Asian Architecture and Building Engineering, November 2004, 357

29 Lemes de Olivera F. *Of Metabolism: future cities for our contemporary world;* NSCO, 14; 81

30 Aitchison M. *Prefab Housing and the Future of Building: Product to Process*. Lund Humphries, p.88, 2018

31 Ibid: pp.93-96, 120-123

32 Hidaka J. *Nakagin Capsule Tower;* UIA 2011 Tokyo Design 2050, 7

33 The first official record of a shipping container home was in November 1987, owned by a man named Phillip Clark. He had filed a patent for the "method for converting one or more steel shipping containers into a habitable building."

34 Kurokawa K. *Metabolism in Architecture*. Littlehampton Book Services Ltd. p.15 , 1977

35 Russell S. *Metabolism Revisited: Prefabrication and Modularity in 21st Century Urbanism;* Without a Hitch - New Directions in Prefabricated Architecture, 253

36 Arata Isozaki, the architect close to Metabolists, in 1963 proposes the redevelopment plan for Shibuya district, by building a megastructure starting from 31 meters of height limit at that time.

37 *Plastic and Prefab houses list*. Internet source: astudejaoublie.blogspot.com/search/label/Prefab%20houses

38 Senk P. *Capsules. Typology of other architecture;* Routledge, 2017, 182

39 Sadler S. *Archigram: Architecture without Architecture*. The MIT Press, p.8, 2005

40 Noboru Kawazoe, architectural critique, and a person related to Metabolists argues about nature of the cities and problems with megastructures in which capsules are opposed to conventional cities are anti-values should, hence, be transformed into values. Kawazoe N. *Capsule as an anti-value;* SD–Space Design (03/1969), 50.

41 Furuhata Yu. *Multimedia Environments and Security Operations: Expo '70 as a Laboratory of Governance*. Greyroom 54, p. 57-59, 2014

42 Banham R. *Megastructure: Urban Futures of the Recent Past*; London Thames&Hudson, p.113, 1976

43 Senk P. *Capsules. Typology of other architecture;* Routledge, p.182, 2017

44 De Cauter L., Patteeuw V. *The Capsular Civilization: On the City in the Age of Fear;* NAi Publishers. Part II The Capsular Civilization, The City in the Age of Transcendental Capitalism, 2005

45 Kurokawa K. Metabolism in Architecture, Littlehampton Book Services Ltd., 1977

46 Koolhaas et al. *Project Japan, Metabolism Talks*; Taschen, 2011

47 Banham R. *Megastructure: Urban Futures of the Recent Past*; London Thames&Hudson, 1976

48 Kagohara R. *A Temporary House That Will Disappear in the Future: The Value of Living in Nakagin Capsule Tower*. International Christian University, 2018

49 Schmidt R., Austin S. *Adaptable Architecture, Theory and Practice*, Routledge, 2016

50 Smith R. *Prefab Architecture, A Guide to Modular Design and Construction*. John Wiley & Sons, 2010

51 Aitchison M. *Prefab Housing and the Future of Building: Product to Process*. Lund Humphries, 2018

52 Kronenburg R. *Portable Architecture, Design and Technology*. Architectural Press, 2008

Chapter 2. Concept and Physical Characteristics of Capsule Architecture

Section 1 Aim and methodology of research

Section 2 Concept of a capsule architecture

- 2.1 Historical development of capsule architecture
- 2.2 Concept of a capsule and its application

Section 3 Basic characteristics of capsule architecture

- 3.1 Capsules and capsule clusters
- 3.2 Characteristics of capsules
  - 3.2.1 Shapes of capsules
  - 3.2.2 Functions of capsules
  - 3.2.3 Materials used in capsules
  - 3.2.4 Capsules' sizes
- 3.3 Characteristics of capsule structures
  - 3.3.1 Number of capsules inside a single structure
  - 3.3.2 General ways of capsules' arrangement

Section 4 Relationship between concept of capsule architecture and its application

Section 5 Conclusion

Section 1 Aim and methodology of research

Architectural movements from the 1960s as Metabolism or Archigram viewed a capsule as a powerful architectural tool to redefine home and to put new principles of functionalism into practice. Nowadays the designs utilizing capsules and modular elements appear frequently again in pursue of sustainability and green technology. Thus, the research, aims to create a comprehensive view onto the typology of capsule architecture and put its various examples on a timescale. By doing this, the research seeks to reinforce a connection between original capsules from 1960s and modern designs to trace the transition of their capacities. The research analyses both capsular buildings and single capsules and treats both as an independent object inside a bigger urban realm.

The analysis applied in this research consists of collecting the data and its classification. First, the selected examples are put onto the timeline in order to observe the distribution of the cases. This research also thoroughly explains application of the concept of a capsule and solidifies a vague figure of capsule architecture among other existing architectural typologies. This is done by grouping the common notions provided by architects in their interviews or texts of how they primarily use the capsules for. Similar ideas and approaches are grouped further in order to extract common trends. Again, the data is sorted and organized by the year of design (or construction), their affiliation to either built or unbuilt category, characteristics of capsules used in a given structure and type of relationship between capsules and a structure. This, in general, will facilitate the deeper understanding of common applications of capsules and their primary parameters. The whole data is summarized in Table 1.

Table 1. Concept of a capsule and physical characteristics

No	Year	Name	Architect/Bureau	Concept			Characteristics						Country
				Mental	Growing	Mobile	Shape	Function	Material	Size	Number	Method	
1	1930	Dymaxion house	Buckminster Fuller			●	⌂			10	3	①	US
2	1940	Mechanical wing	Buckminster Fuller			●	⌂			2	1+	①	US
3	1945	Structural blocks housing	USSR Research Inst.		●		□			5	>10000	②	USSR
4	1950	Rotel	Rotel Company	●		●	□			2	30	②	Germany
5	1955	House of the future	Alison Smithson	●			□			7	1+	①	UK
6	1956	Mobile hotel cabin	Ionel Schein		●	●	□			3	1+	①	France
7	1956	Plastic House	Ionel Schein		●		⌂			7	1+	①	France
8	1960	Futuro House	Matti Suuronen	●	●	●	⌂			7	100	①	Finland
9	1960	Ville Spatiale	Yona Friedman	●	●		□	◎	?	5	1+	④	Global
10	1960	Stackable Multipurpose Cells	Jean-Louis Rey	●	●		⌂	◎		3	1+	②	Global
11	1960	Residential area	Pascal Hausermann	●	●		⌂			5	21~50	④	Swi-land
12	1960	Hanging hotel	Takis Zenetos	●			□			5	380	③	Greece
13	1960	Cable city	Takis Zenetos	●	●		□	◎		3	1+	④	Greece
14	1961	Ball House	Johann W. Ludowici			●	◯			3	>10000	①	Germany
15	1961	Helix City	Kisho Kurokawa		●		⌂			7	1	④	Japan
16	1961	Urban Area Reconst. Plan	Yukio Otani		●		□	◎		4	1+	④	Japan
17	1962	Plastic Sky Lodge	Kenji Ekuan			●	⌂			5	1+	①	Japan
18	1962	Clusters in the air	Arata Isozaki		●	●	⌂			7	800	③	Japan
19	1962	Ikebukuro Plan	Kiyonori Kikutake		●	●	◇			10	1001+	③	Japan
20	1962	Prefab. box-type apartments	Kisho Kurokawa		●	●	□			5	1+	③	Japan
21	1962	Tree housing tower	Arthur Quarmby		●	●	⌂		?	7	51~100	③	UK
22	1962	Emerg. Mass Housing Units	Arthur Quarmby		●	●	⌂			3	1+	①	UK
23	1963	Prefabricated Plastic Cells	Paul Maymont		●	●	◇	◎		5	1+	②	France
24	1963	Marine City	Kiyonori Kikutake		●	●	◇			10	12500	③	Japan
25	1964	Pumpkin House	Kenji Ekuan	●	●		⌂			10	1+	①	Japan
26	1964	Dwelling city	Kenji Ekuan		●	●	⌂			7	>10000	③	Japan
27	1964	Village Housing	Kenji Ekuan		●	●	□			3	23	①	Japan
28	1964	Tortoise House	Kenji Ekuan		●	●	◇			3	1+	②	Japan
29	1964	Potteries Thinkbelt	Cedric Price		●	●	□		?	4	1+	③	UK
30	1964	Office Towers	Peter Cook		●	●	□		?	7	1+	③	UK
31	1964	Plug-in City	Archigram	●	●	●	□	◎		5	1+	③	UK
32	1964	Capsule Homes	Archigram	●	●	●	□			5	520	③	UK
33	1964	Multi-purpose cell prototype	Jean-Louis Chanéac			●	⌂	◎		3	1	①	France
34	1965	Gasket House	Archigram		●	●	⌂			5	1+	③	UK
35	1965	Plug-in University Node	Archigram		●	●	□			10	1+	③	UK
36	1965	Bucky Dome	Buckminster Fuller		●	●	⌂	⊕		20	1	③	US
37	1965	The Environment Bubble	Francois Dallegret	●			⌂	⊕		7	1	①	US
38	1966	Blow-out village	Archigram	●	●	●	□	⊕		4	201~500	③	Global
39	1966	Living pod	Archigram	●	●	●	⌂			7	1+	①	Global
40	1966	Paddington East	Archigram		●	●	⌂	◎	?	5	1+	③	UK
41	1966	Hornsey Housing Study	Archigram	●	●	●	□		?	5	1+	③	UK
42	1966	Cylindrical building	Guy Dessauges		●	●	◇			10	1+	③	Global
43	1966	Novery Space Houses	Pascal Hausermann	●	●	●	⌂			5	51~100	①	France
44	1967	Hotel in Menorca	Pascal Hausermann	●	●		◇			5	21~50	①	France
45	1967	Cylindrical houses	Guy Dessauges		●	●	◇			10	11~20	③	Swi-land
46	1967	Bubble House	Jean Maneval	●	●	●	⌂			5	11~20	①	France
47	1967	Pneumacosm	Haus-Rucker-Co	●	●	●	◯			10	1+	③	Austria
48	1967	House of stacked units	Wolfgang Döring		●	●	□			5	21~50	③	Global
49	1967	Shizuoka Press Broadc. Cntr.	Kenzo Tange		●	●	⌂			7	14	③	Japan
50	1967	JA: 1967 Comp.1st place	K. Harakawa et al		●	●	□	◎		4	1+	③	Japan
51	1967	JA: 1967 Honour. Mention	Takamizawa Sh. et al		●	●	□		?	5	>1000	③	Japan
52	1967	JA: 1967 Honour. Mention 2	Sadao Tanaka		●	●	□	◎		5	1+	③	Japan
53	1967	JA: 1967 Honour. Mention 3	Hiroshi Inagaki et al		●	●	⌂	◎	?	7	1+	③	Japan
54	1967	JA: 1967 Honour. Mention 4	N. Fujimoto et al		●	●	□	◎		7	>1000	③	Japan
55	1967	JA: 1967 Honour. Mention 5	Kuniaki Suda et al		●	●	⌂			5	>1000	③	Japan
56	1967	JA: 1967 Honour. Mention 6	R. Esnard et al		●	●	⌂			10	201~500	③	Japan
57	1967	JA: 1967 Honour. Mention 7	Kazuo Tamama et al	●	●	●	◇			4	1001+	④	Japan
58	1968	Parasitic cells	Jean-Louis Chanéac	●		●	◯			3	1+	③	Swi-land
59	1968	Hexacube	G. Candilis et al		●	●	◇			3	2	①	France
60	1968	Plastic Modular Home	Wight Plastics Lmtd.			●	◇			3	1+	①	UK
61	1968	Residence of M. Ginet	Pascal Hausermann	●			◯			4	21~50	②	France
62	1968	Drive-in House	Michael Webb	●	●	●	⌂			2	1+	③	UK
63	1968	Habitat Puerto Rico	Moshe Safdie	●	●		⌂			5	1+	②	Puerto-R.
64	1969	Plastic cells	Pascal Hausermann	●	●		⌂			5	3	①	Swi-land
65	1969	Mobile theatre	Pascal Hausermann	●		●	◯	⊕		3	11~20	①	Swi-land
66	1969	Inflatable mobile office	Hans Hollein	●		●	⌂			3	1	①	Austria
67	1969	Yadokari Capsule Lodge	Kenji Ekuan			●	⌂			4	1+	①	Japan
68	1969	K67	Sasa J. Machtig		●	●	⌂	◎		3	1+	①	Slovenia
69	1969	Capsule Houses	Wolfgang Döring		●	●	□			3	1+	②	Germany
70	1970	Modular leisure habitat	Jacques Beufe		●	●	⌂			7	2	①	France
71	1970	Pirate bubble	Jean-Louis Chanéac	●		●	◯			2	1	③	Swi-land
72	1970	Experiment 70	Luigi Colani	●		●	◯			2	1+	①	Germany
73	1970	Total Housing Unit	Luigi Colani		●	●	◯			5	2~10	③	Germany
74	1970	Expo Tower	Kiyonori Kikutake	●	●	●	◇	⊕		10	7	③	Japan
75	1970	Takara Beautilion	Kisho Kurokawa	●	●	●	□	⊕		3	20	④	Japan
76	1970	Capsule for living	Kisho Kurokawa	●		●	⌂			5	1	④	Japan
77	1970	Steinhaym	New Metal Prd.		●	●	□			5	1+	②	Japan
78	1970	Tektite II habitat	Alaska Fisheries	●	●	●	⌂			3	2	③	US
79	1971	Venturo	Matti Suuronen	●	●	●	□			7	19	①	Finland
80	1971	Do-Bausystem Plastic house	J-C. Ventalon et al	●	●	●	◇			3	6	①	Germany
81	1971	Domobiles	Pascal Hausermann	●	●		⌂			3	2~10	①	Swi-land
82	1972	AZM Offices	Laurens Bisscheroux			●	□			4	21~50	④	Ne-lands
83	1972	Oase N7	Haus-Rucker-Co	●		●	◯			7	1	③	Austria
84	1972	Tetradon	AUA		●	●	⌂	◎		7	11~20	①	France
85	1972	Microhouse	Ken Isaak	●		●	◇			3	1+	①	US
86	1972	Tower of Youth	Suga Yoshitomi	●			□	⊕		5	48	③	Japan
87	1972	Nakagin Capsule Tower	Kisho Kurokawa	●	●	●	⌂	◎		4	140	③	Japan
88	1972	Capsule village	Kisho Kurokawa	●	●	●	□			4	1+	①	Japan
89	1973	Capsule house K	Kisho Kurokawa	●		●	⌂			4	4	③	Japan
90	1973	Interpod Tower I	William Morgan		●	●	□			7	51~100	③	US
91	1973	Residence Gamma	J. Mermet, A. Parisot	●			□			5	201~500	②	France
92	1974	SIRH Option 75	Claude Prouve	●		●	□			3	2~10	②	France
93	1974	Ludres-Experimental Building	Claude Prouve	●	●	●	□			3	51~100	③	France
94	1974	Metastadt building system	Richard J. Dietrich	●	●		□			3	1+	②	Germany
95	1974	Koito Building	Kisho Kurokawa	●			□			4	11~20	③	Japan
96	1975	Um Al Khanazeer island dev.	Kisho Kurokawa	●		●	⌂			3	201~500	③	Iraq
97	1976	Sony Tower	Kisho Kurokawa	●		●	□			4	11~20	③	Japan
98	1976	Conservatoire de Montreuil	Claude Le Goas	●			□			7	11~20	④	France
99	1979	Capsule Inn Osaka	Kisho Kurokawa	●			□			2	201~500	②	Japan
100	1980	Capsule Inn Sapporo	Kisho Kurokawa	●			□			2	184	②	Japan
101	1984	Globe Houses	Exp. Housing Dev.	●			◯			7	50	④	Ne-lands
102	1990	7th kilometer	7km company		●	●	□			7	>10000	②	Ukraine
103	1991	Egg of the winds	Toyo Ito	●		●	◯			10	1	③	Japan
104	1992	Industrialized housing	Richard Rogers		●	●	□			5	101~200	③	Korea
105	1995	Res. buildings in pr. Venus	Jacque Fresco		●	●	⌂			20	2~10	③	US
106	2000	Mixer	Lot-Ek	●			⌂	⊕		2	1	①	US
107	2000	Morton Loft	Lot-Ek				⌂			3	1	③	US
108	2001	Tree village	Micro Compact Hous.	●	●	●	□			3	1+	④	Europe
109	2001	Torino Porta Susa Station	Lot-Ek		●	●	□			7	101~200	③	Italy
110	2001	Container city	Container city TM	●	●		□			7	51~100	②	UK
111	2002	Cave	Toru Murakami	●		●	□	⊕		2	2~10	①	Japan
112	2003	Challenge space architecture	Shuichi + Ikeda Lab.	●	●		◇			3	11~20	①	Japan
113	2003	House in Azeitão	Aires Mateus	●			□			3	2~10	①	Portugal
114	2003	DST Pods	Cannata/Fernandes	●		●	□			5	2~10	①	Portugal
115	2003	MDU	Lot-Ek		●	●	□			7	1+	③	Global
116	2004	Loft Cube	Werner Aissunger		●	●	□			5	1+	①	Germany
117	2004	Rotor house	Luigi Colani	●		●	□			7	1+	①	Germany
118	2005	Rucksack-House	Stefan Eberstadt	●		●	⌂			3	1	③	Germany
119	2005	Riverside building	Container city TM		●		□			7	51~100	②	UK
120	2005	Expandable ISO shelter	AAR	●		●	□	◎		5	1+	②	US
121	2005	Halley VI Antarctic Res. St.	Hugh Broughton Arch	●	●	●	⌂			5	11~20	①	Antarctica
122	2005	Symbiotic Living machine	G. Shimada et al	●	●	●	□	◎	?	5	>1000	②	Japan
123	2006	HUIK Own home and office	Sculp Architecten		●	●	□	◎		7	4	②	Ne-lands
124	2006	Freitag freeway shop	Yves Netzhammer	●	●	●	□			7	17	②	Germany
125	2006	Papertainer	Shigeru Ban	●		●	□	⊕		10	373	②	Korea
126	2007	Nomadic Museum Tokyo	Shigeru Ban	●		●	□	⊕		7	144	②	Japan
127	2007	DH1 Disaster House	Gregg Fleishman		●	●	⌂			4	1+	①	US
128	2007	Barier	G-Wood			●	◇			3	11~20	①	Japan
129	2007	Yotel Air Gatwick hotel	Yol Company	●			⌂			3	21~50	①	UK
130	2007	Lafayette Tower	Lot-ek	●			⌂			7	21~50	③	US
131	2007	Hotel Everland	S. Lang, D. Baumann	●		●	□			5	1	①	Swi-land
132	2007	Single Hauz	Front Architects	●		●	□			4	1+	①	Poland
133	2008	Puma City	Lot-ek	●		●	□			7	24	②	US
134	2008	Sky-Village	Adept	●	●	●	□			5	201~500	②	Denmark
135	2009	Bayside Marina Hotel	Yasutaka Yoshimura	●			□			7	21~50	②	Japan
136	2009	Platoon Kunsthalle	Graft Architects	●		●	□			7	21~50	②	Korea
137	2009	Contained Calls	Aedas	●	●	●	□			10	8	②	UK
138	2009	Pocket of Active Resistance	Stephane Malka	●	●		□			5	101~200	③	France
139	2009	9h Kyoto	Design Studio S	●			□			2	101~200	②	Japan

(continuation of Table 1)

No	Year	Name	Architect/Bureau	Concept			Characteristics					Method	Country
				Mental	Growing	Mobile	Shape	Function	Material	Size	Number		
140	2009	Sleepbox	Arch Group	●		●	□	⊕		2	20	①	Global
141	2009	Paco	Schemata	●		●				4	1	①	Japan
142	2009	The box office	Joe Haskett		●		□			7	2~10	②	US
143	2009	Treehouse	Terri Chiao	●						3	1	①	US
144	2009	Diogene	Renzo Piano	●		●				3	1+	①	Germany
145	2009	Urban Transducer Skysc.	Daniel Nelson	●	●	●		?	?	3	>1000	④	US
146	2009	Subway Cell	Aaron Berman	●		●			□	3	1+	①	US
147	2010	Lookhotels	Lookhotels TM	●			□			5	44	②	Spain
148	2010	Pier 57	Lot-ek		●		□			7	101~200	②	US
149	2010	Tubohotel	T3ARC	●						4	13	①	Mexico
150	2010	Plug-in Housing Dev.	Tay Yee Wei		●	●				5	51~100	③	Malaysia
151	2010	Capsule Hotel	Unknown	●						3	2	①	Ne-lands
152	2010	Cité A Docks	Cattani Architects		●		□			7	101~200	②	France
153	2010	Sergo Marketing Suite	Container city TM		●		□			7	21~50	②	UK
154	2010	Container Cities (Haiti)	Richard Moreta		●	●				7	101~200	③	Domin. R.
155	2010	Immersive cocoon	Nau	●						3	1	①	Germany
156	2010	Inbox capsule hotel	Inbox	●						2	16	②	Russia
157	2010	Bubble suite	Gites Insolites	●						4	2	①	France
158	2010	Skylodge adventure suites	Naturavive	●		●				4	2~10	③	Chile
159	2011	42/5	Lot-ek	●	●		□			7	101~200	②	US
160	2011	Spacebox studios	TU Delft	●	●	●				5	39	②	Ne-lands
161	2011	Genussregal Exhibition	BMW	●	●	●				7	16	④	Austria
162	2011	Living Roof	Nau	●		●				5	1+	①	Germany
163	2011	Nomad Skyscraper	Luca D'amico et al		●	●				7	>1000	③	Global
164	2011	Blox home	M3House + UAO	●	●	●				5	2	①	China
165	2011	Suguroku office	Daiken Met	●		●				7	7	④	Japan
166	2012	Portishead quays	Container city TM		●		□			7	21~50	②	UK
167	2012	BBC broadcasting studios	Container city TM		●					7	11~20	②	UK
168	2012	Boxpark Shoreditch	BDP	●	●					7	2~10	②	UK
169	2012	Afterlight	Interrupt	●		●				7	18	②	Singapore
170	2012	Das Park hotel	Das Park hotel	●						4	3	①	Germany
171	2012	Free Spirit Spheres	Free Spirit Spheres	●		●				3	1+	①	Canada
172	2012	World of Chlorophyll	IAMZ Design Studio	●	●	●				20	201~500	④	US
173	2012	Eco-pod	Squared Design Lab	●	●	●			□	3	1+	②	US
174	2012	Mangal city	Chimera	●	●	●			□	7	>1000	③	US
175	2012	Xi'an Youth Caspule Hotel	Unknown	●						2	21~50	②	China
176	2012	City Hub Amsterdam	City Hub	●		●				3	50	②	Ne-lands
177	2012	New bivouac Gervasutti	Leapfactory	●		●				7	1	①	Italy
178	2012	Uplift concept	Basecampzero	●		●			□	7	21~50	③	US
179	2012	Egg microhouse	Hiteca	●		●				2	1+	①	Russia
180	2012	Vertical community	Baichuan Song	●	●	●				5	201~500	③	Global
181	2012	Suburbia tower	Aaron Berman	●						3	21~50	③	US
182	2012	Mobile suburbia	Aaron Berman	●	●	●				3	1+	③	US
183	2012	Interchangeable Habitation	Jonas Erssoni	●	●	●			□	20	1001+	④	Sweden
184	2013	Moving city	Manuel Dominguez		●	●				7	1+	②	Spain
185	2013	Toretore village	Toretore village	●	●	●				5	133	①	Japan
186	2013	T2 Unit	SUS	●	●	●				4	11~20	③	Japan
187	2013	Office complex in Bogota	Unknown		●					7	11~20	②	Columbia
188	2013	Aether Apparel - Proxy	Envelope A+D	●	●	●				7	3	②	Japan
189	2013	Swiss Tubes	TCS Camping	●	●					5	5	②	Swi-land
190	2013	A-Kamp47	Stephane Malka	●	●					2	23	③	France
191	2013	Pengheng space cap. hotel	Pengheng sp. caps.	●					□	2	21~50	②	China
192	2013	Micro House in Tsinghua	Liu Lubin	●	●	●				4	1+	②	China
193	2013	Pop-up neighborhood	James Alfandre	●		●				7	3	①	US
194	2013	Archipod	Archipod			●				5	1	①	UK
195	2013	Águeda concept	Águeda concept			●				10	1+	①	Portugal
196	2014	The hut factory	Haseef Rafiei	●	●	●				5	51~100	③	Malaysia
197	2014	EBA51	Holzer Kobler ltd.	●						7	15	②	Germany
198	2014	Modular home prototype	Garrison Architects	●	●	●				7	3	②	US
199	2014	Mill Junction	Citiq	●	●					7	56	②	S. Africa
200	2014	Rotating plug-in capsules	Bojing Qu		●	●				7	201~500	③	China
201	2014	Attrap Reves Bubble Hotel	Attrap'Reves	●						3	1	①	France
202	2014	Songpa Micro-Housing	SsD architecture	●						5	11~20	②	Korea
203	2014	Hive-inn	OVA studio		●	●				10	101~200	④	China
204	2014	Point9 New Bridge	Stephane Malka	●	●				□	3	11~20	③	France
205	2014	Unit Fusion	Y Design Office		●	●		?	?	5	101~200	③	China
206	2014	Casa Futebol	A. D. Stampa et al	●	●	●				5	101~200	③	Brazil
207	2014	Wow pod	Ideo Design	●	●	●				3	1+	①	Global
208	2014	B-and-Bee	B-and-Bee	●	●					2	2~10	②	Belgium
209	2014	Containerville	Scott Kyson		●					7	45	②	UK
210	2015	Container skyscraper	CRG Architects		●	●				20	2500	②	Nigeria
211	2015	Clipper house	Container city TM	●						7	44	②	UK
212	2015	Sleeping Pod	Yazdani Studio	●	●	●			□	5	1+	①	US
213	2015	Common ground	Urbantainer		●					7	51~100	②	Korea
214	2015	Living Roof	Nau	●		●				5	1+	①	Germany
215	2015	Shiftpod	Christian Weber		●	●				2	1+	①	US
216	2015	Eco capsule	Eco capsule TM	●		●				3	1+	①	Slovakia
217	2015	Sleeppod	VATC	●						2	16	①	Vietnam
218	2015	Container Skyscraper	Ganti+Associates	●	●					7	201~500	③	India
219	2015	Prouve house	Richard Rogers & P.		●	●				3	2	③	US
220	2015	Lifepod	Michael R Weekes			●				2	1+	①	US
221	2015	Creative space	Slog&Stuveback	●						7	11~20	②	Sweden
222	2015	Living roof capsule 2	Nau	●		●				4	1+	①	Germany
223	2015	Exo	Michael McDaniel	●	●	●				3	1+	①	US
224	2015	Sleeperoo	Langefreunde Design			●				2	1+	①	Germany
225	2016	BA Head office city	Container city TM		●					7	11~20	②	UK
226	2016	Kasita	Kasita company		●	●				5	11~20	②	US
227	2016	QUO Container center	BZZ Arquitectura	●	●					7	11~20	②	Argentina
228	2016	First cabin Tsukiji	First Cabin	●						3	160	①	Japan
229	2016	Tree House	Richard Rogers		●					5	101~200	②	Global
230	2016	Campera bubble suit	Capmera hotel			●				3	2~10	①	Mexico
231	2016	Fuselage	Tree Tents	●		●				4	1+	①	UK
232	2016	Xpod	Denoldervleugels	●	●	●				5	1+	①	Ne-lands
233	2016	3D printed office unit	Winsul Global			●				7	1+	①	UAE
234	2016	Container market	Siyabonga Gondwe		●					7	51~100	②	S. Africa
235	2017	Shipping container home	Mods International			●				7	1+	①	Global
236	2017	Quadrum-Qudauri	Quadrum Ski & Yoga	●						7	20	②	Georgia
237	2017	Drivelines studios	Lot-Ek	●						7	51~100	②	S. Africa
238	2017	Coodo	Coodo TM			●				5	1+	①	Germany
239	2017	Mobile podcast studio	DN&co and Fantom	●		●				3	1	①	UK
240	2017	3 unit blocks	Ofis architects	●	●	●				4	3	②	Slovenia
241	2017	Pod Vending Machine Scysc.	Haseef Rafiei	●	●	●				3	1+	④	Japan
242	2017	Shelter with Dignity	Framlab	●	●	●				4	51~100	③	US
243	2017	Ras Abu Aboud Stadium	Fenwick Iribarren		●	●				5	101~200	④	Qatar
244	2017	Heil-berg	Luca Beltrame et al	●	●	●				3	201~500	③	Global
245	2017	The Capsule Hotel	The Capsule Hotel	●						2	11~20	②	Australia
246	2017	Container hostel	Kinzo Architecten	●						7	201~500	②	Germany
247	2017	Snoozebox	Snoozebox Hotel			●				2	1+	①	UK
248	2017	Bed and Boarding	Carlotta Tartarone	●		●				2	51~100	②	Italy
249	2017	Inn the park	Inn the park	●		●				3	2~10	①	Japan
250	2017	Matices Hotel de Barricas	Matices Hotel	●						4	11~20	①	Mexico
251	2017	Blowing the building out	Chidai Keisuke		●	●			?	4	21~50	④	Japan
252	2017	Cozy box	S&P architects		●	●				7	2	①	Ukraine
253	2018	Kaohsiung Stereo Cont. Inn	ML Architect	●	●	●				7	51~100	③	China
254	2018	Starbucks in Taiwan	Kengo Kuma	●						7	11~20	②	Taiwan
255	2018	Albang capsule	Yoon Space	●		●				3	7	①	Korea
256	2018	Silver bullet	Airstream			●				7	1+	①	US
257	2018	Sphere hotel	Huisten Bos (HTB)	●		●				7	7	①	Japan
258	2018	OPod Tube Housing	James L. Cybertech.	●	●	●				5	11~20	②	China
259	2018	9h Akasaka	Design Studio S	●					□	2	168	②	Japan
260	2018	Keetwonen	Tempohousing		●	●				7	1001+	②	Ne-lands
261	2018	Cocoon modules	N. Spyropoulou			●				7	1+	①	Greece
262	2018	Stackt Market	Stackt Market	●	●					7	2~10	②	Canada
263	2018	Home coming home	S. Minakami et al		●	●				4	21~50	④	Japan
264	2018	Rubner haus	P. Scoglio, C. Griffa	●		●				3	1+	①	Italy
265	2019	Capsule hotel Lucerne	Hirschengraben	●						2	11~20	②	Swi-land

Explanation of figures:

Shapes: □ – rectangle, ⬭ – custom, □ – cube, ⬭ – tube, ◯ – sphere, ▱ – polygonal, ⬮ – egg-shaped, 🚙 – vehicle, ⌓ – dome, ⬡ – honeycomb, ▭ – cylinder, ⬭ – hexagon

Functions: 🧍 – residential, 🏨 – hotel, ⊙ – multipurpose, 🛒 – commercial, 💻 – office, ⊕ – attraction, 🔧 – utilities, 🔋 – extension, 🎓 – auditorium, 🌿 – vertical farms, ⚽ – sports facilities

Materials: □ – plastics, ▥ – shipping containers, 🏗 – metal/steel, ▯ – reinforced concrete, 🪵 – wood, ? – unspecified, ◎ – concrete tubes, ▨ – glass, ⬑ – other objects

Methods of arrangement: ① – Method 1 Distribution, ② – Method 2 Stackability, ③ – Method 3 Plug-in, ④ – Method 4 Insert

Index number: Regular – unbuilt, Bold – built

Section 2 Concept of capsule architecture

2.1 Historical development of capsule architecture

The capsule-like dwellings began appearing from the dawn of the 20th century, a couple of decades before the formation of capsule concepts by Archigram, Metabolists, as well as separate French, Swiss and German studies on prefabricated and mass-produced multifunctional units and microhouses. Apart of developments in prefabrication houses together with invention of new buildings materials as corrugated iron and precast concrete houses or industrial system for wood-cutting and producing prefabricated wooden elements (metal Quonset hut in U.S, Nissen Hut in Britain, as well as wooden Aladdin house from 1930s)[1)], the theoretical soil for mobile and mass housing was developed by architects pursuing functionalism in a scale of spatial organization, architecture and a city. Among them Gropius and Wachsmann's General Panel company was providing ready-to-install precut packaged houses[2)], and later followed by Jean Prouve's Demountable house[3)], Buckminster Fuller's Dymaxion house and other developments in search for closed environments and dynamic architecture, as well as Le Corbusier and CIAM working on spatial relationships of cities and producing megastructuralist designs[4)]. The discourse followed by even more radical ideas of refurbishing architectural theory for new ethic from Team 10 and Brutalists led by Alison and Peter Smithons and Paul Rudolph and Louis Kahn in U.S., surrealism views of situationists (Neo Babylon by Constant Niewenhuis), and later matured modernism from Archigram, Metabolism, Paolo Soleri, Archizoom and other regional practices[5)6)] .

In the 1960s from which the classical meaning of a capsule is formed, the surrounding world was already a radical place of architectural modernism coping with arising challenges in overpopulated cities while a range of architects was seeking solutions in modular architecture, prefabricated housing for the new organization of urban tissue. In 1960s independent architect, Takis Zenetos took a different utopian trope by designing new sustainable cities relying on solar energy, recycling, and saving of materials – everything connected by an enormously long tensioned network of cables – the concept what later would be called 'Electronic urbanism'. The cable megastructures contained cells of living units, while on the land the repeating blocks relied on natural topography as if protruded caves. At the same time in France Yona Friedman presented another view on so-called spatial urbanism with a recognizable megastructure of Spatial City, as a well-tuned urban system supporting the perpetual cycle of change in dwellings nested on the grid[7)]. The

modular architecture was already practiced by Moshe Safdie in Canada with his Habitat 67 (1967), while Richard J. Dietrich was implementing his building system of spatial blocks called Metastadt in Germany in 1965-1970[8]. Meanwhile, architects and entrepreneurs from Germany, UK, and France were competing in the production of small plastic houses, as Do-Bausystem-Plastic House, Ball House or Hexacube which mostly allowed the connection of several homes in order to create bigger dwellings over time. Haus-Rucker-Co from Austria used architecture for utopian experiments of the 1960s together with their south neighbors from Italy – Archizoom and Superstudio completely crossing out existing modernist cities by endless planes of monotonous gridded panels. A little later Luigi Colani – famous Italian designer – made his appearance in architecture by designing over-futuristic and smooth Total Housing Units (1970) after, in Finland, Matti Suuronen put his famous Futuro House and Venturo House in production as well.

The selected practices above partially describe 1960s' movement of New Brutalism[9] and co-occurring trends of spatial urbanism and functionalism, as opposed to Modernism movement, however, quickly beginning to lose its potential due to over-utopian nature. Moreover, the use of plastic as a building and finishing material having its breakthrough in 1956 was eventually shocked by Oil Crisis in 1973, giving simultaneously a formal end to Japanese Metabolism and together with this the usage of capsules in architecture for the next few decades. This coincided with the eventual end of Modernism and a dramatic shift in paradigms to Postmodernism.

In the period of 1980-1990 under typologies of Postmodernism examples of modular architecture as well as the architecture which were afresh implying functionalism were rare. In 1990s Richard Rogers produced a few projects showing possibilities of customization. In his Industrial Housing project (1992) modular building blocks are both prefabricated and of a large scale while being clipped to a vertical core what together somewhat resembled Nakagin Capsule Tower[10]. In 1991 Toyo Ito designs The Egg of the Winds – a big capsule attached to a wall and suspended from the floor by metal legs. Both examples just utilize the concept of modularity and integrity of an envelope but have mostly utilitarian ideas rather than using capsules in their designs.

The beginning of the 2000s was already the time of grown environmental movement and developed principles of New Urbanism both starting from 1970s. Until 2000s majority of cities in the developed world updated their waste and pollution regulations what facilitated the trend of future cities as sustainable green environments with the help of green

technology. One of the effects of such thinking was a new practice of using shipping containers in large scale urban projects, together with growing energy awareness of both architects and citizens, trend of sterile minimal lifestyle, and movement from cities towards nature to small, prefabricated tiny houses for refreshment from the busy city life supported by further increased mobility. Capsules traditionally symbolizing and utilizing the cutting edge technology reappear in modernity as revisited principles of integration between architecture and new achievements in the industry. Capsules of what may be called 'a second generation[11)], are considered to aim more self-efficiency rather than feed from supportive megastructure. Hence, the modern capsules may have solar panels or compost as well as a chemical toilet to gain independence from urban systems and claim themselves as sustainable houses of the future. Such capsules as direct predecessors from original ones of the 1960s are still at prototype levels of development and meanwhile give way to more quickly deployed container architecture – a capsule concept contained in recyclable premade metal envelopes. The container as a trend is quite popular right now, but already losing its freshness and showing growing critique regarding the faith of its comprehensive usage, while, on the other hand, showing limits and challenges regarding transportation, permissions and registrations of mobile dwellings which presumably would be delivered as easy as delivery of a postal package. Creator of the site 'Uncube' Fiona Shipwright comments on shipping containers' trend as: 'A giant Jenga tournament has been playing out across cities worldwide…' referring to stacked container structure popping up globally[12)]. Also, starting from the late 2000s and the start of 2010s capsule hotels expand from Japan worldwide, while architectural news record the first capsule hotels appearing in one country after another. Usually bearing the futuristic appearance and providing unique experiences the capsule hotels are popular for their relative cheapness and provision of high quality sleeping environment[13)]. This popularity and good reputation together with container architecture are part is a modern pop art celebrating sustainability, eco-design and the optimistic sight oriented towards the new sterile and well-tuned green future cities.

With the support of the given background of capsule developments through 20th and 21st centuries, together with a developed filter for selecting cases of capsule architecture, it is possible to extract 265 modern and historical examples of capsule architecture and distribute them over the timeline (Fig. 9).

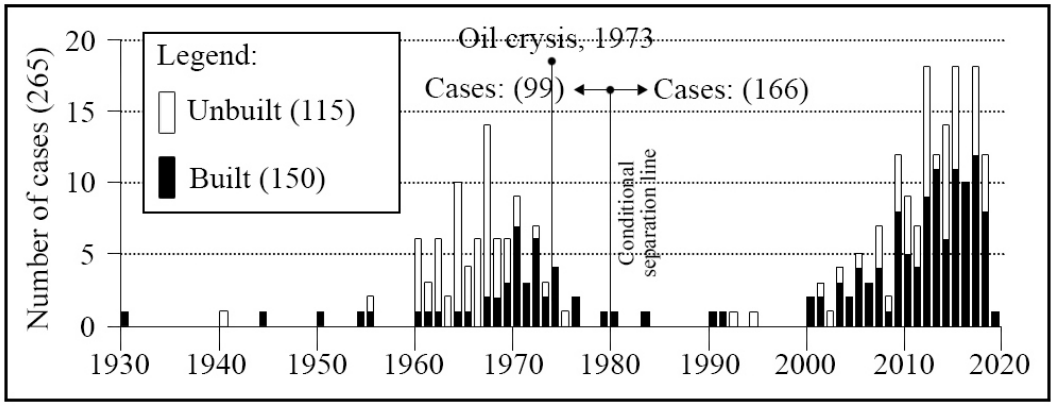


Fig. 9. Appearance of cases of capsule architecture

The table above represents both built and unbuilt examples of capsule architecture. The main feature of this analysis is two spikes corresponding to original developments of capsule architecture from the 1960s to 1970s and the resumed interest in capsule dwellings and micro houses as well as modular architecture from 2000s. From the 1960s it is clearly visible that the capsule concept is new to be able fully implemented on practice, thus, in the 1960s the conceptual projects of capsule architecture prevail while from 1970s more built examples may be seen. From the 2000s the percentage of built-unbuilt example is more or less equal with the shift towards many small-scale built designs. The unbuilt examples often correspond to the new and more massive utopian ideas in urban planning where capsules continue serving their original functionalist role.

2.2 Concept of a capsule and its application

Capsules are thought to first form as a typology in the beginning on the second half of the 20th century on the wave of prefabrication and functionalism trends supported by advances in technology and science. In a sense, a capsule is a functional space to its utmost by bearing usually a single purpose, and which is closely dependent on infrastructure what complements this functional unit to the full operational capacity. As a tool to oppose the crisis occurring in International Style and Modernism starting from the 1920s and symbolically ending later as a whole in the dramatic demolition of Pruitt-Igoe complex[14)] in 1972, capsular structures were viewed as an alternative, if not a consequential architectural type belonging to the newly forming, jolly consumer society of the future based on an individual. Its roots can be also traced in the argument occurred over the congress of CIAM

II in 1929 discussing so-called “minimal dwelling” and how cities’ planning begins from housing provision (The Wohnung für das Existenzminimum (dwelling for the minimum level of existence). The approach discussed by Le Corbusier, Alexander Klein and Karel Teige pursuing their own line of research further, and others was fully rationalistic and was closely connected to organization of social behaviors and way of living by providing a prefabricated housing for, primarily, workers. By this “The Existenzminimum” by its name pushed the limits of the acceptable living giving out some of the functions of a regular house outside in so-called “communal” spaces (canteens, leisure activity spaces, etc.). That would have created an optimal prefabricated “individual living cell” what would be rationally both separated as a private space from others but simultaneously connected to the whole system (room or minimal-size flat in a large scale communal building). Standardization and “minimization” of the living environment would make sustainable urban, economic or social systems, however, according to Corbusier, reduce a work of an architect, therefore, the profession of an architect together with a new order in the organization of functional environments would change to tuning the environment due to the surrounding conditions (geographical, ergonomically justified, economically, etc.) through spatial planning, façade or equipment. The minimum living unit was a countermeasure occurring in housing market, and urbanism by providing new vision on architecture, living and organization of cities.

Later, after the Second World War the housing provision again became topical but with attenuation of Modernism the new order and visions occurred through the 50s-70s in a modern more radical view on functionalism in architecture. Still much attention to the environmental crisis yet, the new or ‘other’ architecture proposed by various modernist architects was oriented to the maximum potential of buildings to provide services to people of new social order. That meant the physical flexibility of buildings able to contract or expand with the reflection to each individual in more democratic and enjoyable world[15)]. One of the elements facilitating such change was a capsule. The world ‘capsule’ itself was widely used by two influential architectural movements of 1960-1970s - Archigram and Metabolism, but first, a mobile, attachable and well-equipped unit was called ‘a capsule’ by Warren Chalk in the project by Archigram called “Capsule Homes”, 1964 (Fig. 10). There, a corn-like structure with a formal crane on its top wears hundreds of capsules and is described as “an industrial design approach. It implies a deliberate – even a preferred – lifestyle. It suggests that the city might contain a defined conglomeration of such a lifestyle, rather like a hotel. At the same time, it is definitive and would by-pass many of the myths of urban design which depend upon hierarchies of the incident and the treatment of housing as

folk-art.[16)]" On the other hand, Metabolists used a range of terms to describe their version of these functional elements, until Kurokawa fixed such name in his Capsule Declaration in 1969[17)]. Before this, a prefabricated 'living unit', or 'cell', or 'pod', etc., was used in previous practices of Le Corbusierm, Konrad Wachsmann, and Jean Prouve in their studies on urban design and prefabricated homes, concepts of either mobile or portable architectures by Buckminster Fuller, study on 'House of the future' by Smithons, works of Arthur Quarmby, Paul Maymont, Ionel Schein, Yona Friedman, Constant Nieuwenhuys, and others who were developing either urban spatial structures or prefabricated units, particularly, those made of plastic as a result of the corresponding trend exploiting this building material and starting from the 1950s.

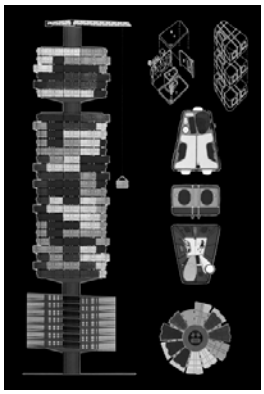


Fig. 10. Capsule homes, Archigram, 1964

Therefore, the definition of a capsule may be confused with other similar terms as prefabricated homes or micro-dwellings. In architecture, explanation of a capsule in retrospective is provided by German architectural critique Gunter Feuerstein – a contemporary of pioneers in capsule architecture – as "the smallest, still moveable, and autonomous environment, well-equipped with communications"[18)]. Later, the term of a capsule, expanded to a metaphorical level, was used in the publications related to psychology or urban studies describing it as a closed spatial framework to contain some function or activity without its connection to the original concept of a capsule in architecture from the 1960s. Such definition corresponds to either macro environments as shopping malls or amusement parks which submerge customers in another completely different controlled environment, or microenvironments corresponding to a small tightly closed envelope as screens of TV-sets, screens of mobile phones, etc. Here, the capsule still tightly related to

society means some closed and separated environment which is still being able to expand or move, extending this concept to definitions of restricted zones, transportation hubs themselves, a country's state in political studies, controlled biomes or vehicles[19]. The instances for such capsule-like objects are two projects by Buckminster Fuller – American architect working alongside with his European colleagues under the topics of new technocratic cities of the future what promoted the development of commonly accepted capsules a couple of decades later. Fuller's Biosphere for EXPO 67 in Montreal either before this Standard of Living Package model (1949) had a massive transparent dome with some architecture and greenery inside. It fundamentally restricts the surrounding natural environment by providing its own simulated microclimate declaring the triumph of technological achievement. This dome is the biggest and one of the latest among about 1000 other smaller and slightly different domes built under Fuller's patent over the course of the 20th century. As, again, an alternative to cubical cities drowning in traffic junctions and pollution as derivative from modernism, the dome represented another more universal environment built from different architectures[20] (Fig. 11). Dymaxion projects of the same author are a range of mobile or transportable units coming down to vehicle's design as one clled a Dymaxion car. The car is, similarly, of universal use and is able to pass through any medium – land, sea or air, as an ultimate usage of technology for the sake of people's happiness[21] (Fig. 12). Another example representing the characteristics and nature of a capsule's design is escape-pod-like egg-shaped sarcophagus designed for Winston Churchill to withstand high altitude trips in an aircraft. The capsule provided ground level pressure inside together with another additional comfort. This case particularly represents introversion and alienation regarding the surrounding medium without physically leaving the medium itself[22] (Fig. 13).

Fig. 11. Montreal Biosphere, Buckminster Fuller, 1967

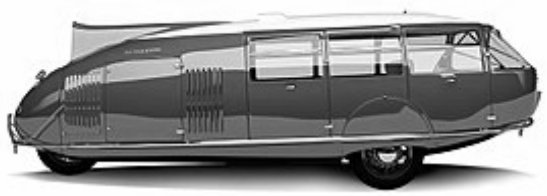


Fig. 12. Dymaxion car, Buckminster Fuller, 1933

Fig. 13. Churchill Egg, Institute of Aviation Medicine, 1940

These examples are aimed to provide a broader view of the subject of a capsule in architecture and highlight some of its characteristics. Senk unifies this terminology in a common term of ‘capsules’ and further concretizes the definition provided by Feuerstein and describes a capsule as an object which should fall into the following characteristics[23)]:

1. Relative impermeability of the envelope;
2. physical or simulated comfort of the introverted interior enabled by connection to the network;
3. structural, functional and visual integrity;
4. temporal conditionality or interchangeability;
5. smallness enabling movability or mobility.

Thus, the capsule should have a clearly distinguishable structure and envelope, be well equipped, have a temporal nature, and, therefore, to be movable. The characteristics above are used as a reference basis for sorting out examples which are not suitable, and, thus, cannot be included as study cases for this research. Nonetheless, the definition above yet allows flexibility in interpretation what makes it acceptable to bring in some examples of container architecture or capsule hotels as variations of understanding of the definition above.

The nomadic nature as one of the basic characteristics of a capsule may be traced as far as ancient Greece by introducing Diogenes barrel. While bearing solely sociological, philosophical and physiological meaning the case of the Greek philosopher Diogenes shows how the concept to oppose common social norms reflects on a dwelling. The dwelling in this example is a barrel for wine – a minimal and self-sufficient shelter in a macrocosm of the city (Fig. 14). The analogy with the relation of a capsule to a megastructure, hence, may be provided. Definitely, the Diogenes' barrel is a mental capsule, tool for expression and protest in order to show society's drawbacks and possibilities for a future change of society's set of values. Modern capsules are still often viewed as an additional layer onto the current urban environment by populating it with separate living units nesting (sometimes as if illegally) on buildings' rooftops or being clipped to existing walls or facades in order to highlight insufficiency of current urbanization approach – lack of affordable housing, unsafety, policies' instability, homelessness and others. The major point what the Diogenes barrel lack is a technological progress put inside, therefore, it is partially a capsule, but it finds its continuation in Renzo Piano's emergency hut called familiarly 'Diogene' (Fig. 15). The Diogene is a well-equipment and self-sufficient modern house providing the opportunity to encapsulate oneself inside another environment in order to retreat inside a well-defined personal space with the strict borderlines[24)]. Renzo Piano's example is more resilient case corresponding to the modern trend of sustainability.

Fig. 14. Diogenes, John William Waterhouse, 1882

Fig. 15. Diogene, Renzo Piano, 2009

Capsules find their modern origins in the early developments of capsule-like architecture or prefabricated houses, specially designed by Le Corbusier and Jean Prouve in their projects of stacked functional units or transportable and collapsible houses respectively. The noteworthy example is Jean Prouvé's Demountable House, done in a range of dimensions, with a steel frame, easily installed walls, and noticeable legs visually detaching the house from the ground and showing its temporary nature (Fig. 16). Started as a concept deriving from Prouvé's previous occupation in furniture production from the 1930s, the houses became in demand after World War II as one of the desperately needed solutions to provide 'insta-housing' for a short period of time before the more monolith architecture would be able to gain its full potential[25)]. Such need was eventually global and provided not only a literal change regarding architecture and its shape but also the fundamental reevaluation of architectural theory directed towards the cities of the future. Regarding the production scale, the Prouve's house was brief, cutting it to about 400 units, but the massive block construction in USSR starting approximately from the same period of pre-capsule studies expanded greatly by building the entire cities from the prefabricated blocks ready to be only stacked on one another on the construction site.

Fig. 16. A demountable house, Jean Prouvé, 1944

The next project, in the chain leading to capsules, is considered to be Le Corbusier's Unite d'Habitation – a quite different structure opposed to that of Prouves, despite the fact, that Corbusier also designed a prefabricated house for Albert Einstein himself with support of widely known developer of prefabricated building elements and spatial structures – Konrad Wachsmann[26]. The Corbusier's building is fully functional and optimized machine for living containing within its tight body 337 living units which are spatially related to their neighbors, but are still fully independent both visually and sensitively. On the façade of the building, the sides of balconies are colored in different shades highlighting the borders of each living unit, that is, the functional division is directly reflected onto the building's appearance[27] (Fig.17). Architect's thinking is further asserted in a drawing usually accompanied to the explanation of the building's concept where the hollow structure resembling a wine rack to which a giant hand inserts the living unit is depicted. The hand is of Le Corbusier's from his studies related to housing units and it clearly shows how some gigantic machine stuffs up the spatial structure with separate housing units as a design approach (Fig.18). Later, it would not be a coincidence that the similar drawing was done by Kiyoshi Awazu[28] – a graphic designer worked with Metabolists, as well as, the similar image again appears in Metabolist Manifesto in the Kikutake's "movable house" project (Fig.19, 20). A hand is a symbolic element representing a blind faith in technology able to manipulate living units as easy as if picked by fingers of still undiscovered but seemingly powerful technological 'entity'.

Fig. 17. Unité d'habitation, Marseille, Le Corbusier, 1952

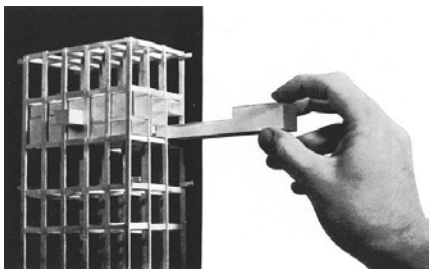


Fig. 18. Unité d’habitation, Marseille, explanation of concept, Le Corbusier, 1950

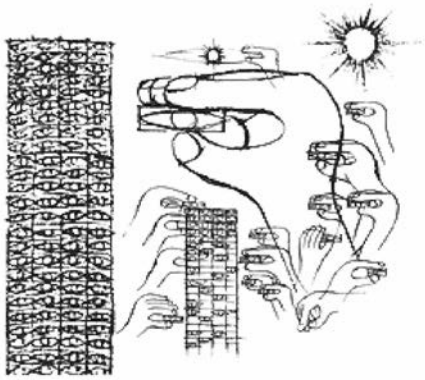


Fig. 19. Metabolist concept, drawing, Kiyoshi Awazu, 1960

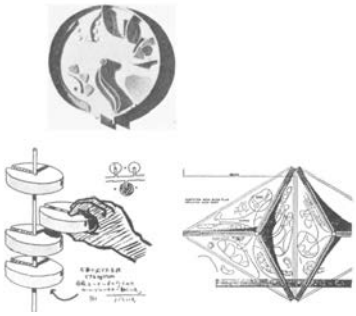


Fig. 20. Movable house, Kiyonori Kikutake, 1960

Recent examples represent a more tangible approach when it comes to dealing with dynamic architecture by depicting heavy machinery on the top of the building as well as simply hanging from above or delivered by modified large drones. This is still thought to be a partially symbolic approach, as well as, partially a tribute to pioneers of capsule architecture where technological possibilities seemed to be overpowered. Yet, it facilitated the development of the easily-replaceable capsules which are known until now. In overall, due to the instability of the 20th century with the challenges never existed before, the

capsules were the symbolic shelters to escape reality or rebuilt it anew, both physically and spiritually.

A capsule as a production unit which can be bought as consumer goods often was compared to a car by capsule architecture promoters in the 1950s-1960s. After all, the capsules were quite closely related to movable vehicles, which parts may be interchangeable, or how Kurokawa put it in his 'Capsule Declaration' there is no need to throw out a car if only a part of it is broken[29)]. Here Kurokawa makes an analogy to demolition occurring with buildings when they are of no need or partially damaged. Later, a car as a capsule is highlighted by Lieven De Cauter in 'Capsular Civilization' as a mobile residence and extension of the house[30)], where partially the functions belonging to housing may be served – sorting emails, arranging schedule, or, probably, even taking a meal or resting in a traffic juncture – all that activity resembles living in a house. Taylor Woodrow from Archigram in his design of Capsule Homes makes another analogy to cars, particularly Ford and Chrysler built onto the same floor tray, in other words – they are exchangeable. Next, a conclusion follows – "Perhaps a dream-machine as well as a mere house?"[31)]. Electric Tesla cars popular nowadays combine sustainability with interchangeability in their models – all of them have the same floor tray and, thus, they are highly customizable. Their road tracking and the self-driving system already allow zero engagement of a driver. On the other hand, as a backside of the same behavior – taxi drivers or truck drivers in Japan often spend nights in their vehicles neglecting their homes. Capsule as a car, or, rather, a self-driving functional places are being proposed by IDEO Design Consultancy blurring a line between car and dwelling by introducing Wow Pod – a moving space what is almost lost its vehicle appearance in favor to vertical walls as if being a room, and representing a capsule where housing and vehicle are combined (Fig.21). For these reasons this research also includes several examples of recreation vehicles as those sharing a capsule's concept.

Fig. 21. Wow Pod, IDEO Design Consultancy, 2014

Another basic interpretation of a capsule includes an intangible shelter from the surroundings or a private space guaranteeing complete independence and freedom of individual[32)]. Such capsule addresses the physiological need of a person to be secured from the surrounding information rather than simply the right to be alone in the private space. In a similar way how Yona Friedman in his spatial urbanism describes it, the architect from Switzerland Pascal Häusermann found capsules as tools for people to express themselves as co-creators of the urban environment[33)]. Jean-Louis Chanéac working at the same time as Häusermann expressed the capsules as a volunteer engagement of residents to adjust their homes, by clipping additional parasitic capsules to their flats via windows in order to satisfy their both actual and psychological needs as the necessity of a wider living space or additional private[34)]. Modern examples are represented in works of a contemporary modern French architect Stephane Malka in his 'Pocket of Active Resistance'. There slum-like individual homes are stacked one on the top of another and bear a particular function as a temporary shelter for protesters in times of political or social instability[35)]. Another demonstrative example is so-called 'Shelter with Dignity' by Framlab (Fig.22). More than an architectural project itself its framework is a social platform designing and providing shelters for homeless in New York city. The shelters themselves are small honeycomb pods linked together and clipped to empty walls of conventional buildings. The aim of pods is in their names what is to provide besides the shelter itself the dignity for people in need after they receive a residence as ordinary citizens[36)]. In order to further clarify this explanation several projects of Metabolists can be analyzed and compared. In case of Kisho Kurokawa, belonging to Metabolists, the capsules had their strong psychological nature and environment: in his projects of Nakagin Capsule Tower (No.87) capsules were used as a shelter for another type of social stratum – "homo movens" while in his projects of Takara Beautillion (No. 75), Capsule for Living (No.76), Capsule village (No. 88), Capsule House K (No. 89) were additionally designed either to create a completely different environment inside a capsule (luxurious interiors Takara Beautillion or tea-room capsule in Capsule House K), or provide each resident its one capsular shelter by dividing capsule homes into smaller capsules. In other projects as Helix city (Kurokawa, No. 15), Clusters in the Air (Isozaki, No. 18), Marine City (Kikutake, No. 24), Dwelling City (Ekuan, No. 26) the strong urban approach is presented, that is, capsular urban structures able to grow and die out, however, the capsules are shown as typical living units attached to the big urban structures with no distinguished separation from ordinary dwellings. If to compare these projects to Spatial Village (Friedman, No.9) the capsules are created by residents themselves who decide to occupy the plot of land in the ever-growing spatial structure. This create another

type of urban environment, therefore capsules are labeled as mental originating from another organization and nature of environment. Another example is a Futuro house (Suuronen, No.8) created in a shape of a UFO and celebrating a leisure and luxurious lifestyle what implies another mentality and vivid contrast to surrounding environment.

The mental aspect of a capsule is one that often combined with urban planning approach dealing with lifestyle of people, and in many project the latter prevails before more psychological and social discourse which the ‘mental’ applicability of a capsule commonly represents. In this way, the thinking of Metabolists as a whole is highly saturated with notions of new types of cities or buildings as an entity able to change over time but capsules may be less distinguished from the image of an ordinary house, except that they can be movable or be combined with each other. In the mentioned projects of Kurokawa capsules were also presented as “cyborg architecture” bringing in again a perspective of a resident to define a main nature of a capsule. If to compare it to projects of Kikutake, the mentions of capsules plugging in or out are present, thus, some special type of lifestyle is indeed mentioned. By this, all projects of Metabolists can be called those which have a “mentality” as a feature of the designs of their capsular buildings, and categorization of whether a capsule can be called “mental”, in this research, is defined in its comparison to an urban planning aspect of the same project and the fact whether it take over some formal notions about organization and living of residents or users of capsules.

Fig. 22. Shelter with Dignity, Framlab, 2017

A different way to use capsules lays their ability to create changeable structures similar to the Nakagin Capsule Tower. Such a principle is yet the most complex one to realize. However, new suggestions have been arriving at the architectural discussion as the solutions to optimally control building environments in still growing cities. Unlimited by the

grown trend of globalization the capsule architecture expands beyond cultural limits (Metabolism from Japan is considered a Japanese style, while Archigram surely translated optimism of pop-art of the UK) and serves as countermeasures to disasters occurring around the world or as social housing. The capsule architecture, still an alien to the post-modernism urban realm, is proposed to infill empty spots of modern cities regardless of their location. The MDU (Mobile Dwelling Unit) by Lot-Ek utilizing containers from the early 2000s is a modified shipping container similar to the expandable 'Tetrodon' units for resorts in France from 1972 by AUA. The MDUs are supposed to be easily transported by sea as ordinary containers to other ports where they can be plugged in again to special shelves bearing dozens of the same units[37] (Fig.23). James Law Cybertecture utilizes another component of modern technology – concrete pipes, by transforming them into cheap experimental housing. The stacked pipe sections then are placed by a crane onto the vacant gap between buildings what increases urban density without capital construction[38]. On the other hand, Container Skyscraper by Ganti+Associates suggests creating the new modern kind of city which will metabolize existing slums in Indian towns. Containers attached to a frame of the skyscraper are provided for residents of the slums as a tool to update their living conditions[39]. Hence, the abovementioned examples play their role in the urban metabolism of cities by adjusting themselves to the current urban paradigms.

Fig. 23. Mobile Dwelling Unit, Lot-Ek, 2003

Therefore, the implementation of architectural capsules based on their role and application may be divided into three following categories. These categories represent architects primary intentions and reasoning of using capsules in their designs based on the information provided by architects themselves. Capsules utilizing mobility as their prior advantage; the capsules which are aimed to surpass the layer of either building codes of a country or any other paperwork connected to construction permits; and the capsules being

financially affordable due to their lightweight and simplicity to assemble or dismount may be categorized into the 1st category as ‘mobile capsules’. Next, the capsules being viewed as And lastly, the capsules which serve purposes as a shelter for mind, temporary loneliness or rest; the capsules which due to their closed nature create a different environment in order to isolate an individual from incoming information; and the capsules meant to symbolize innovation, joy of experimentation or provision of new impressions and experience are categorized into the 3rd category – mental capsules. The categorization and case study examples are shown in a figure below (Fig. 24).

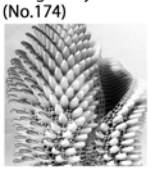
Mobile podcast studio (No.239) 	Mobile capsules - mobility as a key feature prevails - mobility as a prior advantage - surpassing building codes and construction permits - financially affordable - lightweight - simplicity to assemble or dismount	Citation: <...>we also wanted to build a place that seemed to ‘appear out of nowhere’, so we worked with box deluxe, a fabrication studio that specializes in building for movies and live events, to build the pod entirely off-site – for it to be installed overnight. Architects’ description
Nakagin Capsule Tower (No.87) 	Mental capsules - sociological and psychological aspect prevails - shelter for mind - temporary loneliness or rest - isolation from incoming information - and the capsules meant to symbolize innovation - joy and experimentation - provision of new impressions and experience - new organization of society	Citation: <...>It had a very specific intent that it was going to serve a certain clientele: businessmen who needed an urban home during the week<...> Its design embodies the Metabolists’ urban and social ideals: a city of mobility and flexibility, and a system adapted to the needs of a fast-paced, constantly changing society. The building celebrates the idea of interchangeability and flexibility through the capsule<...>. iconichouses.org, fastcompany
Mangal City (No.174) 	Growing capsules - aspect of changeability prevails - part of a capsule cluster - change of relationship between capsules - the capsules with joints to create structures - the capsules allowing fusion with each other - the capsules being adjustable; - recycable - urban planning approach	Citation: <...>the project is an “urban ecological system” composed of modular pod capsules that shift to adapt to environmental and contextual conditions. A beautiful example of biomimicry and certainly a flight of fancy, the plan proposes a futuristic building system based upon flexibility.’ Inhabitat

Fig. 24. Categorization and types of capsules in terms of applicability

The division above is a separation of capsule’s various applications which may be all-encompassing. Some capsules can be claimed by an architect as both a mental and mobile, or it can fall into all three categories. The iconic example of Nakagin Capsule Tower shows the capsules able to be movable, be replaced by capsules’ exchange over time and provide the new lifestyle (urban nomadism). As it seen in the Fig. 25 there is an equal number of built and unbuilt cases except the category of mental capsules where built examples exceed twice in number. It can be said that this aspect of capsule architecture recently becomes topical. Also, all three application methods are equally often used by architects. Despite the fact that megastructures are out of the focus in modern architecture trends, some utopian projects continue a futuristic agenda. Moreover, the appearance of

container architecture showed more flexibility how to decompose and recycle buildings with several successful projects of srudent housing as Keetwonen or Spacebox capsules TU Delft (Fig.25).

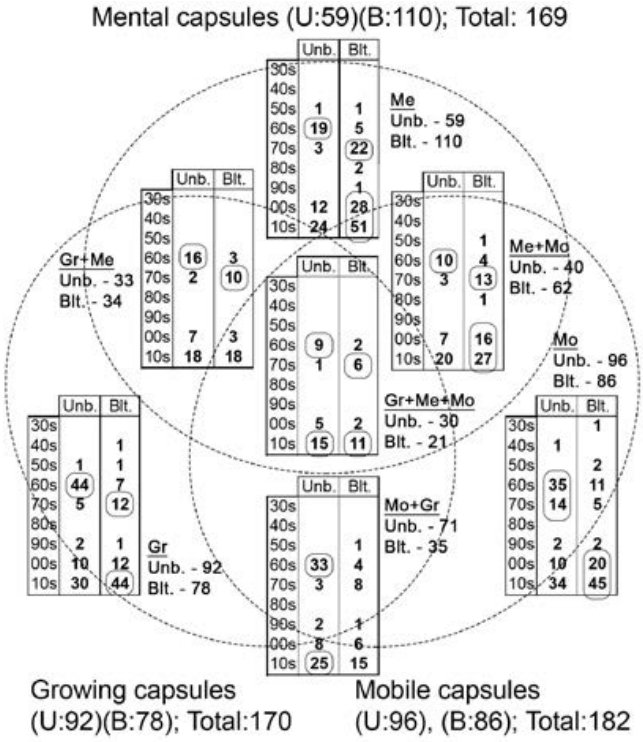


Fig. 25. Application of capsules

This section describes the origins of a capsule in architecture by analyzing its definition and background. This is done in order to better understand the purpose and need of using capsules in architectural design. Also, the chapter shows historical developments of capsule architecture starting from the beginning of the 20th century until the beginning of the 21st century. Respectively, the main characteristics described by Peter Senk in his book on capsules are used as a filter to separate 265 examples of capsule architecture in order to study their usage and categorize their purposes. It became clear that architects implied a range of advantages by using capsules in their designs, for instance, mobility, provision of both physical and mental shelter, as well the potential of change over time and flexibility. It helps to define the abilities of capsule architecture and its limits. Lastly, the collected examples are put onto the timeline in order to trace tendencies in capsule developments over the given time. It becomes clear that from 2000s capsules reappear in architectural design in

a form of either right successors of original capsules from 1960s or find their realization in a shape of shipping containers, as well as capsular bedrooms in capsule hotels.

Section 3 Basic characteristics of capsule architecture

3.1 Capsules and capsule structures

The characteristics of capsules provide understanding of the physical parameters of such objects and way of their arrangements in a single cluster. For instance, the mobile nature of capsules implies that they should be done from lightweight materials, while means of their arrangement and relationship may come from its shape, absence or presence of joints and clipping elements, as well as potential openings to be directly connected to neighbors. Hence, physical and visual characteristics define and reflect a capsule's concept.

These characteristics originate from capsules as separate objects themselves, as well as their combination what creates capsule architecture. All capsules even if they are self-sustainable, in principle prone to congregate in some structures what enhance their capacities. As a cluster capsule buildings have more flexibility of functional relationships and spatial arrangement than single capsules or their dissemination in a given area without physical attachment to each other. The famous Futuro House from Matti Suuronen is known to be an independent single dwelling, sometimes able to fuse with the houses alike, but less known example of application of Futuro Houses is Futuro Hotel – the arrangement of dozens of capsules pierced by either beam or string and hanging around the core structure[40)] (Fig. 26). Another example is Loft Cube which in general serves a purpose of detached mobile dwelling unit meant to nest on building's roofs; however, there exists another project of several loft-cubes arranged inside a single congestion[41)] (Fig. 27). Archigram's Living Pod, despite the attached additional functional nods to itself, can be a part of a bigger composition made from Living Pods nested in a framed structure[42)] (Fig. 28).

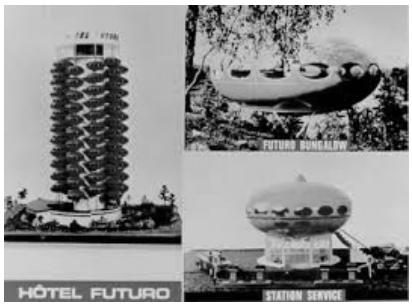


Fig. 26. Futuro Hotel and Futuro House

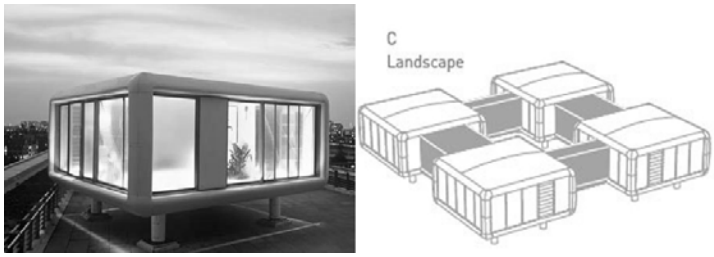


Fig. 27. A single Loft Cube and an option of their arrangements

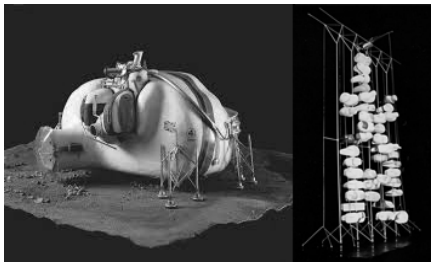


Fig. 28. Archigram's Living Pod and their cluster inside a metal frame

Thus, characteristics of capsule architecture are divided into two groups: basic capsule characteristics as shape, function, material, and size, and the second group describing characteristics of capsule compositions as a number of capsules inside a single building as well as a way of their arrangement. The following picture represents differences between characteristics of individual capsules as not architecture itself but rather the link between architecture and industry versus the properties of capsule architecture consisting of capsules and supporting elements (Fig.29).

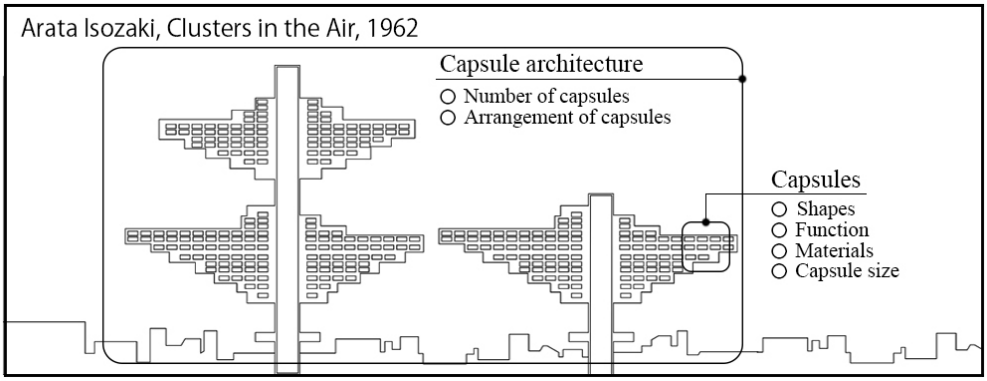
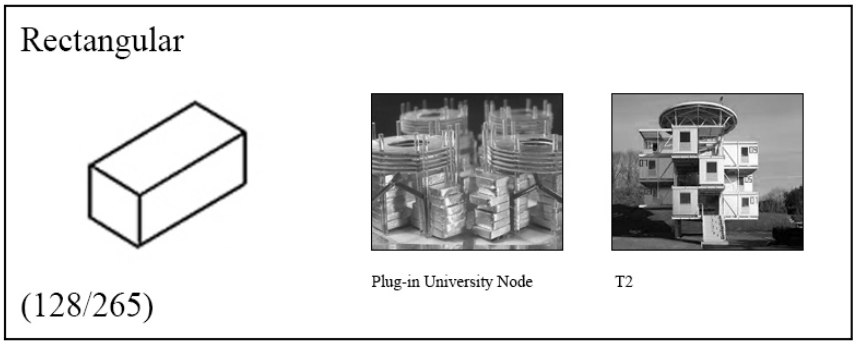


Fig. 29. Specification of characteristics of separate capsules and capsule architecture (Clusters in the Air, Arata Isozaki, 1962)

3.2 Characteristics of capsules

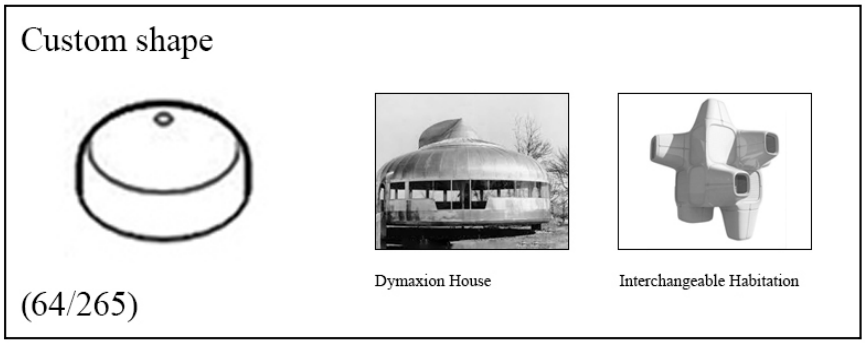
3.2.1 Shapes of capsules

Capsules may be of different shapes and they are unrestricted by own typology. However, capsules usually have to rely on connections to the neighboring capsules or supporting structures, which requires a solid edge representing a wall or connection of a size of, approximately, a door between capsules. This flat and wide region usually represents an entrance to a capsule, while other openings may be provided to windows, enclosures or other connections. Capsules are also viewed as optimized and ergonomic units what means either usage of plain shapes to organize and subdivide interior space, or custom shapes allowing the creation of additional subsections, elements, and other functional parts.

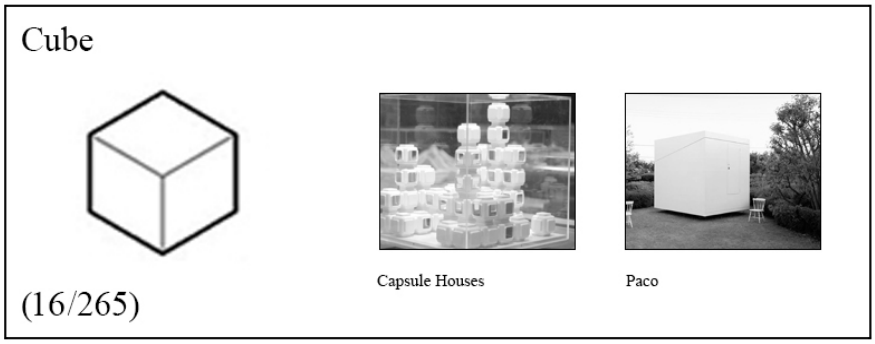


Rectangular capsules. Rectangles resembling a one-room space are dominant in capsule architecture. Such shapes create two directions – wider and shorter ones which allow bigger flexibility of organizing interior space as well as guaranteeing easiness in combining capsules together. In capsule hotels, a small prolong space corresponds to the dimensions of

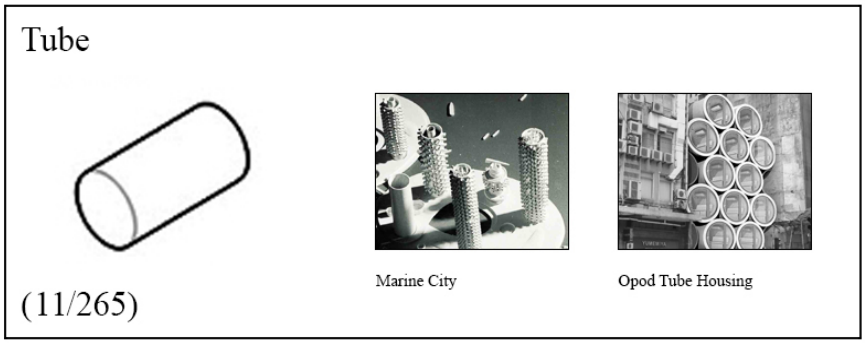
an average man, while container architecture relies on the long sided shape of a container, what itself shows ergonomics and optimal usage of volume to be filled with some content.



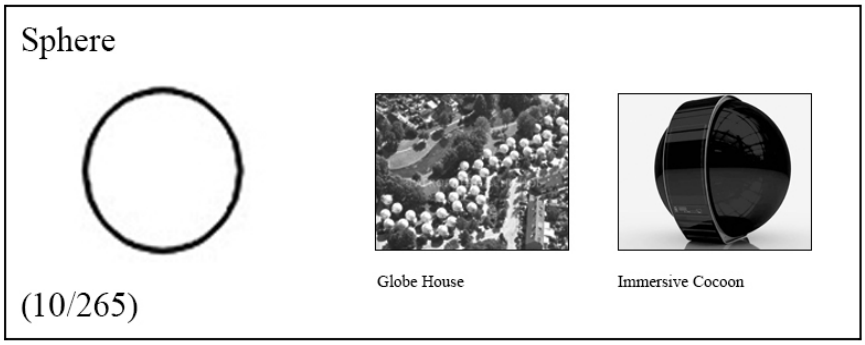
Capsules of custom shapes. Frequently claimed as experimental architecture or dwellings of the future the capsules are the smallest objects which might provide such experimentation as well as the flexibility regarding the economic justification of these complex designs. Therefore, capsules despite the fact that they meant to be mostly mass-produced sometimes shared extravagant design, both reflecting cultural, social and technological paradigms let alone an architect's expression.



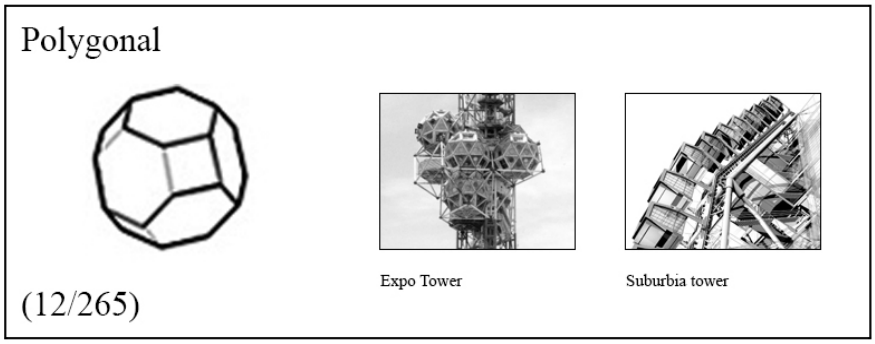
Cubical capsules. Cubes as uniform and simple shapes are frequently found in capsule architecture. They surrender to rectangular forms and sometimes join together as spatial blocks in order to create more complex structures based on a square module. Besides this, there is a little difference between them and rectangles.



Tubes. Well-known due to Kikutake's Marine City, the massive tubes with a width of 8 meters is a typical representative of tube capsules from the 1960s. On the other hand, modern examples find the shape of a tube in recycled concrete pipes by adjusting them for living or unusual hotel rooms.

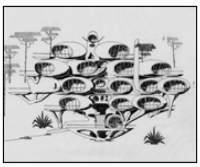


Spherical capsules. A sphere as another perfect and voluminous shape is yet difficult to connect, stack onto each other and adjust for conventional living lifestyle. Nevertheless, some project utilizes this form as a symbol of a bubble where a person or some function is inserted into. It was widely used by Austrian architectural group Haus-Rucker-Co, especially in their project of Pneumacosm where they used a large inflatable bubble to secure individual dwellings in a sprawling utopian city.

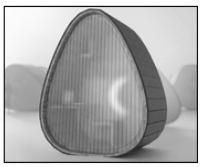


Polygonal capsules. Polygonal shapes occur from spatial connections of several edges. The polygons can be joined together to create openings and connect independent cells due to this geometrical shape.

Egg-shaped



Residence of M. Ginet

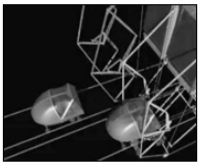


Egg Microhouse

(10/265)

Egg-shaped capsules. Egg's shape as an analogy to a capsule is also sometimes used in architecture. Discovering the bigger possibility of reinforced concrete shells in 1960s Swiss architect Pascal Hausermann was using egg-shaped capsules arranged together in alien-looking buildings.

Vehicle

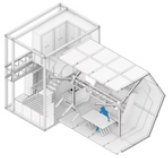
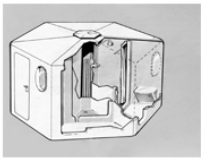


Drive-in House

Silver Bullet

(4/265)

Vehicles. Capsules in a shape of vehicles are the special section of capsules as a medium between architecture and car design. Cars viewed as a continuation of a house are replaced by these mobile functional units.

Dome	Honeycomb	Cylinder	Hexagon
			
The Environment Bubble	Rotating Plug-in Capsules	Prouve House	Plastic Modular Home
(2/265)	(3/265)	(3/265)	(1/265)

Domes, honeycombs, cylinders, hexagons. Besides the examples of shapes above, there is a row of distinguishable examples utilizing particular shapes. For example, a honeycomb structure is adopted because of its ability to be efficiently stacked what saves building materials and space. Domes as dwellings were being introduced by Buckminster Fuller since 1940s. Cylinders as a custom shape sometimes were rarely used as attachable spaces as it is presented in a project by Richard Rogers and partners. Lastly, there is a rare example of using a hexagon in a prototype of the mass-production modular plastic home by Wigth Plastics Limited from the UK.

The shapes and appearance of capsules are significantly connected to design trends prevailing over time. The 60s and 70s of the 20th century favored smooth forms and explicit use of plastics in design, interiors, and architecture, which allowed creation a range of smooth and curvy volumes. With the change in paradigms towards simplified, ergonomic and economically justified design capsules became having more straight lines and laconic shapes. Flat design dominating nowadays also has its influence on capsules which are partially a product of industrial design aimed to be maximally useful and easy to operate. It is possible to make a comparison between, what may be conditionally called a capsule, – a Moon base from the film Space Odyssey 2001 by Stanley Cubric (1968) featuring the sterile futuristic design of interior space of a lobby together with futuristic chairs by Olivier Mourgue representing the design of the future but in modernism thinking[43)]. On the other hand, as stated by architect himself – the combination of furniture and a house – Paco by Schemata Architects has a white spacious and minimalistic design utilizing the simplicity of straight forms[44)] (Fig.30).

Fig. 30. Interior design of a Moon base in Space Odyssey 2001, Stanley Cubric (1968) (left), and Paco by Schemata Architects (2009) (right)

Considering the abovementioned background and possible influences given by the time of design and completion, the general shapes of capsules are divided into two conditional time periods and presented in the diagram below (Fig. 31).

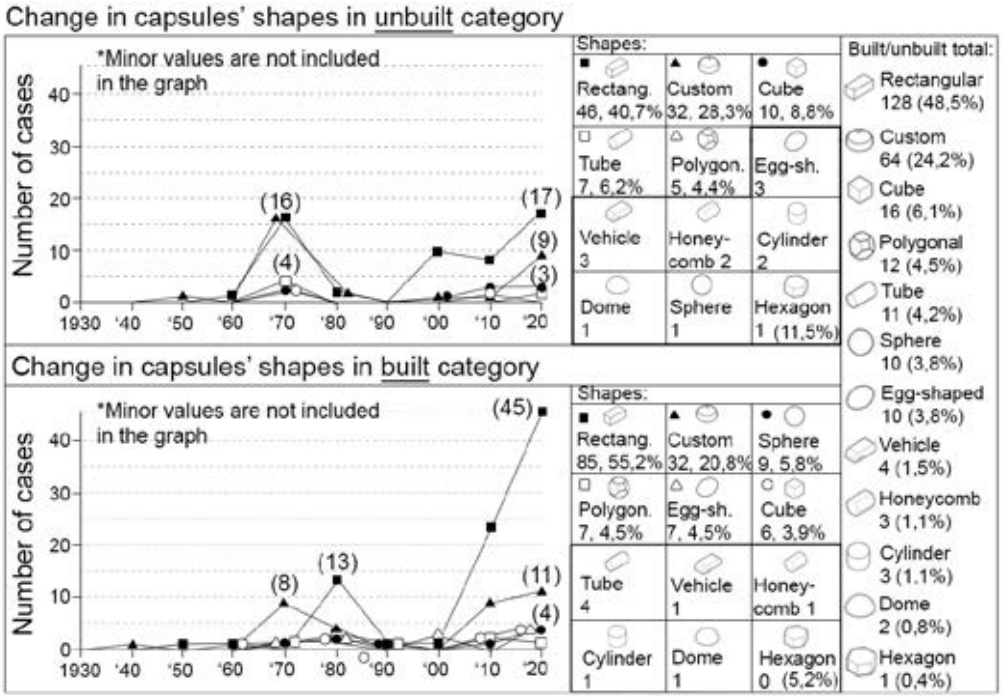


Fig. 31. Change in capsules' shapes

The column on the right in the diagram above is a percentage of each shape in the total number of studied cases. Here it is possible to extract common shapes of capsules and their percentage as follows: Rectangular (48,5%), Custom shape (24,2%), Cube (6,1%), Tube (4,5%), Sphere (4,2%), Polygonal (3,8%), Egg-shaped (3,8%), Vehicle (1,5%), and lastly Domes, Honeycombs, Cylinders and Hexagons as rarely occurring cases (3,4% all together).

The diagram above shows the distribution of shapes over two time periods which are additionally subdivided into realized and unrealized categories. The division of vertical columns corresponds to the percentage of each shape in the total number of cases. The numbers represent the quantity of each shape and are given for reference in order to understand the real number of the examples. This is done in order to remove confusion which may occur judging from the increased percentage of usage of the given parameter,

while the numerical value may actually decrease. As stated before in this chapter it concentrates on percentages as a more accurate representation of the distribution of cases. Therefore, in the case of capsules' shapes, it is clear that cubic and rectangular ones become more used over time. Particularly, rectangular shapes are dominant through both realized and unrealized examples. The fraction of custom designs is decreasing over time what shows architects' inclined to use more unified shapes. Cubes as capsules appear more in the 1980s-2010s but rarely realized. Use of the spherical shapes increased over time and includes the dominant fraction of realized examples. It corresponds to the use of inflatable structures in the shape of bubbles which are easy to manufacture. Rather than actual dwellings, such bubbles are often used as hotel rooms or for other purposes. In general, capsules of shapes different from the dominant ones occupy about 1/3 of the total number and are heavily subdivided into various shapes. Thus, the changes in them are minute and may be unified into a single category. Usage of such shapes also decreasing over time.

Both realized and unrealized cases show an almost identical trend with the increase of rectangular shapes, a decrease of custom shapes together with other shapes. This leads to the conclusion that the new generation of capsules mostly exploits rectangular shape or those which are close to such shape as a basis for their design.

3.2.2 Functions of capsules

A capsule as a functional space is meant to fulfill a range of purposes. Despite the fact that capsules are usually monofunctional, some of them gathered into a three-dimensional nod may serve different functions and be polyfunctional architecture as a whole. Thus, capsule architecture, although it fits residential typology quite well, is not limited to house provision, but allows to use capsules for different occasions and to be able to adjust and change functional content by rearranging capsules' roles.

Residential capsules. These monofunctional units are the most common among capsule architecture and represent both capsule clusters with individual dwellings often limited to only one room and separate micro-homes without neighboring capsules. Yet, in some cases, capsules may connect to each other via tunnels or intermediate space in order to create bigger dwellings. The concept of a capsule partially assumes its use as a modular home, which can grow or change with time reflecting the increasing number of family members who would need new space or, perhaps, new capsules.

Hotel rooms. Capsules bearing a sense of temporary and intermediate dwelling are of good use in the case of hotel rooms. This small space is relatively comfortable for a short living and is quite cheap comparing it to ordinary hotels. Together with the increased mobility recently, it is not uncommon that tourists choose several places within a foreign country to visit or even several countries in a considerably short period of time. Thus, people often prefer hostels, AirBnB, or capsule hotels as their place to stay. Capsule hotels themselves serve the purpose of new experiences and are not limited to only small cabins inside interior space. Das Park Hotel in Germany provides pipe sections modified to hotel rooms what creates a unique experience of staying inside such an unusual place. On the other hand, the capsules are still a wonder for western public and are still a symbol of the futuristic lifestyle; hence, capsule hotels' owners transfer this feeling inside capsules' design.

Multipurpose capsules. These capsules are still mostly monofunctional units, but they are mixed together inside a single building. On the other hand, their function also may change over time. The good example is the Nakagin Capsule Tower itself. Designed as a second house, that is, not a real housing, but as a shelter and hobby room for Japanese salaryman, the real implementation of its units is fluid. The capsules may be used more as a residence, office, showroom, meeting-room, studio, etc. In principle, all capsules may be slightly readjusted for fulfilling other function than before, but the cases as Nakagin Capsule Tower usually highlight the flexibility regarding function in their designs. In projects of Kisho Kurokawa's contemporaries who were designing megastructures, their urban objects were often divided into different functional areas as residential blocks, office units, leisure areas, etc. what, as a whole, made such large-scale architecture a multifunctional space.

Commercial capsules. Capsules provide a flexible solution to create seasonal commercial spaces or trading centers connected to some big events. As a part of 'pop up movement' when architecture is considered an easy tool to fulfill the current needs by easy and quick construction, the capsules usually in a shape of containers can be quickly installed onto some temporary empty spot without establishing fundaments. If a building is no more needed it can be quickly disassembled and sold or put to another use, what makes architecture just a part of a business plan. Capsules containing shops may create quite massive commercial places and physically expand or shrink according to market fluctuations.

Office capsules. Office capsules are exceptionally provided for office rooms or studios. Archigram's Plug-In City contained so-called office towers serving the purpose of business districts. The business what is equally fluid as commercial activity then could

dislocate its headquarters and move its own office capsules to another place. In recent years, as a reaction to enslaving and stuffed office cubicles inside stereotypical companies of the second half of the 20th century, modern companies are looking for updating working conditions where capsules as transparent and spacious personal boxes may be of use.

Attraction capsules. As one of the major functions presented in architecture the 'attraction' category includes exposition halls, installations, and so on. The good example is Kikutake's Expo Tower used to observe Expo'70. Another example is Mixer by Lot-Ek who used a cement mixer as an exhibit containing different environment which the visitors were invited to submerge into.

Utility capsules. Often used by Kurokawa the utilities placed outside the main building's body are seen in his Sony Tower, Koito building and Um Al Khanazeer Island and Tourist Development. Another notable example is Pod Vending Machine Skyscraper (2017) acting as a production building for small capsules which are as easy to buy as a drink in a conventional vending machine.

Capsules as extensions, auditoriums, components of vertical farms, and sport facilities. Besides the categories provided above capsules may be used as extensions and functional components to ordinary buildings. As an extension capsules are usually meant to be brutally attached to existing facades or walls of the buildings as a proclamation of expansion of personal space. The typical example, in this case, is quite famous Rucksack House traveled over some spots in Europe as an exhibit together with its owner. Auditoriums as capsules are the functional spaces mostly described in Archigram's Plug-in City as movable laboratories able to change their physical location. Vertical farming with the usage of capsules is presented in the project of the Eco-Pods containing greenery and crops inside. Capsules as detachable tribunes are shown in the project of Ras Abu Aboud Stadium in Qatar. The stadium will be reassembled into two new sports facilities after Qatar carries the World Cup in 2022.

In the 1950s-1960s with the development of the movement of New Urbanism with the one of its first representation in the shape of 'House of the Future' by Smithons and techno-utopian or biological concepts by Archigram and Metabolism later, the primary function of capsules was residential. The generation of residents living inside the vast megastructures was provided with the monofunctional capsules taking a significant part in the constant transformation of the utopian cities. That made capsules more dependent on infrastructure which on the contrast had conventional buildings, hubs, joints, etc., serving

other purposes. On the other hand, after the megastructures, as a principle, were abandoned, capsules began relying on themselves or the clusters they composed. That led to the increase of a range of the functions which capsules could generally have. Hence, capsules became a provision for a temporary residence what facilitated the increase of capsules as hotel rooms. With the increased globalization and mobility what also supported capsule hotels as a hotel industry as a whole, a new type of global consumerism symbolized in a shape of shipping containers helped to create container malls and other commercial objects what was just occasionally considered before. The capsules which could be potentially used as kiosks or telephone booths were developed by Sasa J. Machtig in his K67 (1969) module and the telephone booth for Nippon Telegraph and Telephone Corporation by Kenji Ekuan (1953) respectively. The diagram below shows the transition in usages of capsules of different function divided by decades, as well as the two chosen time periods (Fig. 32).

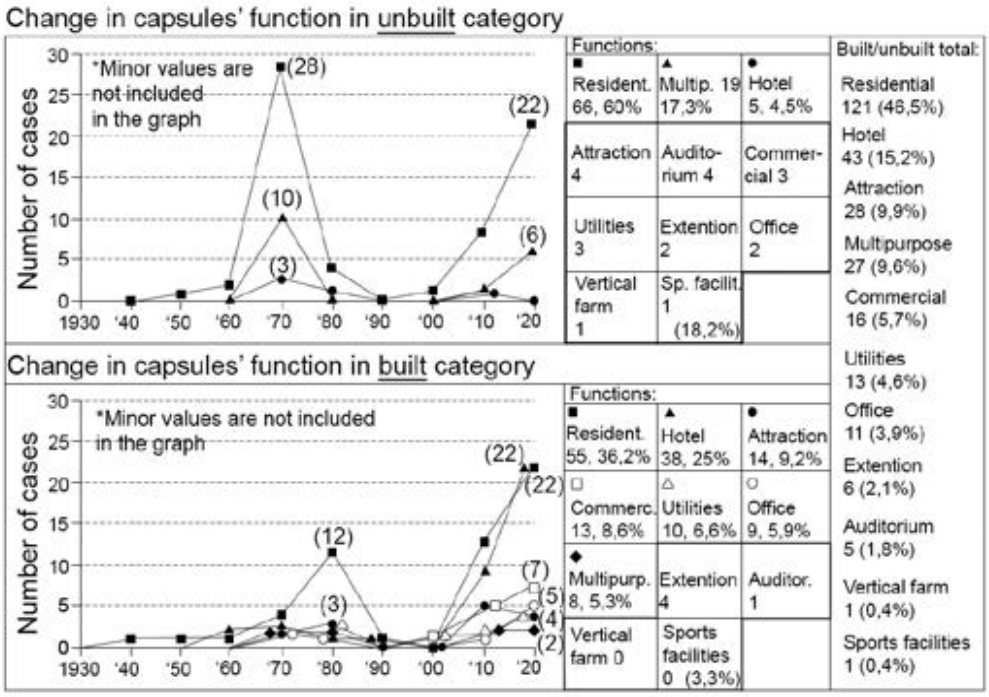


Fig. 32. Change in capsules' function

The column on the right in the scheme above represents the percentage of each function from the total number of studied cases. It is clear that residential function prevails among other usage of capsule architecture. The percentages of each functions are: Residential (48,5%), Hotel room (15,2%), Attraction (9,9%), Multipurpose (9,6%),

Commercial space (5,7%), Utilities (4,6%), Office (3,9%), and eventually the capsules aimed to create Extensions of a house, Auditoriums or study rooms, Urban vertical farms and Sport facilities are the rarest examples (4,7% in total).

The table above is presented in percentages of each function described in Section 3 of this research. The percentage is shown as divisions of vertical columns while numbers correspond to the actual number of the studied cases. It is clear that residential function dominates at all given time periods regardless of whether the examples are realized or unrealized. Yet it should be mentioned that residential function is being slightly decreased over time by growing numbers of the function as hotel rooms and commercial spaces. These two functions were very often realized in 1980s-2010s. The reasons for such efficient realization are that both functions have economic profit in the implementation of a design, as well as during maintenance. The latter corresponds to the deployed trend of capsule hotels worldwide what was not of such a big scale in 1930s-1970s. The similar trend may be found in capsules serving the purpose of attraction since they also appear more often and in a built form. Multipurpose cells were sometimes proposed by architects in 1930-1970s but were not built often. In modern times, multipurpose cells are also designed rarely. Similar to the trends with capsule shapes, other functions which may be found in capsules, does not occupy more than 1/3 of the total number of cases, and, therefore, they mean a natural differentiations and experiments with other capsules' usage. The good examples are sports facilities and vertical farms – the two fresh ideas corresponding to current trends of sustainability and recycling.

In general, both realized and unrealized examples of the two given timelines show a similar trend of the slight decrease of residential function over time, although, if presented by decades, the residential capsules show just fluctuations around 50% of all cases. In both realized and realized examples of capsules as hotel rooms and commercial spaces are often realized due to their profitability. Other functions are also presented in lesser numbers and are shown as a bigger fraction in 1930s-1970s.

3.2.3 Materials used in capsules

If compared to conventional buildings capsules' structures are often a monocoque structure or a similar bearing frame, to which various infill is applied. Capsules may consist of several components combined together to create an envelope of a capsule, and due to their

smallness as an inherent feature, they can be easily disassembled. Examples of Tetrodon and Futuro house show how these capsules may be transported in the disassembled state but then put together on site. This section concentrates on primary building materials from which the capsules are made from. It includes both materials for bearing structure and shells. It is not rare when a capsule's structure and walls are made from a single material.

Plastics. Application of plastic as a building material in architecture began in the 1950s and from that time different kinds of plastic shells or skins have been used until nowadays. This includes membranes of inflatable architecture, plastic walls of capsules in capsule hotels, fiberglass-reinforced plastic in projects of Futuro, Plastic Stackable Cells from Chaneac, Cylindrical Building from Guy Dessauges together with contemporary examples of Mangal City, Xpod or Toretore village in Japan.

Shipping containers. Shipping containers as a finished product borrowed from industrial design is already a metal frame with corrugated metal walls, but due to its characteristics, it would be better to consider it as a separate section. For small-scale construction, it is enough to add isolation to thin walls of a container in order to make it more or less livable space. Architectural bureau Lot-Ek currently competes with their colleagues from the UK by creating more flexible designs done from shipping containers which become less and less limited as a dwelling because of their initial properties.

Metal frame/Steel plates. The metal was widely used in projects of Metabolists. In Kikutake's Marine City the long cylindrical cantilever capsules are simply magnetized to the core structure. Archigam also implemented designs of metal boxes for their Plug-in city. Modern examples include New Bivouac Gervasutti (a remote nomadic shelter done from oval metal sections) and Living Roof Capsule 2 from stainless steel by Nau2.

Reinforced concrete shells. If reinforced, concrete allows the creation of smooth shapes what fits well a capsules' definition of the integrity of an envelope. Spaceboxes from TU Delft in the Netherlands relies on a concrete structure as a reliable and durable building material. The capsules when they finish their contract may be still in a good shape to be resold to another developer.

Wood structures. With a widened awareness of environmental crisis and impact from the building industry, there is a tendency of an increased number of projects made from wood. Eco-capsule from Slovakia is made from a light wooden structure. Similarly, other projects of micro-homes are also being refusing plastic in favor of wood, but such an

approach is still developing nowadays. On the other hand, Microhouse from Ken Isaak (1970) has plywood walls and it a good example of DIY and early sustainable design.

Unspecified. As shown above, in this section, there are the cases included in this research when a project is still at the concept stage, therefore it may lack some technical information including building materials, especially if a project is of a large scale. Stephane Malka in his Pocket of Active Resistance streams his design into sociological and political realm rather than architecture. Thus, his capsules (pockets) are immaterialized to some degree, that is, the material serves no purpose in the main concept.

Glass, Concrete pipes and Other objects. There are occasional usages of glass as a dominant material used in capsules. In Heal-Berg designed as a facility for arctic research big glass capsules of different uses are transported by drones. Concrete pipes as a less known substitution to containers as finished industrial products are sometimes used to become a shell for capsules. Other objects converted into capsules may be wine barrels, abandoned escape pods, cement mixers or other voluminous objects which are big enough to contain a person.

Capsules, due to their smallness and lightweight allow architects to design them in a range of different materials. In the 20th century with the boom of usage of plastics in a range of fields, capsules also were influenced and proposed as plastic shells with some insulation inside to serve a function of a sufficient home. Used primary by separate practices from the 1950s the plastic cells were also used by the big movements as Archigram as well as Kenji Ekuan related to Metabolists in his projects of mobile capsules. Many bath units done from plastics still on the large scale of production in Japan are related to Fuller's 'Prefabricated Bathroom' from 1938. The bathroom unit inside a capsule in Nakagin Capsule Tower is also a semi-metal and semi-plastic component. On the other hand, metal monocoque together with metal sheets for the skin of a capsule was frequently used by Japanese Metabolists as a building material due to its better recyclability since the capsules meant to be notably temporary entities. Reinforced concrete structures as one of the good representative of the 20th century's Brutalism in architecture was sometimes used in capsules as well by independent architects. Nowadays concrete is still in use as a structural frame in conventional buildings and as an architectural tool in works by Zaha Hadid or Tadao Ando, as it was similarly used by Louis Kahn in the 20th century, but with no relation to capsule design. Recently, many designs of capsules are done from wood due to the trend of sustainability, and a 'clear reputation' of wood as a green material what is easy to work with

and what is flexible enough not to interfere with an architect's expression. Simultaneously, the use of plastic has decreased as a response to global pollution and standardization provided for new green and environment friendly architecture. As a continuous image of the future, capsules are often considered as recyclable and sustainable designs provided with newly developed recycled plastics, or with minimum usage of them in favor of painted wood. The appearance of shipping containers plays a different role in the implementation of capsule architecture using the already manufactured element as a frame on which a small dwelling may be based. This trend is not limited by only containers, but other objects having a volume to contain a man – sections of pipe tubes, emergency pods or other objects borrowed from different fields. The table above shows the transition in different uses of materials in capsules over time (Fig. 33).

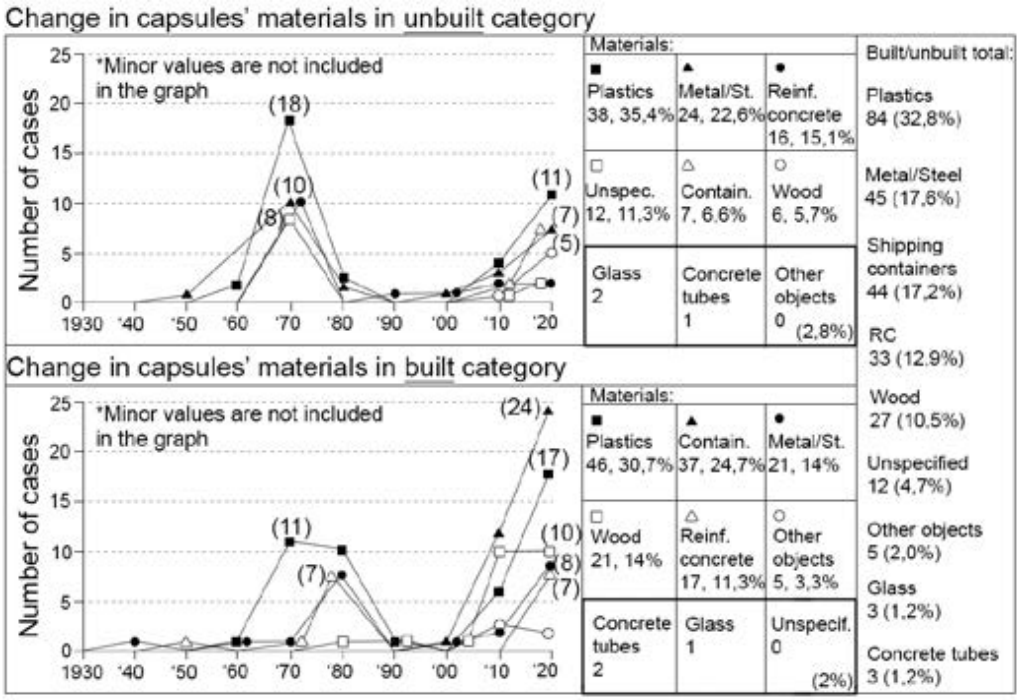


Fig. 33. Change in capsules' materials

The column to the right in the table above corresponds to the percentage of studied cases where each described material is shown. The distribution shows a gradual decrease in material use from plastics to unspecified what shows a wide range of different types of materials in capsules' design. The category named 'unspecified' partially indicates the lack of information regarding materials in the given design what, in some cases, is omitted by

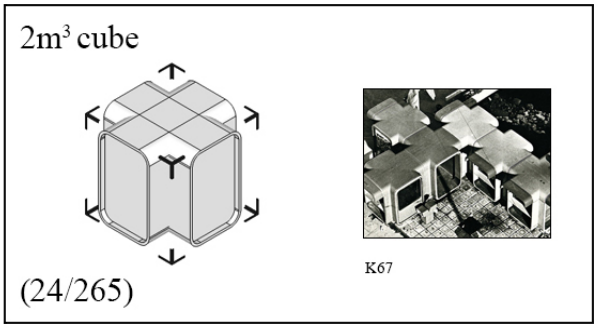
architect oneself. Such matter occurs if a selected project is a concept, sketch or study which contains useful information about other properties of capsules, but lacks in clarifying materials' as a secondary characteristic[45]. Nevertheless, the table above clearly shows a wide use of plastics and shipping containers in capsule architecture. The percentage of each given material follows as: Plastics (32,8%), Metal/Steel (17,6%), Containers (17,2%), Reinforced concrete shells (RC) (12,9%), Wood (10,5%), Unspecified (4,7%), together with Concrete pipes, Glass as well as Other objects (4,4% in a total).

The table above shows changes related to materials in capsule architecture and is divided by decades as well as two chosen time periods which are subdivided into realized and unrealized examples. Both tables show different patterns in the use of materials where some of them may be more or less used in designs without a strict dominant related to some particular material. For example, sometimes the percentage of plastics is taken over by metal structures and containers, which are, basically, the same material. The appearance of containers in middle and large-scale projects from the 2000s has a significant influence on the transition of use of the materials in capsule architecture. Reinforced concrete shells have decreased in use over time, due to its lesser use in prefabricated construction over the new techniques of 3d printing in architecture what finds a more flexible way to combine concrete and modern technology. On the other hand, it is partially replaced by the section of concrete pipes used as an extravagant living place for modern urban nomads. There is also a decrease in the unspecified category which exists only in conceptual projects of capsule architecture. This corresponds to large urban planning projects which were often proposed by modernist architects, while modern capsule architecture does not put the primary goal to reinvent the urban environment but complement it by new and innovative ways what, particularly means the use of capsules for various purposes while their characters may be more or less defined. The good examples are Eco-Pod (2012) by Squared Design Lab, Micro Compact Home (2001) and Wow Pod by IDEO Design Consultancy (2014). This also means the significant role of capsules in the easier manipulation of the urban environment in the modern trend of sustainable and flexible cities.

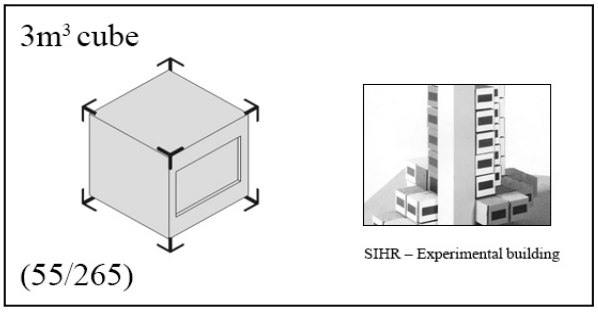
The realized and unrealized section shows a similar trend of materials' use where percentages of different materials are mostly the same with two big exceptions in the case of shipping containers as well as wood structures with appearing in the period of 1980s-2010s.

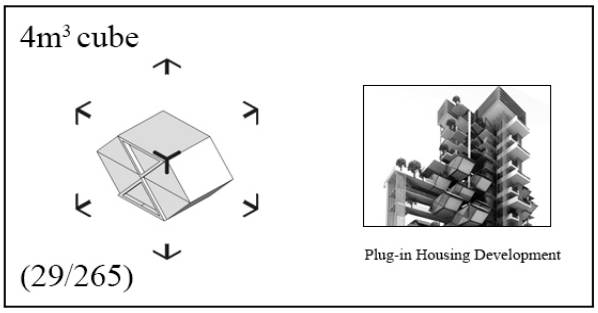
3.2.4 Capsules' sizes

Capsules due to their small size are able to create bigger structures which scale directly depends on the number of capsules inside its physical borders. Nevertheless, capsules appear of a big variety of shapes and sizes. The iconic capsules from Nakagin Capsule Tower are 2.5x2.5x4.0 meters in size, while Claude Prouve's SIHR unit is approximately a block with sides of 3x3x2.5 meters. There are even smaller capsules which may fit inside a square of 2-meters sides, while, on the other hand, some capsules may include even several floors within its structure, and their longer side may exceed 10 meters. Shapes of capsules vary drastically, especially those of a custom design; therefore, it is confusing to correlate their actual size to only three spatial parameters. On the other hand, what can be alternatively done is to adjust a capsule's size to a cube with the defined dimensions in order to see if a capsule fits inside. This allows comprehensively evaluating an actual volume of a capsule as a set of various dimensions coming from a capsule's shape.

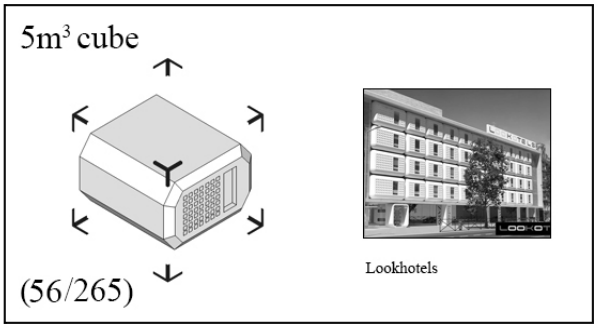


Capsules fitting inside 2 m^3 cube. Capsules of such size may barely fit a man inside, therefore, are not used as dwellings. But if combined they may create homes made from interconnected separated pods, what as a whole make it a dwelling of an appropriate size. This volume is enough as a camping or temporary shelter, as well as for a cell in a capsule hotel.

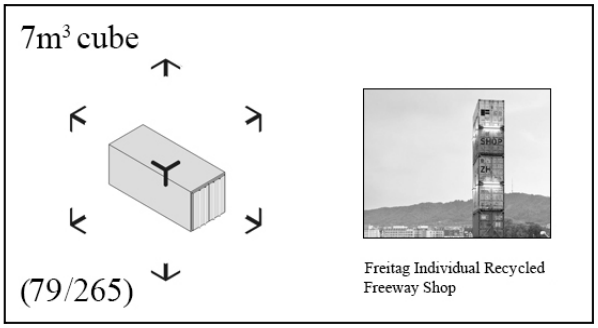




Capsules fitting inside 3 and 4 m^3 cube. Considering the fact that there is no big difference between the length of 3 and 4 meters judging from ergonomics, capsules of these sizes often appear to have similar properties of extra-small homes which are sufficient enough to facilitate living for longer periods of time. Any other function may be put inside such space is correspondingly should occupy a mere amount of space. Together these two categories create the biggest fraction inside capsule sizes, what appropriately transfer the meaning of smallness going in parallel with a capsule's concept.

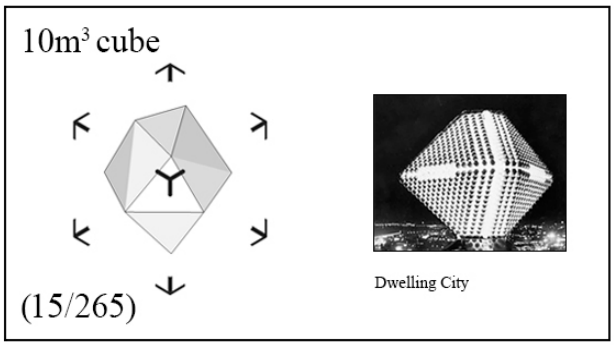


Capsules fitting inside 5 m^3 cube. Capsules of this size are the medium between stereotypically small capsules and more spacious self-sufficient capsules of bigger sizes. Such size already satisfies a requirement for a small flat, dorm room, studio or office.

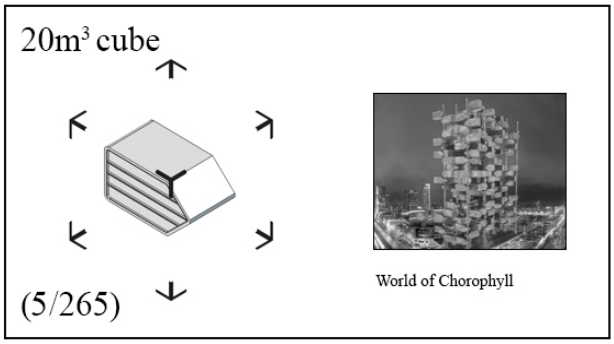


Capsules fitting inside 7 m^3 cube. Connected to a size of a 20' container of approximately 6.0x2.4x2.4 meters the capsules of this size corresponds to large scale usage of shipping containers in modern construction. On the other hand, this size is picked by

other modernist and contemporary architects as enough space to contain a nuclear family. The size already allows capsules to have 2 floors inside their solid envelope. This is the second fixed size for capsules to have, as a bigger version of those about 3~4 meters in length. Such size is not compulsory to be connected to a shipping container, but, rather, on the opposite, the shipping container's profile is suitable to become a space for dwelling.



Capsules fitting inside 10 m^3 cube. Such capsules usually have a complex inner structure and if combined create massive clusters. Their shapes may have extensions or protrusions what adds up a spacious shape.



Capsules fitting inside 20 m^3 cube. Capsules exceeding 10 meters in length are rare due to their massiveness, and consequently the difficulties regarding their mobility. Nevertheless, capsules of such big sizes may be mass-produced and replaced using extra-heavy machinery and cranes.

Capsules can have different sizes starting from extra small and solely theoretical minimum spaces for people to live and operate (1SQM House by Van Bo Le Mentzel[46)]) to quite massive capsules able to contain a whole family. If compared to the modernism period the modern capsules also appear in a wide range of sizes, thus, there appears to be no defined trend towards increasing or decreasing area of a single unit with time. If we calculate the average area of all capsules designed in the time period of the 1930s-1970s and compare them to modern ones, the result will be 5.35 m3 versus 4.91m3 cube respectively.

This means that the average capsule has a size approximately fitting the cube with sides of 5 m regardless of the chosen time period. This number is connected to a different characteristic of capsule architecture namely the property of capsules to combine in order to form bigger structures. Similarly to Kikutake's Sky House which grow over time by connecting the new pods to the main house with the increasing number of family members and Colani's Experiment 70 implying future houses consisting from a combination of separate capsules, there is no need for capsules themselves to increase their volume, but rather combine together in order to create more spacious dwelling inside a building made from capsules. Nevertheless, such property does not cancel the big variety of extra small dwellings aiming for nomadism or functionalism as well as extra-large capsules serving a purpose of a big shield protecting content (Pneumacosm by Haus-Rucker-Co, Fuller's Fly Eye). Thus, capsules' size, in general, is not influenced by change in paradigms, models for the future better cities or people's demand for the bigger dwellings, but rather it is dependent on the typology of capsule architecture itself which relies on ergonomics, and considering the potential to grow over time, by connecting new capsules, this kind of architecture, theoretically, may provide dwellings of any size.

The table below shows the main changes in capsule architecture regarding given sizes of capsules over two chosen time periods of 1930s-1970s and 1980s-2010s (Fig.34).

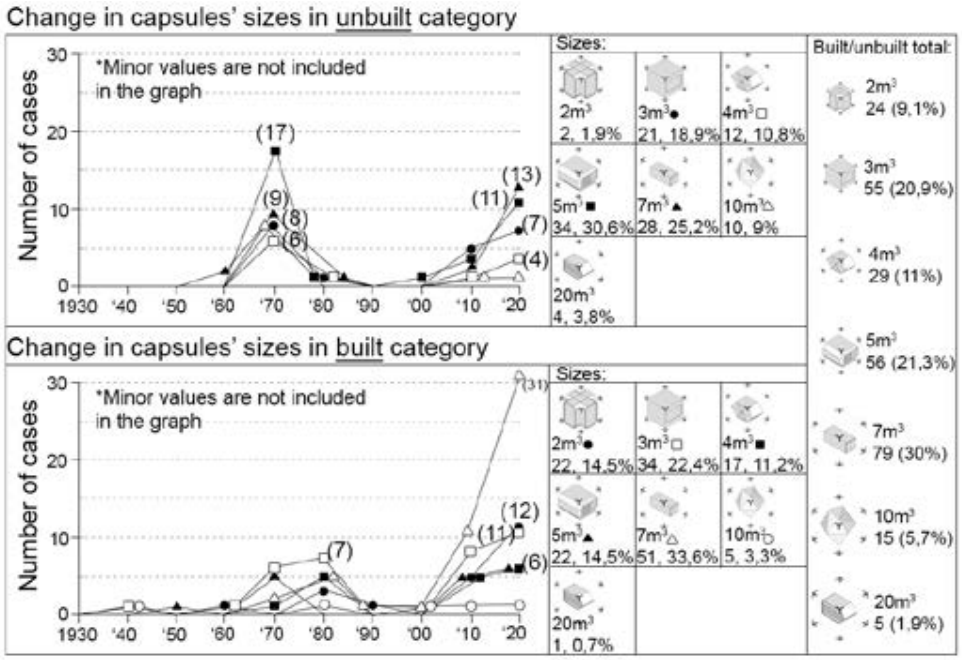


Fig. 34. Change in capsules' sizes

The line to the left in the table above shown percentage of different capsules sizes as follows: 2 m^3 (9,1%), 3 m^3 (20,9%), 4 m^3 (11%), 5 m^3 (21,3%), 7 m^3 (30%), 10 m^3 (5,7%), 20 m^3 (1,9%). The numbers show that capsules which may fit a 7 m^3 cube are the most frequently used, together with capsules not exceeding a cube of 3 m^3 side. The former corresponds to an average size of a microhouse or majority of shipping containers – the space may be enough for minimal living. On the other hand, the latter capsules are more prone to combine into various structures, but some examples as Micro Compact Home Ltd (2001) provide an extremely small space of several square meters as an independent dwelling. On average, sizes of capsules may be freely decided in a range of 2~7 m^3 cube with the approximate areas staring from 3-4 m^2 to around 50 or 60 m^2.

The table above represents the main changes in capsules' sizes over time divided by decades as well as the two time periods which are additionally subdivided into realized and unrealized categories. It is clear that there are no dominants in the given diagram and capsule sizes are distributed evenly with some fluctuations. The sizes appearing the most correspond to 2, 3, 5 and 7m^3 cubes. It is clear that the capsules which may fit inside the 7 m3 cube are common in both time periods corresponding to capsules devoted to containing either a nuclear family or an individual. In modern times this number has increased due to the introduction of shipping containers to the architectural field, and the number of built examples has grown as well. Capsules of medium size about 5 m^3 cubes are decreasing over time while the factor of the realized examples has grown in the period of 1980s-2010s. The cases of large capsules exceeding in size the 10 m^3 volume are rare and were proposed more by modernist architects. The small capsules appear more often in modern times corresponding to the increasing trend of capsule hotels and mobile hotel rooms or temporary shelters (Snoozebox by Snoozebox Hotel, Exo by Michael McDaniel). Such capsules are often manufactured in numbers due to their small scale. In general, small cabins, pods or compact hotel rooms often can be found in transportation hubs, or elsewhere due to increased people's mobility.

In general, the two time periods have small changes and have the slight differences regarding capsules' sizes in the unrealized category, but show an increased number of built capsules in 7m^3 the category and decrease in capsules which may fir inside the conditional 3m^3 cube.

3.3 Characteristics of capsule structures

3.3.1 Number of capsules inside a single structure

Capsule architecture is a unique kind of architecture due to its composition of spatial building blocks which number is not limited and may change over time. This creates the phenomenon that at some chosen periods of time capsule architecture may have a different number of capsules and, hence, a different shape and properties, at least in the concept. Real examples often include container architecture as such examples. With the constant provision of containers which characteristics do not change over time, container architecture always gets new unified material. On the other hand, until now no other mass produced unit was continuous enough to withstand the test of time. In many famous examples of the 1960s as Tetrodon, Futuro or SIHR the production collapsed due to various reasons while many modern examples are still at the prototype stage in the ambition to create new capsule design. Nonetheless, the fact of natural 'shapelessness' of capsule architecture rises question how to relate to capsules' count per single structure or architectural assemble. In this research it is decided to count the current number of capsules provided with the corresponding remarks regarding change of a number of capsules over time, if such fact exists in the built examples [47)]. Moreover, in the cases when a capsule is presented as a prototype and, in principle, the potential scale of expansion is undefined the capsule refers to the number '1+(no limit)', what corresponds to its potential multiplication. This includes both built and unbuilt examples if an architect does not specify the limits of capsules may be put inside a single building. Another note should be clarified is a category '1'. This corresponds to some examples where a capsule is not meant to be mass-produced what does not contradict with a capsule's definition. In such cases, capsules are chosen due to other characteristics, as simulated comfort, smallness, and mobility, etc.

Ever-growing capsules (1+(no limit). Opposite to as it was done in the case of Nakagin Capsule Tower when capsules were specially manufactured as a part of actual architectural project, studies on Tetrodon in France or Futuro House in Finland presented their mobile dwellings as a product to start architecture from. About 1000 Tetrodons and 100 Futuro Houses were manufactured in total, but clusters made from those capsules varied in number. Therefore it is better to consider these cases, as a whole, unlimited in scale. Modern examples, still being at the prototype stage, gradually increase the production of their capsules, which are being bought still one by one.

2~50 capsules per building. This corresponds to a limited number of capsules shown in the studied designs. It includes a big fraction of shipping containers as a suitable solution to quickly create functional space by stacking several containers onto each other. This number is usually sufficient enough for small and middle scale architectures.

51~500 capsules per building. The buildings bearing this number of capsules correspond to middle and large scale construction including capsule skyscrapers. As a rule, such buildings have a supportive structure and increased mobility and means of manipulation with capsules – cranes on top of the buildings, additional infrastructure inside the buildings, robotic arms, etc.

501~1000 capsules per building. Such buildings correspond to the more complex architecture with more ramified structures which can crawl on topography or be built up vertically.

1001~10000 capsules per structure and more per agglomeration. Projects of this scale often include several clusters of capsules unified under some platform or a core, what may be a project for new districts, towns, megastructures, etc. The largest scale includes many utopian projects of vast cities exploiting megastructures as Archigram's Plug-in City, Marine City by Kikutake or a new district called Mangal City by Chimera.

The capsules if combined together can grow in numbers and increase the size of a building they create. Therefore, starting from the beginning of the 20th century many architects studying capsules were concentrating on their shapes, sizes, and means of connection and communication. The 1960s, which had significantly increased activities regarding the development of capsule architecture, were more experimental rather than the period of built designs in the 1980s-2010s. For example, Archigram despite the number of different capsule projects did not intend their ideas to be implemented on practice, similarly as it was done with the House of the Future by Smithons. Capsules, first, were a study subject for experimenting with architecture, and such experimentation was expanding during the 1960s. In the 1970s there was an increased number of built examples of capsule architecture what, nonetheless, was still considered a trial. Experimental building in Ludres by Claude Prouve and Nakagin Capsule Tower were indeed one of the first medium scale examples of working capsule architecture. Such developments were rapidly cut by both tiredness by Modernism which had created inconvenient cities as well as the Oil Crisis which had directly influenced the global construction market. From the 2000s some architects start reconsidering modular and capsule architecture from anew by interpreting the

previous studies on the capsule architecture by modern thinking. This time the built examples appear quite quickly but are limited in scale. Capsule architecture allowing movability and enabling potential growth was mixed with the pop-up movement which also used temporary structures as means for expression, utilization of practical matter and architectural progressivism[48]. Such buildings were operating within the framework of a small scale with capsules not exceeding several dozens in number and which could be potentially dismantled and resold. Modern capsule architecture shows its practical implementation but on the small scale leaving enormous megastructures' proposals in the past.

The table below shows changes in capsule architecture regarding the number of capsules inside a single building or structure and are divided into the two time periods of 1930s-1970s and 1980s-2010s (Fig. 35).

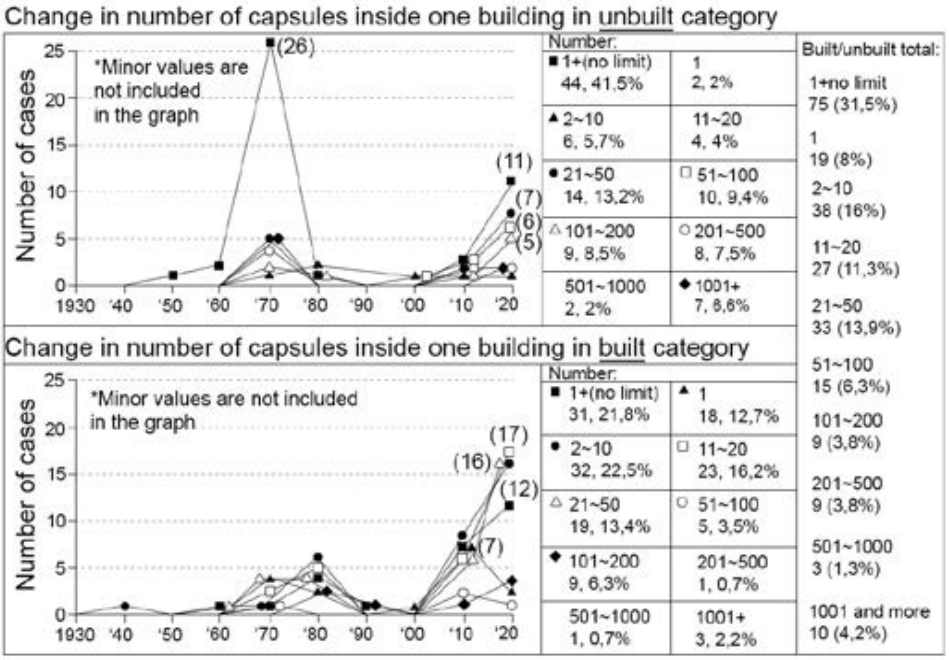


Fig. 35. Change in number of capsules per single structure

The line to the left in the table above corresponds to the percentage of different numbers of capsules per single building or closely connected group of buildings as follows: 1+(no limit) (31,5%), 1 (8%), 2-10 (16%), 11-20 (11,3%), 21-50 (13,9%), 51-100 (6,3%), 101-200 (3,8%), 201-500 (3,8%), 501-1000 (1,3%), 1001 and more (4,2%). It is seen that dominant figure corresponds to 1+(no limit) what represents the flexible nature of capsules

as they may be an architecture itself, consisting from a single capsule or can multiply and grow indefinitely. This figure corresponds to a capsule's concept and is explained separately. On the other hand, both built and unbuilt examples show two conditional limits for the buildings consisting from capsules: 2~50 what is a unified range of three categories shown above corresponds to small scale structures bearing up to 50 capsules together, and the buildings of 51~500 units per building which fraction is two times smaller.

The table above shows the studied examples divided into decades and two time periods which are further subdivided by unbuilt and built categories. It is clear that the percentage of the cases showing the capsules as prototypes or the capsules inside megastructures have decreased over time. The same trend continues in the category of the built cases where this number exceeds one of the unbuilt categories. This means that modern capsule architecture is often realized in the shape of modular houses or micro compact homes provided for the market. On the other hand, modernist's capsules were meant to be produced on a large scale together with the development of the new urbanist ideas involving megastructures. For these reasons, many of the designs were unbuilt due to the absence of a supporting structure or artificial land where the capsules should have nested. As an example, individual dwellings in Kurokawa's Helix City were supposed to be located on the gigantic spiraling structure. Other categories in the table above show the dominating fraction of other numbers of capsules which are almost unlimited in quantity in unbuilt cases, but usually, do not exceed 200 capsules in the built examples. The Nakagin Capsule Tower currently holds one of the front positions regarding the number of capsules collected at a single structure or area and is followed by Toretore village in Japan with 133 modular dwellings spread on a topography. Buildings with the size of greater of 2 capsules combined together in a single building occupy about 50~75% of all cases and are presented in more or less even fractions. This shows that a number of capsules are a flexible figure and can depend on each given case. The cases gathered around the 1960s usually show the greater distribution of different scales of capsule architecture up to megastructures and entirely new cities, while modern projects usually do not exceed the scale of skyscrapers.

3.3.2 General ways of capsules' arrangement

Capsules usually form complex structures with different kinds of relationship. Depending on the way of capsules' arrangements, properties of capsules, their degree of freedom, as well as the shape of a building may vary. The iconic example is the Nakagin

Capsule Tower in Tokyo having 140 capsules arranged around the two ferroconcrete cores. However, this composition is not uniform, and four basic ways of capsule arrangements may be applied[49)]. Two of them do not require supporting structure what makes the capsules themselves bearing elements, while, on the other hand, two latter ways of arrangement free capsules from structural loads.

Method 1. Distribution. This arrangement corresponds to a sprawling capsule cluster onto some topography or artificial land. They are rarely physically connected to each other but are assembled inside a conditional region. This is related to self-sustainable microhouses, capsules which due to their shape and composition cannot be stacked together, and remote nomadic shelters which rely on the surrounding topography. Examples of this kind are Skylodge Adventure Suites by Naturavive hanging on a cliff side, Eco-Capsule as an independent and self-sustainable living unit, and Exo which may be both independent and organized in the semi-theatre compositions.

Method 2. Stackability. The second way of arrangement allows stacking capsules onto each other and organizing multistory buildings. This type of arrangement assure the modular nature of capsular buildings, however, it highly seemingly highly interferes with the aspect of a mobility of a capsule defined by researchers above. This especially concerns “modern” type of capsules in a shape of shipping containers. Being an autonomous environment and structurally complete, a shipping container is argued in the research to be a good candidate for a modern capsule. And in the relation to a type of arrangement – stackability, the potential mobility of shipping containers is not cancelled out and can be observed in the terms of degree of freedom instead. Degree of freedom, in principle, is also an arguable notion since it depends on a structure type and machinery required to attach, detach or move a capsule. In Nakagin Capsule Tower, despite a visual appearance that each capsule can be independently removed at any time, the structure, actually, did not allowed this operation without interfering with surrounding capsules (capsule should be first tilted that requires additional space), and for this reason the capsules thought to be replaced at once. Therefore, the method of capsules’ arrangement Stackability remains one of the methods of possible capsules’ arrangement what, temporary interfere with a mobility of a capsule but does not cancel it out as far as the capsule cannot be detached as a structurally complete object.

Not only shipping containers but many individual designs of cells fall into this category. In this case, the capsules’ degree of freedom depends on neighboring cells. This

means that a capsule cannot be inserted or detached from a main body of the building without interference caused to other capsules. Such structures are usually meant to be dismantled all at once, however, in principle, decomposition of the building and its reorganization is not prohibited. A good representation of this method is Container City I, Songpa Microhousing, as well as capsule hotels where cells are similarly stacked together.

Method 3. Plug-in. This method implied using of supportive structure in a shape of cores, vertical shafts, pipeline and infrastructure blocks, etc., to which capsules are attached. Capsules, therefore, entrust some of its self-sufficiency to bearing and supporting elements. The capsules may be easily detached from one building and be inserted into another which has the same properties. Alternatively, capsules may be attached to any other structure which guarantees some capacities what a capsule itself usually lacks. This relationship between capsules and bearing structure is typical for capsule architecture. The good examples are Nakagin Capsule Tower and Capsule House K by Kisho Kurokawa. Theoretically, capsules from Nakagin Capsule Tower and Capsule House K may be interchanged since they have the same type of capsules. Other examples include Sony Tower by the same author, Residential Buildings in Project Venus by Jacque Fresco, Oase N7 by Haus-Rucker-Co.

Method 4. Insert. Capsules occupying the empty blocks in the three-dimensional frames have a relative degree of freedom to be pulled out and inserted in another location because they are often are pressed by other capsules in the three-dimensional space. Structure, in this case, may serve a purpose of infrastructure and provision of communications, as well as bear solely construction loads while the capsules are fully independent. Such a frame corresponds to a different kind of artificial land. The examples include Spatial City by Yona Friedman, Genussregal Exhibition by BWM Architekten & partner, and Takara Beautilion by Kisho Kurokawa.

The four basic ways of capsule arrangement presented in capsule architecture changed over time from vast megastructures having capsules as units connected to the infrastructural framework provided by the former, to stackable capsules which are either dependent on each other as well as on a minimum supporting core without constructive function. This makes capsules more self-sustainable but less movable, that is, a capsule cannot be removed of added to a building without interference to other neighboring capsules. Nevertheless, this principle is still rather conceptual, due to the challenges which mobile architecture faces, such as the development of heavy machinery which can be deployed in a

tight urban space where capsule clusters are often located and others. On the other hand, if capsules have either conditional connections or are not stacked on each other, they are quite movable and can indeed change location what is actually done in a range of modern examples. Thus, comparing to the past, the modern capsule architecture have a majority of projects made from only capsules without supporting structures, while the other concepts resembling the shape of the Nakagin Capsule Tower and other iconic buildings are being presented as well. The table below shows the main changes in realized and unrealized examples of capsule architecture divided into the two time periods of 1930s-1970s and 1980s-2010s (Fig. 36).

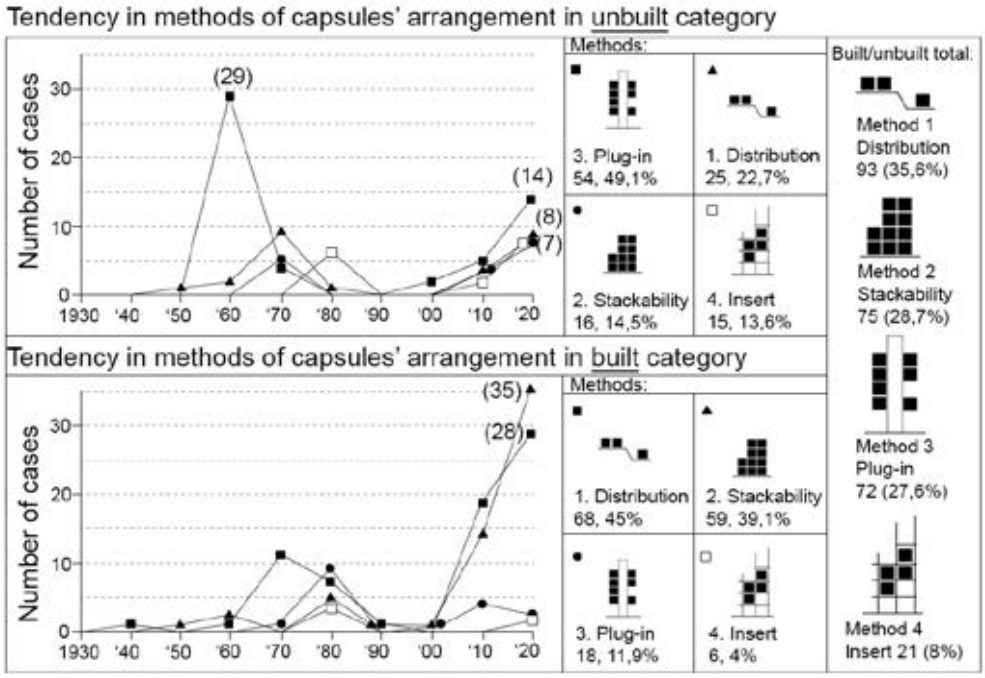


Fig. 36. Change in ways of capsules' arrangements

The table above shows a number of cases for each way of arrangement, while the percentage of each kind follows as Method 1 (35,6%), Method 2 (28,7%), Method 3 (27,6%), Method 4 (8%). It is clear that all three methods except 4th are equally applied in capsule architecture. The 4th way of arrangement corresponding to a three-dimensional frame inside which capsules are inserted into is the rarest case.

The table above represents percentages of different types of arrangement divided into realized and unrealized categories. The main feature of the received graph is the dominant

fraction of the method 1 and 2 in the built examples in the 1980s-2010s if compared to unrealized projects of the same time where the proposed methods of capsules' arrangements are more or less the same with a small dominant of the method 1, what corresponds to single capsules mainly presented as prototypes, as well as the capsules spread on a topography (Tubohotel by T3ARC). It shows that despite a range of projects featuring different concepts the built examples are mostly stacked capsules or the ones spread over some location. Being less presented in the 1930-1980s the methods 2 and 4 meaning the clusters of stacked capsules and capsules trapped inside a frame bearing construction loads respectively appear more often in the modern times in the unrealized category. On the other hand, method 3 corresponding to a relationship between bearing core and attached capsules prevails in the 1930-1970s as a classical example. As shown above, this kind of architecture is rarely realized in the same period of time and has just a couple of the built examples of a small scale in the modernity (T2 by SUS, Rucksack-House by Stefan Eberstadt) with capsules rarely exceeding 10 pieces. This is done partially due to economic reasons since it is more efficient to build by using only capsules without other additional support. Therefore the second type of capsule arrangement is currently developing fast. New start-ups designing new capsules get much attention from media – Katita, Spaceboxes in TU Delft, 3 living units by Ofis design and architecture, Shelter with dignity by Framlab and others, besides to the accustomed container architectures. Both abovementioned capsules and containers are meant to stack on each other, however, there are the rare examples utilizing additional structures as it is done in Suguroku Office by Daiken Met.

Realized and realized examples change in percentages over time and have similar trends as the decrease in usage of the 3rd method and 1st method of arrangement together with the steady increase of using the second way of arrangement which allows piling up capsules onto each other to from multistory structures.

Section 4 Relationship between concept of capsule architecture and its application

Initially capsules were closely related to postwar projects of megastructures serving as a tabula rasa for a community to form their own environments and individual living spaces – capsules[50]. In the West it also coincided with the trends of consumerism, progressiveness and pursuit for the new spirit of time[51] while Japanese Metabolists, mostly focused on notions of the 'recreation' of the 'age of high metabolism'[52]. Despite being treated as inherent for modernist movement the capsules may have evolved into what can be called 'the second generation'. These capsules find their implementation in the examples of pop-up architectures, urban shelters, or entire green cities continuing the development of synthetic urbanism[53]. Their role can be summarized in three major design topics – 'mobile', 'mental' and 'growing' capsules. The data shows even distribution of such approaches numerically and in both generations, what may indicate a common reoccurring interest towards the capsule's concept in general.

It reflects on capsules' objective characteristics, particularly shapes, sizes, and materials. While there is a stable trend of abandoning the plastic visage of a capsule, the strict rectangular shape continue combining in itself its ergonomic features in order to be mass-produced, moved in or out, and pile up in a cluster. Size of capsules varies - it both contributes to development towards the high-density living environment which is still topical in developing countries[54], however, there is a trend of small reduction of capsules' sizes in the modern examples. With the dominance of residential function in the conducted analysis, the hotel rooms and multipurpose capsules are also can be treated as semi-residential capsules, that is a conditional living space for short times or the place combining in itself among others residential functions as well. Moreover, recent developments of container architecture and working business model of capsule hotels provide residence in extreme environments or cheap short stay combined with low-cost travelling.

Summarized by Leslie as a 'technological nihilism'[55] the capsular structures can in principle grow indefinitely. Yet, the majority of capsular homes' designs in the 1960-1970s were left on paper. This experimentation continues in modern times, and some new startups present their vision onto small movable houses with the possibility to grow into bigger structures (Coodo, Loftcube, Kasita). Such developments, similarly to their predecessors, mostly position themselves as progressive hi-tech living environments. The modern capsular structures mostly do not implement any additional bearing elements or use the existing urban environment as a medium to be plugged-into or clipped-on. Despite the iconic

example of Nakagin Capsule Tower where capsules are attached to the so-called ‘vertical ground’, the new image of capsular structures may be summarized in Container City (2001) consisting of shipping containers which could eventually gain the desired scale of mass-production multiplied with reusability, adaptability, and sustainability in order to be regarded as a modern capsule’s archetype. The relationships occurring between applicability of capsules and their physical characteristics can be summarized in the graph below (Fig. 37).

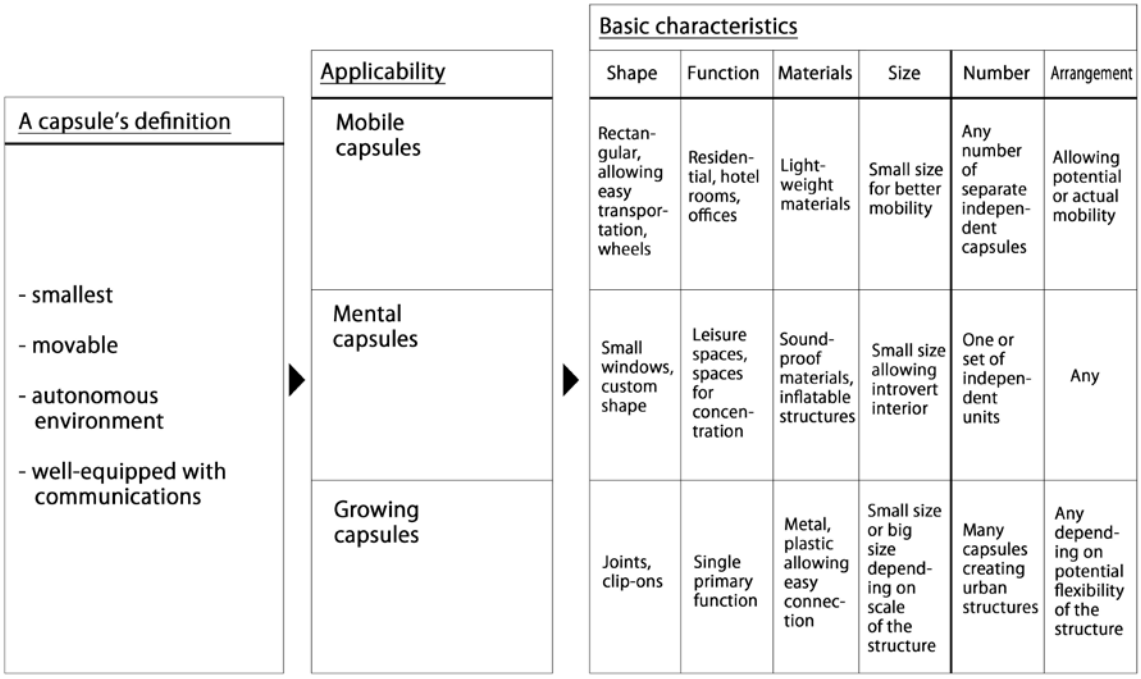


Fig. 37. Relationship between capsule’s definition, its concept in terms of applicability and reflection of basic characteristics

Section 5 Conclusion

Considering the performed historical analysis it became clear that capsule architecture may be divided into two time periods which can be grouped to 1930s-1970s and 1980s-2010s. This corresponds to the two conditional ‘generations’ of capsules which are presented in the two distinguishable paradigms in architectural theory, means of architectural expression, social trends, and technical parameters. Therefore, in this chapter the comparative analysis regarding the physical capsules’ characteristics ranging from shapes, functions, material, and sizes, as well as a number of capsules per single structure and ways of capsules’ arrangement, was implemented.

The results showed the increased percentage of rectangular shapes of capsules over time and a lesser differentiation regarding any other custom shapes in capsule architecture. In functions, the residential one prevails regardless of the given timeframe together with the notable increase of using capsules as hotel rooms in modern times. Changes in use of materials are shown in the decrease of using plastics over time, with the increase of use metal frames and infill in the modern examples. It also shows a significant amount of capsules in the form of a shipping container as well as an increased number of wooden capsules. Regarding capsules’ sizes the comparison of average sizes of the two chosen time periods show a slight decrease in the volume of capsules and respectively their average areas, which means that the modern capsules are slightly smaller what is still enough to satisfy the minimal needs for living with the respect of modern citizens. Number of capsules in a single building or structure shows what modern capsules are less experimental and often realized. However, it significantly limits the quantities of capsules combined together in the built cases. The capsule clusters in 1930s-1970s are more massive comparing to a less ambitious scale seen in the modern times with several big-scale examples. Lastly, it is clear that despite the fact that architects still utilize all four methods of different capsule arrangements in their designs, the realized examples utilize combination of capsules what do not require significant additional structures which, theoretically, are unprofitable and require more cautious designing and maintenance.

Notes:

1 Smith R. *Prefab Architecture, A Guide to Modular Design and Construction*. John Wiley & Sons, pp.5-17, 2010

2 Aitchison M. *Prefab Housing and the Future of Building: Product to Process*. Lund Humphries, pp. 46-55, 2018

3 Schmidt R., Austin S. *Adaptable Architecture, Theory and Practice*, Routledge, pp. 22-25, 2016

4 Banham R. *Megastructure: Urban Futures of the Recent Past*; London Thames&Hudson, pp.13-15, 1976

5 Banham R. *The New Brutalism*. Architectural Press, pp.10, 41-43, 1966

6 Banham R. *Megastructure: Urban Futures of the Recent Past*; London Thames&Hudson, pp.205-207, 1976

7 Ibid. pp.63-66

8 *Metastadt.* Interned source: wulfen-wiki.de/index.php/Metastadt

9 Senk P. *Capsules. Typology of other architecture;* Routledge, 2017, 28-39

10 Richard Rogers. *Industrialised Housing;* Internet source: rsh-p.com

11 The name is provided due to the second appearance of capsule architecture in 21st century. These capsules share common characteristic and concept with the original capsules from 1960s. Some of modern capsules are considered to be direct successors of original concepts and others derive their new concepts by metabolizing projects from Modernist movements and adjusting them to current state of things in urban environment.

12 *Here's Johnny. A Container Village for Students in Berlin ;* Uncube. Internet source: uncubemagazine.com

13 *Rotel;* Uniq Hotels. Internet source: uniqhotels.com

14 Pruitt–Igoe, were joint urban housing projects first occupied in 1954 in the US city of St. Louis. By the late 1960s, the complex had become internationally infamous for its poverty, crime, and racial segregation. All 33 buildings were demolished with explosives in 1972 and the project has become an icon of failure of urban renewal and of public-policy planning.

15 Senk P. *Capsules. Typology of other architecture;* Routledge, 2017, 2

16 The Archigram Archival Project. *Capsule Homes project*; Internet source: archigram.westminster.ac.uk, project No: 62

17 Kurokawa K. *Capsule declaration;* Metabolism in Architecture, Littlehampton Book Services Ltd, pp.75-85, 1977

18 Feuerstein G. *Der Mensch in der Kapsel;* Wieviel Raum braucht der Mensch?:Wohnen fur das Existenzminimum; Munchen: Aries, 1996, 61

19 In 1964 Kurokawa provides a design of a trailer containing basic utilities as kitchen and toilet to complement an ordinary vehicle. Kurokawa himself names the invention “Moving Capsule” and Koolhaas also drawing a parallel between vehicles and formal capsules throughout his book. Koolhaas et al. Project Japan, Metabolism Talks; Taschen, 2011, 339

20 *AD Classics: Montreal Biosphere / Buckminster Fuller;* Archdaily; Internet sourse: archdaily.com

21 Hoogenboom O. *R. Buckminster Fuller*; American National Biography, 2000

22 Lamb R. *It Existed: Churchill's High-Tech Flight Pod;* Invention Pod; Internet source: inventionpod.com

23 Senk P. *Capsules. Typology of other architecture;* Routledge, 2017, 5

24 *Diogene by Renzo Piano Building Workshop and Vitra;* Smow; Internet sourse: smow.com/blog

25 *The Paradoxical Popularity of Jean Prouvé's Demountable Houses;* Archdaily; Internet sourse: archdaily.com

26 Koolhaas et al. *Project Japan, Metabolism Talks*; Taschen, 2011, 20

27 *Plug-in Architecture Loses an Icon;* ArchiTakes; Internet sourse: architakes.com; Please also refer to the site of the association of inhabitants of Unité d'habitation in Marseille: citeradieuse-marseille.com; and site of Foundation of Le Corbusier: fondationlecorbusier.fr

28 Nitschke G. *Transience and Renewal in Japanese Form;* KYOTO Journal 50: Transience - Perspectives on Asia, 2002, 2-12

29 Kurokawa K. *Oh! The Code of the Cyborg*; SD–Space Design (03/1969)

30 De Cauter L., Patteeuw V. *The Capsular Civilization: On the City in the Age of Fear;* NAi Publishers, 78-79

31 The Archigram Archival Project. *Capsule Homes project*; Internet source: archigram.westminster.ac.uk, project No: 62

32 Kurokawa K. *Capsule Declaration;* Metabolism in Architecture, Littlehampton Book Services Ltd, 1977

33 Frac Centre-Val de Loire. *Pascal Häusermann;* Internet source: frac-centre.fr

34 Frac Centre-Val de Loire. *Parasitic cells, 1968;* Internet source: frac-centre.fr

35 Stephane M. *Self Defence. Pocket of active resistance;* Internet source: stephanemalka.com

36 Framlab. *Shelter with Dignity;* Internet source: shelterwithdignity.com

37 Lot-Ek. *Mobile Dwelling Unit;* Internet source: lot-ek.com

38 James Law Cybertechture. *Opod Tube Housing;* Internet source: jameslawcybertecture.com

39 Ganti+Associates. *Container Skyscraper;* Internet source: ganti-associates.com

40 *Futuro – A New Stance for Tomorrow;* Internet source: phinnweb.org

41 *Loft Cube;* Internet source: loftcube.net

42 The Archigram Archival Project. *Living Pod*; Internet source: archigram.westminster.ac.uk, project No: 86

43 *Djinn chair by Olivier Mourgue;* Film and Furniture; Internet source: filmandfurniture.com

44 *Paco;* Schemata architects; Internet source: schemata.jp/paco

45 Despite the fact that some studied cases might have provided information regarding capsules' materials in other sources, but are labeled 'unspecified' in this research, the number of cases in 'unspecified' category may not have a noticeable influence on the received results. On the other hand, it supports the fact that architects may sometimes omit details if a project is on a concept stage, what simultaneously shows still a conceptuality of capsule architecture as a whole.

46 'Berlin-based architect Van Bo Le-Mentzel of Hartz IV Möbel has conceived of the 'one sqm house'- a do-it-yourself structure which offers one square meter of floor area to be used as a dwelling, mobile kiosk or an extra room inside an apartment. Made with everyday materials, the wooden frame can be put together with a cordless screwdriver and saw.' *One sqm house;* Van Bo Le Mentzel; Internet source: designboom.com

47 Also, it is not excluded that an architect may utilize an unfinished appearance of a building and hidden potential of growth as a tool for architectural expression.

48 *From Ancient Rome to the Coachella Festival: A Brief History of Pop-Up Architecture;* Archdaily; Internet source: archdaily.com

49 This separation is based on Senk's classification of the capsules as: method 1 – 'independent cells', method 2 – 'composite cells', method 3 – 'clip-ons/plug-ins, parasites', method 4 – 'pendants, inserts'. Senk P. *Capsules. Typology of other architecture;* Routledge, 2017, 114-146

50 Senk P. *The Plug-in Concept: Technology and Aesthetics of Change*, Architecture, Research, 44, 2013/1

51 Senk P. *The Concept of Capsule Architecture as Experiment*, Prostor, 352, 2.46, 2013.21

52 Schalk M. *The Architecture of Metabolism. Inventing a Culture of Resilience*, Arts 3, 283, 2014

53 Senk P. *The Plug-in Concept: Technology and Aesthetics of Change*, Architecture, Research, 48, 2013/1

54 Lin Z. *Nakagin Capsule Tower and the Metabolist Movement. Revisited*. 98th ACSA Annual Meeting Proceedings, Rebuilding, 520, 2010

55 Leslie T. *Just What Is It That Makes Capsule Homes So Different, So Appealing?* Space and Culture 2006, 9, 180, 2006

Chapter 3. Aspect of Changeability of Capsule Architecture and Actual Renovation

Section 1 Background and aim of research

Section 2 Ways of technical change in capsule architecture

Section 3 Renovation approaches in cases of capsule architecture

Section 4 Relationship between concept of changeability and actual renovation

Section 5 Conclusion

Section 1 Background and aim of research

In modern society, the importance of preservation of and flexibility in use of buildings is increasing. The buildings designed without sufficient conservation plans are dismantled and rebuilt after they have deteriorated or damaged by the process named ‘scrap and build’. Here, renovation has become one of the major areas of architectural design while capsule architecture, which appeared in the early 20th century, is characterized by the assumption that the building will be updated or renovated by capsule’s manipulation or reuse. Many capsular buildings or home prototypes from the 20th century were meant to be an object of constant change, however, in many cases such change did not occur and if not renovated by architectural enthusiasts, or either owners or residents themselves, the buildings were usually demolished. By this it is possible to extract two approaches in regard of the concept of change as initial idea or method of technical change devised by a designer's intention (idea) and actual renovation method (actual practice) appeared after the building was built. In this chapter, all 265 cases were studied according to the initial concept of change and renovation. In the 177 cases there was a description by a designer regarding a change over time, as well as in 27 cases of 150 built examples various types of renovations were observed. From the previous chapter the application of capsules are divided into three categories and two of them, namely "mobile", and "growing" correspond to the ideas of architects regarding technical change of capsules and capsule architecture (the “mental” category of capsules also may assume some allegorical change of man’s perceptions, etc. but is more related to a social aspect of a capsule and which is studied in the next chapter). Therefore, the purpose of this study is to organize and examine the intentions at the design stage regarding technological changes in capsule architecture together with actual renovation methods, and to observe the relationship between these two notions. The all case studies are summarized in Table 2.

At Nakagin Capsule Tower the major type of change occurring in a plan by Kisho Kurokawa was to replace old capsules with new ones after a period of 25-35 years, what would make capsule architecture and changeable architecture as a whole a crucial component of society. However, due to the cost of replacing the capsules, their price fluctuations over time, changes in land prices, real estate market conditions, etc., capsules’ replacement was not carried out as originally intended, but many capsule has been renovated independently what in general improved conditions of the building itself for some time. This kinds of renovations did not guarantee the preservation of the building on the whole. While small renovations were possible, the building’s design and Metabolists thinking supporting

the design could not allow any other interventions, as Nakatani explains it by the notion of "anastilosis" found in Metabolism architecture with the relation to a change. While the building could be theoretically preserved as a monument, the strong relationship with the structure (so-called "strong technology)[1)] would make implementation of any other more flexible type of change or replacement unfeasible (that is, for example, to take capsules from structure one-by-one, what is technically hard and, correspondingly economically as well). As written above the changes in capsule architecture does depends on various factors such as economy, society, culture, politics, and technology, but this study focuses only on the intention of technological changes in capsule architecture and actual renovation approaches.

Table 2. Concept of a capsule and physical characteristics

No.	Year	Name	Architect	Concept								Renovation							Country
				Replace	Addition	Reforming	Fusion	Mobil.	Function	Recycling	Prod.	Social	Warranty	Location	Struct.	Cosmetic	Update	Adapt	
1	1930	Dymaxion house	Buckminster Fuller	-	-	-	○	○	○	○	-	●	-	-	-	-	-	-	US
2	1940	Mechanical wing	Buckminster Fuller	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	US
3	1945	Structural blocks housing	USSR Research Inst	-	-	-	-	-	-	-	-	-	-	-	●	●	●	●	USSR
4	1950	Rotel	Rotel Company	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
5	1955	House of the future	Alison Smithson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
6	1956	Mobile hotel cabin	Ionel Schein	-	-	-	-	●	○	-	-	-	-	-	-	-	-	-	France
7	1956	Plastic House	Ionel Schein	-	○	-	-	-	○	-	-	-	-	-	-	-	-	-	France
8	1960	Futuro House	Matti Suuronen	○	○	-	-	-	○	○	-	●	-	●	●	●	●	●	Finland
9	1960	Ville Spatiale	Yona Friedman	○	○	○	○	-	○	-	-	-	-	-	-	-	-	-	Global
10	1960	Stackable Multip. Cells	Jean-Louis Rey	-	○	-	○	-	○	-	-	-	-	-	-	-	-	-	Global
11	1960	Residential area	Pascal Hausermann	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-	Swi-land
12	1960	Hanging hotel	Takis Zenetos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Greece
13	1960	Cable city	Takis Zenetos	-	○	-	○	-	○	-	-	-	-	-	-	-	-	-	Greece
14	1961	Ball House	Johann W. Ludowici	-	-	-	-	-	○	-	-	-	-	-	-	-	-	-	Germany
15	1961	Helix City	Kisho Kurokawa	-	○	-	-	-	-	○	-	-	-	-	-	-	-	-	Japan
16	1961	Urban Area Reconst. Plan	Yukio Otani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
17	1962	Plastic Sky Lodge	Kenji Ekuan	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Japan
18	1962	Clusters in the air	Arata Isozaki	○	○	○	○	-	-	-	-	-	-	-	-	-	-	-	Japan
19	1962	Ikebukuro Plan	Kiyonori Kikutake	○	-	○	○	○	○	○	-	-	-	-	-	-	-	-	Japan
20	1962	Prefab. box-type apartm.	Kisho Kurokawa	-	○	-	-	-	-	○	-	-	-	-	-	-	-	-	Japan
21	1962	Tree housing tower	Arthur Quarmby	○	-	○	-	-	-	-	-	-	-	-	-	-	-	-	UK
22	1962	Emerg. Mass Housing Units	Arthur Quarmby	-	○	○	○	○	-	-	-	-	-	-	-	-	-	-	UK
23	1963	Prefabricated Plastic Cells	Paul Maymont	-	○	-	○	-	○	-	-	-	-	-	-	-	-	-	France
24	1963	Marine City	Kiyonori Kikutake	○	○	-	-	-	○	○	-	-	-	-	-	-	-	-	Japan
25	1964	Pumpkin House	Kenji Ekuan	-	○	-	-	-	○	-	-	-	-	-	-	-	-	-	Japan
26	1964	Dwelling city	Kenji Ekuan	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
27	1964	Village Housing	Kenji Ekuan	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
28	1964	Tortoise House	Kenji Ekuan	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
29	1964	Potteries Thinkbelt	Cedric Price	○	○	-	-	○	-	○	-	-	-	-	-	-	-	-	UK
30	1964	Office Towers	Peter Cook	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
31	1964	Plug-in City	Archigram	○	○	○	-	○	-	-	-	-	-	-	-	-	-	-	UK
32	1964	Capsule Homes	Archigram	○	-	○	-	○	-	-	-	-	-	-	-	-	-	-	UK
33	1964	Multi-purpose cell prototype	Jean-Louis Chanéac	-	○	-	○	-	○	-	-	●	-	-	-	-	-	-	France
34	1965	Gasket House	Archigram	○	○	-	-	○	-	-	-	-	-	-	-	-	-	-	UK
35	1965	Plug-in University Node	Archigram	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	UK
36	1965	Fly's Eye	Buckminster Fuller	-	-	-	-	○	-	-	-	●	-	-	-	-	-	-	US
37	1965	The Environment Bubble	Francois Dallegret	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
38	1966	Blow-out village	Archigram	-	○	-	-	-	○	○	-	-	-	-	-	-	-	-	Global
39	1966	Living pod	Archigram	○	○	-	○	○	-	-	-	-	-	-	-	-	-	-	Global
40	1966	Paddington East	Archigram	○	○	-	-	○	-	-	-	-	-	-	-	-	-	-	UK
41	1966	Hornsey Housing Study	Archigram	○	-	-	-	○	-	-	-	-	-	-	-	-	-	-	UK
42	1966	Cylindrical building	Guy Dessauges	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Global
43	1966	Novery Space Houses	Pascal Hausermann	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
44	1967	Hotel in Menorca	Pascal Hausermann	-	-	-	○	-	○	-	-	-	-	-	-	-	-	-	France
45	1967	Cylindrical houses	Guy Dessauges	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Swi-land
46	1967	Bubble House	Jean Maneval	-	○	○	○	-	-	-	-	●	-	●	-	●	-	-	France
47	1967	Pneumacosm	Haus-Rucker-Co	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Austria
48	1967	House of stacked units	Wolfgang Döring	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Global
49	1967	Shizuoka Press Br. Cntr.	Kenzo Tange	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
50	1967	JA: 1967 Comp.1st place	K. Harakawa et al	○	○	○	-	○	-	-	-	-	-	-	-	-	-	-	Japan
51	1967	JA: 1967 Honour. Mention	Takamizawa Sh. et al	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
52	1967	JA: 1967 Honour. Mention 2	Sadao Tanaka	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Japan
53	1967	JA: 1967 Honour. Mention 3	Hiroshi Inagaki et al	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
54	1967	JA: 1967 Honour. Mention 4	N. Fujimoto et al	-	-	-	○	-	-	-	-	-	-	-	-	-	-	-	Japan
55	1967	JA: 1967 Honour. Mention 5	Kuniaki Suda el al	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
56	1967	JA: 1967 Honour. Mention 6	R. Esnard et al	-	○	○	-	-	-	-	-	-	-	-	-	-	-	-	Japan
57	1967	JA: 1967 Honour. Mention 7	Kazuo Tamama et al	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	Japan
58	1968	Parasitic cells	Jean-Louis Chanéac	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Swi-land
59	1968	Hexacube	G. Candilis et al	-	-	○	○	-	-	-	-	●	-	-	-	-	-	-	France
60	1968	Plastic Modular Home	Wight Plastics Lmtd.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
61	1968	Residence of M. Ginet	Pascal Hausermann	-	-	-	-	-	○	-	-	-	-	-	-	-	-	-	France
62	1968	Drive-in House	Michael Webb	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	UK
63	1968	Habitat Puerto Rico	Moshe Safdie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Puerto-R.
64	1969	Plastic cells	Pascal Hausermann	-	-	○	-	-	○	-	-	-	-	-	-	-	-	-	Swi-land
65	1969	Mobile theatre	Pascal Hausermann	○	○	○	-	○	-	-	-	-	-	-	-	-	-	-	Swi-land
66	1969	Inflatable mobile office	Hans Hollein	-	○	-	-	●	-	-	-	-	-	-	-	-	-	-	Austria
67	1969	Yadokari Capsule Lodge	Kenji Ekuan	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Japan
68	1969	K67	Sasa J. Machtig	-	●	●	●	○	○	-	-	●	-	-	-	-	-	●	Slovenia
69	1969	Capsule Houses	Wolfgang Döring	-	○	○	-	-	-	-	-	-	-	-	-	-	-	-	Germany
70	1970	Modular leisure habitat	Jacques Beufe	-	○	○	-	-	-	-	-	-	-	-	-	-	-	-	France
71	1970	Pirate bubble	Jean-Louis Chanéac	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	Swi-land
72	1970	Experiment 70	Luigi Colani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
73	1970	Total Housing Unit	Luigi Colani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
74	1970	Expo Tower	Kionori_Kikutake	○	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
75	1970	Takara Beautilion	Kisho Kurokawa	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
76	1970	Capsule for living	Kisho Kurokawa	-	-	-	○	-	-	-	-	-	-	-	-	-	-	-	Japan
77	1970	Steinhaym	New Metal Prd.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
78	1970	Tektite II habitat	Alaska Fisheries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
79	1971	Venturo	Matti Suuronen	-	-	-	-	○	-	-	-	●	-	●	●	●	-	●	Finland
80	1971	Do-Bausystem Pl. house	J-C. Ventalon et al	-	-	-	○	-	-	-	-	-	-	-	-	-	-	-	Germany
81	1971	Domobiles	Pascal Hausermann	-	○	-	○	-	○	-	-	-	-	-	-	-	-	-	Swi-land
82	1972	AZM Offices	Laurens Bisscheroux	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ne-lands
83	1972	Oase N7	Haus-Rucker-Co	-	-	-	○	○	-	-	-	-	-	-	-	-	-	-	Austria
84	1972	Tetrodon	AUA	-	●	-	●	●	-	-	-	●	-	●	-	●	●	-	France
85	1972	Microhouse	Ken Isaak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
86	1972	Tower of Youth	Suga Yoshitomi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
87	1972	Nakagin Capsule Tower	Kisho Kurokawa	○	○	-	○	○	-	○	-	●	-	-	-	-	●	●	Japan
88	1972	Capsule village	Kisho Kurokawa	-	-	○	-	-	-	-	-	-	-	-	-	-	-	-	Japan
89	1973	Capsule house K	Kisho Kurokawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
90	1973	Interpod Tower I	William Morgan	○	-	-	-	○	-	-	-	-	-	-	-	-	-	-	US
91	1973	Residence Gamma	J. Mermet, A. Parisot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
92	1974	SIRH Option 75	Claude Prouve	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-	France
93	1974	Ludres-Experim. Building	Claude Prouve	-	○	-	○	-	-	-	-	●	-	-	-	-	●	-	France
94	1974	Metastadt building system	Richard J. Dietrich	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-	Germany
95	1974	Koito Building	Kisho Kurokawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
96	1975	Um Al Khanazeer isl. dev.	Kisho Kurokawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Iraq
97	1976	Sony Tower	Kisho Kurokawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
98	1976	Conservatoire de Montreuil	Claude Le Goas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
99	1979	Capsule Inn Osaka	Kisho Kurokawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
100	1980	Capsule Inn Sapporo	Kisho Kurokawa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
101	1984	Globe Houses	Exp. Housing Dev.	-	-	-	-	-	-	-	-	-	-	-	●	-	-	-	Ne-lands
102	1990	7th kilometer	7km company	-	●	-	-	-	-	-	-	-	-	-	-	●	●	●	Ukraine
103	1991	Egg of the winds	Toyo Ito	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
104	1992	Industrialized housing	Richard Rogers	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Korea
105	1995	Res. buildings in pr. Venus	Jacque Fresco	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	US
106	2000	Mixer	Lot-Ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
107	2000	Morton Loft	Lot-Ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
108	2001	Tree village	Micro Compact Hous.	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-	Europe
109	2001	Torino Porta Susa Station	Lot-Ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Italy
110	2001	Container city	Container city TM	-	●	-	○	○	-	○	-	-	-	-	-	-	●	-	UK
111	2002	Cave	Toru Murakami	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
112	2003	Challenge space architect.	Shuichi + Ikeda Lab.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
113	2003	House in Azeitão	Aires Mateus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Portugal
114	2003	DST Pods	Cannata/Fernandes	○	○	-	-	○	-	-	-	-	-	-	-	-	-	-	Portugal
115	2003	MDU	Lot-Ek	○	-	○	○	○	-	-	-	-	-	-	-	-	-	-	Global
116	2004	Loft Cube	Werner Aissunger	-	-	-	○	-	-	-	-	-	●	-	●	●	-	-	Germany
117	2004	Rotor house	Luigi Colani	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
118	2005	Rucksack-House	Stefan Eberstadt	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	Germany
119	2005	Riverside building	Container city TM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
120	2005	Expandable ISO shelter	AAR	-	-	-	-	-	●	-	-	-	-	-	-	-	-	●	US
121	2005	Halley VI Antarctic Res. St.	Hugh Broughton Arch	-	●	○	●	○	-	○	-	-	-	-	-	-	-	-	Antarctica
122	2005	Symbiotic Living machine	G. Shimada et al	-	-	-	-	-	○	-	-	-	-	-	-	-	-	-	Japan
123	2006	HUIK Own home and office	Sculp Architecten	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ne-lands
124	2006	Freitag freeway shop	Yves Netzhammer	-	-	-	-	○	-	●	-	-	-	-	-	-	-	-	Germany
125	2006	Papertainer	Shigeru Ban	○	○	○	-	○	-	○	-	-	-	-	-	-	-	-	Korea
126	2007	Nomadic Museum Tokyo	Shigeru Ban	○	●	○	-	●	-	●	-	-	-	●	-	-	-	●	Japan
127	2007	DH1 Disaster House	Gregg Fleishman	-	-	-	○	○	-	○	-	-	-	-	-	-	-	-	US
128	2007	Barier	G-Wood	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	Japan
129	2007	Yotel Air Gatwick hotel	Yo! Company	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
130	2007	Lafayette Tower	Lot-ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
131	2007	Hotel Everland	S. Lang, D. Baumann	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	Swi-land
132	2007	Single Hauz	Front Architects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Poland
133	2008	Puma City	Lot-ek	-	-	-	-	●	-	●	-	-	-	●	-	-	-	●	US
134	2008	Sky-Village	Adept	-	-	-	○	-	-	-	-	-	-	-	-	-	-	-	Denmark
135	2009	Bayside Marina Hotel	Yasutaka Yoshimura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
136	2009	Platoon Kunsthalle	Graft Architects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Korea
137	2009	Contained Calls	Aedas	○	○	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
138	2009	Pocket of Active Resistance	Stephane Malka	-	-	-	-	-	○	-	-	-	-	-	-	-	-	-	France
139	2009	9h Kyoto	Design Studio S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan

(continuation of Table 2)

No.	Year	Name	Architect	Concept							Renovation						Country
				Replace	Addition	Reforming	Fusion	Mobil	Function	Recycling	Period	Social	Warranty	Location	Struct.	Cosmetic	Update	Adapt	
140	2009	Sleepbox	Arch Group	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Global
141	2009	Paco	Schemata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
142	2009	The box office	Joe Haskett	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
143	2009	Treehouse	Terri Chiao	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
144	2009	Diogene	Renzo Piano	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Germany
145	2009	Urban Transducer Skysc.	Daniel Nelson	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	US
146	2009	Subway Cell	Aaron Berman	-	○	-	-	○	-	-	-	-	-	-	-	-	-	-	US
147	2010	Lookhotels	Lookhotels TM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Spain
148	2010	Pier 57	Lot-ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
149	2010	Tubohotel	T3ARC	-	○	-	-	-	-	○	-	-	-	-	-	-	-	-	Mexico
150	2010	Plug-in Housing Dev.	Tay Yee Wei	○	○	○	○	-	○	-	-	-	-	-	-	-	-	-	Malaysia
151	2010	Capsule Hotel	Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ne-lands
152	2010	Cité A Docks	Cattani Architects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
153	2010	Sergo Marketing Suite	Container city TM	○	-	-	-	○	○	-	-	-	-	-	-	-	-	-	UK
154	2010	Container Cities (Haiti)	Richard Moreta	○	○	-	-	○	○	○	-	-	-	-	-	-	-	-	Domin. R.
155	2010	Immersive cocoon	Nau	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Germany
156	2010	Inbox capsule hotel	Inbox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Russia
157	2010	Bubble suite	Gites Insolites	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
158	2010	Skylodge adventure suites	Naturavive	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Chile
159	2011	42/6	Lot-ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
160	2011	Spacebox studios	TU Delft	-	○	-	-	○	○	●	-	-	-	-	-	-	-	-	Ne-lands
161	2011	Genussregal Exhibition	BMW	-	○	○	-	-	-	-	-	-	-	-	-	-	-	-	Austria
162	2011	Living Roof	Nau	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Germany
163	2011	Nomad Skyscraper	Luca D'amico et al	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Global
164	2011	Blox home	M3House + UAO	-	-	●	○	-	-	-	-	-	-	-	-	-	-	-	China
165	2011	Suguroku office	Daiken Met	○	-	○	-	○	-	-	-	-	-	-	-	-	-	-	Japan
166	2012	Portishead quays	Container city TM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
167	2012	BBC broadcasting studios	Container city TM	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	UK
168	2012	Boxpark Shoreditch	BDP	-	○	-	-	○	-	○	-	-	-	-	-	-	-	-	UK
169	2012	Afterlight	Interrupt	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	Singapore
170	2012	Das Park hotel	Das Park hotel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
171	2012	Free Spirit Spheres	Free Spirit Spheres	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Canada
172	2012	World of Chlorophyll	IAMZ Design Studio	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	US
173	2012	Eco-pod	Squared Design Lab	○	○	○	-	-	-	○	-	-	-	-	-	-	-	-	US
174	2012	Mangal city	Chimera	○	○	○	-	-	-	-	-	-	-	-	-	-	-	-	US
175	2012	Xi'an Youth Caspule Hotel	Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	China
176	2012	City Hub Amsterdam	City Hub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ne-lands
177	2012	New bivouac Gervasutti	Leapfactory	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-	Italy
178	2012	Uplift concept	Basecampzero	○	-	○	-	-	-	○	-	-	-	-	-	-	-	-	US
179	2012	Egg microhouse	Hiteca	-	-	-	-	-	○	-	-	-	-	-	-	-	-	-	Russia
180	2012	Vertical community	Baichuan Song	○	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Global
181	2012	Suburbia tower	Aaron Berman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	US
182	2012	Mobile suburbia	Aaron Berman	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	US
183	2012	Interchangeable Habitation	Jonas Erssoni	-	-	○	○	-	○	-	-	-	-	-	-	-	-	-	Sweden
184	2013	Moving city	Manuel Dominguez	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Spain
185	2013	Toretore village	Toretore village	-	○	-	○	-	-	-	-	-	-	-	-	-	-	-	Japan
186	2013	T2 Unit	SUS	○	○	-	-	○	○	-	-	-	●	-	●	●	-	-	Japan
187	2013	Office complex in Bogota	Unknown	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	Columbia
188	2013	Aether Apparel - Proxy	Envelope A+D	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Japan
189	2013	Swiss Tubes	TCS Camping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Swi-land
190	2013	A-Kamp47	Stephane Malka	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
191	2013	Pengheng space cap. hotel	Pengheng sp. caps.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	China
192	2013	Micro House in Tsinghua	Liu Lubin	-	○	-	-	-	○	-	-	-	-	-	-	-	-	-	China
193	2013	Pop-up neighborhood	James Alfandre	-	-	○	-	●	-	○	-	-	-	-	-	-	-	-	US
194	2013	Archipod	Archipod	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
195	2013	Águeda concept	Águeda concept	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Portugal
196	2014	The hut factory	Haseef Rafiel	-	○	-	-	-	-	-	○	-	-	-	-	-	-	-	Malaysia
197	2014	EBA51	Holzer Kobler ltd.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
198	2014	Modular home prototype	Garrison Architects	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	US
199	2014	Mill Junction	Citiq	-	○	-	-	-	-	-	-	-	-	-	-	-	-	-	S. Africa
200	2014	Rotating plug-in capsules	Bojing Qu	-	○	-	-	-	○	-	-	-	-	-	-	-	-	-	China
201	2014	Attrap Reves Bubble Hotel	Attrap'Reves	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	France
202	2014	Songpa Micro-Housing	SsD architecture	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	Korea
203	2014	Hive-inn	OVA studio	○	○	○	-	○	-	○	-	-	-	-	-	-	-	-	China
204	2014	Point9 New Bridge	Stephane Malka	○	○	○	-	-	○	-	-	-	-	-	-	-	-	-	France
205	2014	Unit Fusion	Y Design Office	-	-	○	-	-	○	-	-	-	-	-	-	-	-	-	China
206	2014	Casa Futebol	A. D. Stampa et al	-	○	-	-	-	-	○	-	-	-	-	-	-	-	-	Brazil
207	2014	Wow pod	Ideo Design	-	-	-	-	○	○	-	-	-	-	-	-	-	-	-	Global
208	2014	B-and-Bee	B-and-Bee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Belgium
209	2014	Containerville	Scott Kyson	-	○	-	-	-	-	-	-	-	-	-	●	-	-	-	UK
210	2015	Container skyscraper	CRG Architects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nigeria
211	2015	Clipper house	Container city TM	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	UK
212	2015	Sleeping Pod	Yazdani Studio	-	-	-	○	-	○	-	-	-	-	-	-	-	-	-	US
213	2015	Common ground	Urbantainer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Korea
214	2015	Living Roof	Nau	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Germany
215	2015	Shiftpod	Christian Weber	-	●	-	●	-	-	-	-	-	-	-	-	-	-	-	US
216	2015	Eco capsule	Eco capsule TM	-	-	-	-	●	-	-	-	-	●	-	-	-	-	-	Slovakia
217	2015	Sleeppod	VATC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Vietnam
218	2015	Container Skyscraper	Ganti+Associates	-	○	-	-	-	-	○	-	-	-	-	-	-	-	-	India
219	2015	Prouve house	Richard Rogers & P.	-	-	-	●	-	●	●	-	-	-	-	-	-	-	-	US
220	2015	Lifepod	Michael R Weekes	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	US
221	2015	Creative space	Slog&Stuveback	-	○	○	-	○	-	-	-	-	-	-	-	-	-	-	Sweden
222	2015	Living roof capsule 2	Nau	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Germany
223	2015	Exo	Michael McDaniel	-	●	-	●	●	-	-	-	-	-	-	-	-	-	-	US
224	2015	Sleeperoo	Langefreunde Design	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	Germany
225	2016	BA Head office city	Container city TM	-	-	-	-	-	-	○	-	-	-	-	-	-	-	-	UK
226	2016	Kasita	Kasita company	○	-	-	-	○	-	-	-	-	●	●	-	-	-	-	US
227	2016	QUO Container center	BZZ Arquitectura	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Argentina
228	2016	First cabin Tsukiji	First Cabin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
229	2016	Tree House	Richard Rogers	-	-	-	○	-	-	-	-	-	-	-	-	-	-	-	Global
230	2016	Campera bubble suit	Capmera hotel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Mexico
231	2016	Fuselage	Tree Tents	-	-	-	-	-	-	-	-	-	●	-	-	-	-	-	UK
232	2016	Xpod	Denoldervleugels	-	-	-	○	-	-	-	-	-	-	-	-	-	-	-	Ne-lands
233	2016	3D printed office unit	Winsul Global	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UAE
234	2016	Container market	Siyabonga Gondwe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. Africa
235	2017	Shipping container home	Mods International	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Global
236	2017	Quadrum-Qudauri	Quadrum Ski & Yoga	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Georgia
237	2017	Drivelines studios	Lot-Ek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. Africa
238	2017	Coodo	Coodo TM	-	○	-	○	-	○	-	-	-	-	-	-	-	-	-	Germany
239	2017	Mobile podcast studio	DN&co and Fantom	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	UK
240	2017	3 unit blocks	Ofis architects	-	○	○	○	●	○	○	-	-	-	-	-	-	-	-	Slovenia
241	2017	Pod Vend. Machine Scyscr.	Haseef Rafiei	-	○	○	○	-	-	-	○	-	-	-	-	-	-	-	Japan
242	2017	Shelter with Dignity	Framlab	-	○	-	-	-	○	-	-	-	-	-	-	-	-	-	US
243	2017	Ras Abu Aboud Stadium	Fenwick Iribarren	-	-	○	-	○	-	○	-	-	-	-	-	-	-	-	Qatar
244	2017	Heil-berg	Luca Beltrame et al	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	Global
245	2017	The Capsule Hotel	The Capsule Hotel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Australia
246	2017	Container hostel	Kinzo Architecten	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Germany
247	2017	Snoozebox	Snoozebox Hotel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	UK
248	2017	Bed and Boarding	Carlotta Tartarone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Italy
249	2017	Inn the park	Inn the park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
250	2017	Matices Hotel de Barricas	Matices Hotel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Mexico
251	2017	Blowing the building out	Chidai Keisuke	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
252	2017	Cozy box	S&P architects	-	-	○	-	-	-	-	-	-	-	-	-	-	-	-	Ukraine
253	2018	Kaohsiung Stereo Cont. Inn	ML Architect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	China
254	2018	Starbucks in Taiwan	Kengo Kuma	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	Taiwan
255	2018	Albang capsule	Yoon Space	-	○	-	-	-	○	-	-	-	-	-	-	-	-	-	Korea
256	2018	Silver bullet	Airstream	-	-	-	-	●	-	-	-	-	●	-	-	-	-	-	US
257	2018	Sphere hotel	Huisten Bos (HTB)	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	Japan
258	2018	OPod Tube Housing	James L. Cybertech.	-	○	-	-	○	-	○	-	-	-	-	-	-	-	-	China
259	2018	9h Akasaka	Design Studio S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Japan
260	2018	Keetwonen	Tempohousing	-	●	○	-	●	-	●	-	-	-	●	-	-	-	●	Ne-lands
261	2018	Cocoon modules	N. Spyropoulou	-	-	-	-	-	-	○	-	-	-	-	-	-	-	-	Greece
262	2018	Stackt Market	Stackt Market	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Canada
263	2018	Home coming home	S. Minakami et al	-	-	○	-	○	○	-	-	-	-	-	-	-	-	-	Japan
264	2018	Rubner haus	P. Scoglio, C. Griffa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Italy
265	2019	Capsule hotel Lucerne	Hirschengraben	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Swi-land

Legend: Number: Normal - Unbuilt, Bold - Built; ○ - Initial concept, ● - Renovation/change after construction: 'Concept' column) According to concept; (Renovation column) Different from concept

▼Change occuring in built/unbuilt cases of capsulr architecture (2 periods)

	Total: 265		Total: 115		Total:150 ▶	No change 71	Renovation (some cases with several methods)		49	Demolished 30
Period 1 1930~1979	99	Unbuilt	58	Built	41	8	15	Renov. acc. to concept (52) 5	New renovation(27) 12	18
Period 2 1980~2019	166		57		109	63	34	27	15	12

Renovation in relation to the concept of change in capsule architecture

Renovation is frequently used to identify the process of historical preservation of buildings at the late stages of their lifespan. Nevertheless, a renovation process implies change of different properties of a building – both physical and conditional ones in order to prolong the building lifespan by reconstruction, repair, updating of communications, as well as change in a building's functioning, purpose or value, while the last one is done in order to resell a building on the market. Therefore, the renovation process is not only connected to the nostalgic feeling of preserving a historically valuable building environment, but rather finding the new uses for the building, even if it becomes an exhibit of cultural heritage. As Designing Buildings Ltd. explains in their Designing Buildings Wiki: 'The term 'renovation' refers to the process of returning something to a good state of repair. In the construction industry, renovation refers to the process of improving or modernizing an old, damaged or defective building'[2)].

As a strictly construction term the 'renovation' is subdivided into structural and cosmetic renovations which include the following:

Structural renovations:

- Making extensions
- Loft conversion
- Repairs of basement
- Redesign of floor plans
- Re-wiring, re-plumbing

Cosmetic renovations

- Decoration
- Flooring
- Updating fixtures
- Light landscaping

Considering the list above it is possible to apply these technics to capsule architecture and convert them into derivations from the conventional renovation. Capsules as building blocks for capsule architecture may undergo cosmetic renovations, however, capsule architecture as a whole may require the structural renovations what means replacement of old capsules with their change to the new ones as a principle. Thus, the extension may mean the addition of capsules over time together with their partial

replacement or without replacement as a tool to update the building's shape, profitability, purpose, etc. On the other hand, the rearranging of plans means a change in a building's organization or the functional components, what may correspond to the reorganization of capsules and their change to the new ones. As an example in Kikutake's Marine City and Isozaki's Clusters in the Air, the capsules could be potentially changed and rearranged to form so-called 'family clusters' – the combination of several capsules connected to each other, while this connection could change over time and capsules may be placed elsewhere on the supporting core structure. Moreover, capsule architecture allows manipulation with capsules as their mobility, reorganization by changing the capsules' locations inside a cluster as well as redistribution of their functions (for example by converting some previously residential capsules into hotel rooms) what may imply the corresponding cosmetic renovation and, in general, an update of the building. Such possibilities are derived from the ability of the typology of capsule architecture to be easily disassembled and assembled again into something new, its mobility, connectivity, recyclability and other properties allowing change over time, what, eventually, bring renovation and the concept of change in capsule architecture together. The case of Nakagin Capsule Tower becomes a good example of such combination.

Construction method and concept of change in Nakagin Capsule Tower

The case of Nakagin Capsule Tower currently combines the notions of metabolic change and renovation. In a sense, by replacing capsules of the building done from the independent elements with the different lifespans the building can undergo renovation, what shows the potential of capsule architecture in general to infinitely prolong its lifespan. As an existing built case the tower became the place for the new experimentation regarding the new ways of renovation techniques by the possible replacement and disassembling of a building due to its typology. This case also includes the factors of social appeal, international recognition of notable architectural heritage, construction norms, a country's policy, the realm of the real estate and construction market.

The real estate industry may often omit the cultural value or uniqueness of a building in favor of profitability of land by building something new on the vacant plot. The capsule tower is located in Ginza district of Tokyo what is equal to Manhattan district in the New York City regarding the land value and potential profitability for real estate developers. With the growing construction market in Tokyo, the land value in Ginza also has been gradually

increased in recent years, thus, capsules have become a subject for trading with investors buying the property rights related to the capsules which may be even unlivable or abandoned. Nevertheless, their price fluctuates together with prices on the market. Capsules vary in value depending on their location on the core structure, real condition and time when they were bought. For example, their initial price in 1972 was about 3.8-4.8 million Japanese yen corresponding to 20-25 million yen (184,000-230,000 USD) if to recalculate this value to the modern rate. The prices were gradually increasing in the impetuous rate later during the Japanese asset price bubble (1986-1992) with capsules' values getting to 30-40 million yen[3,4)]. Starting from the bubble's burst together with the degradation of the building and occurrence of the major issues with the capsules as corrosion of the metallic envelope, prohibition of using asbestos in construction, as well as the caution regarding structural degradation of the building and the outdated seismic resistance ability (the new seismic resistant requirements and corresponding mechanisms were implemented in Japanese construction field from 1981) led to decrease of capsules' values to about 1-2 million yen[5)]. Yet these prices have skyrocketed tenfold in 2018 again. This fluctuation shows the dependence of the building's fate regarding its rather financial value than cultural or architectural one, what almost led to the building's demolition in 2009 while the real threat of this outcome had become clear from 2004 when capsules' and the building's value was relatively low. Fortunately for this piece of architecture, the financial crisis of 2007-2008, what led to the collapse of indexes of Japanese construction market again, triggered bankruptcy of the company responsible for demolition, leaving the building in an uncertain state for the next decade[6)].

This, on the other hand, triggered the interest regarding the building in the global media, as well as, its history and history of Metabolism. In 2006 the building was added to the list of Docomomo Japan (a non-profit organization supporting modernist architecture)[7)]. In the late 2011 two big events highlighting the tower's problematic as well as its principles of change over time – XXVI UIA World Congress of Architecture and the exhibition entitled "Metabolism. The City of the Future" were held in Tokyo. Later in 2015 'The Nakagin Capsule Tower Renovation and Restoration Project' was launched inside the building by the decision of the building's Management Association[8)]. Ever since the issue of the building and the current state of things periodically appears in different internet media, published media, TV programs, etc. The Nakagin Capsule Tower, expressing the concept of change by its own dynamic shape gets more and more attention from the common public. With this growing interest to the potential of the building to change in a Metabolist way, the

government of Chuo-ku city, where Ginza district belongs to, expressed no reservations regarding the possible metabolism-way replacement of the capsules in the future if such event happens, but, in general, the government would not interfere with the private sector which, on the other hand, may pursue the buildings' demolition[9]. This status quo also can possibly undergo reconsideration due to the building's age of 50 in coming years what would become the argument to add the building to the list of the tangible cultural property by Japanese law[10].

The capsules finished at about 90% rate were prefabricated outside Tokyo and were transported by trucks to the location where the two core shafts and two-floor pedestal were being assembled manually. The capsules as a product were requested by the architectural project, and later they were again prefabricated for the residence of Kisho Kurokawa himself in the outskirts of Tokyo Prefecture - Capsule House K in 1973. The slightly altered versions of the familiar capsules were designed but never reached the construction stage in Kurokawa's Capsule Village (1972) in Usami. And later again in 1976, the capsules of the same size were produced in a small quantity again for Kurokawa's Sony Tower in Osaka. These four projects show the short relationship occurred with architectural practice and industry oriented to mass-produced prefabricated houses. While in the Western World capsules were provided as building blocks and unified units to create architecture, Kukorawa initiated capsules' production to the already designed buildings. Be the request to produce capsules continuous and, thus, more economically justified, capsule architecture could become a self-sustainable typology relying on the joint partnership of capsules' production industry and architecture.

Thus, inside the Nakagin Capsule Tower's initial project the development team consisted of an architect, a construction company, capsules' manufacturer and a client. While the relationship of the design team was conventional with constant cooperation of architect and subcontractors regarding the specific structural matters, the client – Nakagin Integration, a real estate company, were promoting their first capsule mansion of the future, due to Kurokawa's persuasiveness regarding future social transformation to 'homo movens'. This relationship was not based on strict negotiations but rather belief and respect of both parties regarding one another and the building typologies of future architecture in general. Therefore the capsules were sold on the market via the households with the property right for 60 years until 2032[11]. These rights themselves gradually became the real value of the capsules rather than capsules were viewed as a profitable property to lend or use for oneself. On the other hand, by the concept, the capsules were supposed to be replaced (by different

sources) after 20, 25 or 35 years, while their real lifespan and durability remain uncertain. After 25 years of construction Nakagin Capsule Tower as a capsule mansion did not trigger such a trend, as well as it became obvious that urban matter changes in a different way as it was envisioned by Metabolists. The people indeed became more moveable, but such change just slightly influenced architecture. Therefore, besides the obvious building's degradation and maintenance problems, the replacement plan became unfeasible. Additionally, there, supposedly, were not any other long-term contracts regarding the framework and budget agreement between parties to recycle old capsules and produce new ones. It would be problematic to predict. The framework of construction and corresponding relationships are presented in the scheme below (Fig.38).

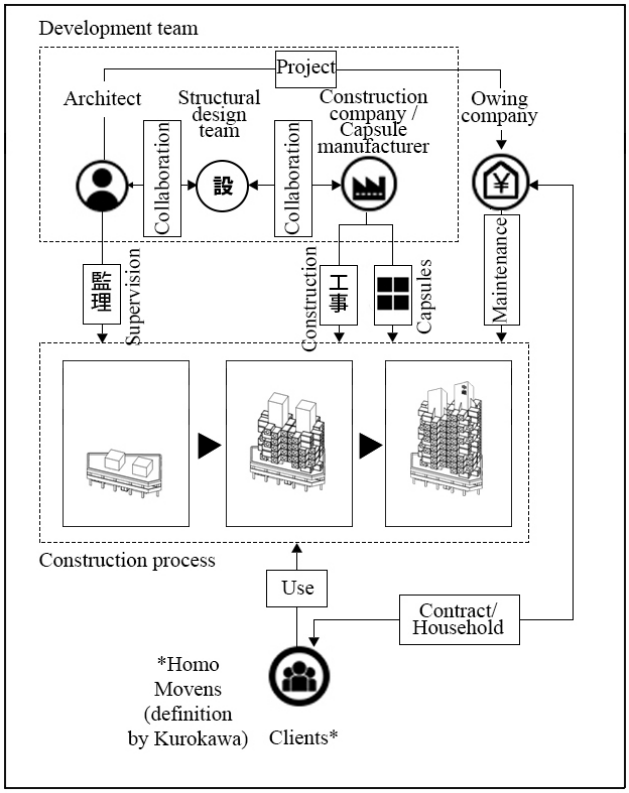


Fig. 38. Construction process and relationships between involved parties

The building by the concept consisted from three independent elements with different lifespans – capsules which come to their conditional death after 20~60 years, core shafts which can withstand much longer – 100~250 years, and, lastly, communications which, at first, had to be the part of shafts and could be accessible at some point of time in order to be updated, but eventually they found themselves packed outside between capsules

in the pipeline's blocks. Such location made solid metal welded pipes unreachable if something is broken in the tight space between capsules. Therefore, the pipeline can be further related to the lifecycle of the capsules, that is, if capsules are taken off the pipes become accessible and can be replaced simultaneously with the new capsules. In the

Metabolist city, a capsule as a basic living unit inside a vast infrastructural city could be potentially replaced at any time without influence to other parts of a building, however, in Nakagin Capsule Tower the capsules were meant to be replaced at once by detaching them from up to down using a crane. That means that individual replacements of capsules one by one from, to say, the middle are, in general, impossible. Rather, on the opposite, this is theoretically possible by using some delicate but simultaneously heavy machinery, but that would consequently influence if a not the building, then the surrounding environment. There has been already a stern denial by the owing company to deploy any kind of construction gears, even a forklift which could potentially, as a demonstration, try and remove one of the lowest capsules. Lastly, together with the permissions paperwork, there is always the issue of funding such projects. The table below shows the framework may be applied in the case of capsules' replacement by the concept (Fig. 39).

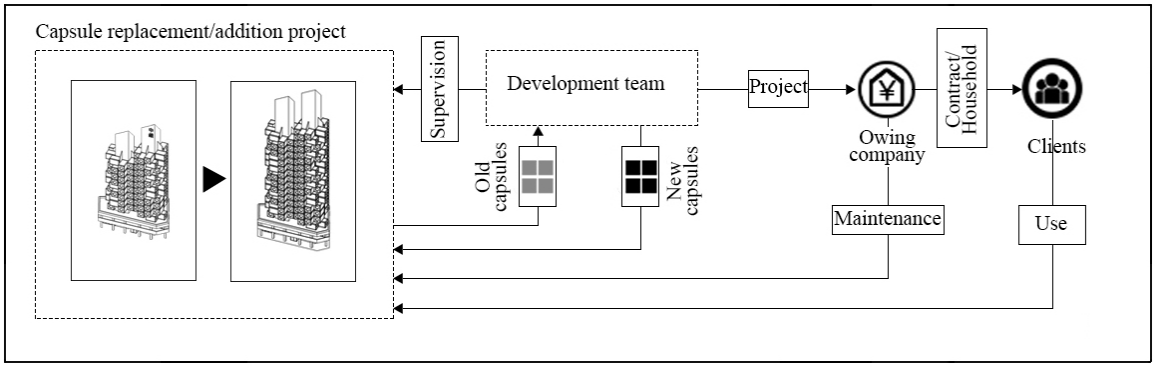


Fig. 39. Concept of change/addition of capsules over time

Started working from 1998, in 2002 Kurokawa's architectural bureau and Taisei Construction (大成建設) which with Daimaru Engineering Division (大丸装工事業部) had been working on the original construction and capsules' manufacturing in the 1970s, developed a project of capsules' repairs by detaching all the capsules and repairing them on manufacturer's location. In a sense, this was a first detailed project for the actual replacement of the capsules and was performed in the thought metabolic way with some

changes. The replacement itself, originally, meant to be not due to capsules' structural and physical deterioration but their symbolic obsolescence unfit for modernity. That was a firm prediction because the internal filling of homes has been constantly changing and required an update in an about every 20 years. In the 1990s almost all electrical appliances installed in the capsules as part of interior design like TV-set or tape-recorder were outdated despite the fact that in 1972, the capsules were, without exaggeration, a high-tech living space of the future. Answering this, the capsules meant to be repaired on the outside, provided asbestos removal, and new design of the capsules' space. The core shafts temporary left naked together with pipeline blocks were supposed to be repaired as well. Joints, similarly, had to be reinforced and repaired. At that time, a decisive force shifted to a majority of capsules' owners organized the building's Management Association. As it was not established when the building was completed, there was not any direct course towards maintenance what eventually would mean future renovations as well as possible capsule replacement. On the other hand, the association was created when first issues occurred in order to deal with the buildings' deterioration, and it had not any accumulated funds to implement such big projects. Due to the budget issues, the plan was suspended.

The second project by Kurokawa was being discussed in 2005-2006 between the architect and Management Association. This time the completely new capsules were proposed to replace the old ones. The newness did not affect the capsule's outward appearance and the same was applied to the bath unit section. On the other hand, the new capsules' design was eliminating the previous design flaws as the flatness of the roofs which were gradually sagging and accumulating the water corroding the metal, problems with the joint part between a capsule and the shaft due to poor insulation, and others. The inner space was left empty for an owner's discretion to transform it into any preferable interior design. For better access to pipelines, each capsule had an opening from which a section of the pipes would be accessible. This time the capsules had the defined lifecycle of 60~70 years, thanks to an improved envelope, insulation materials and joints. As a downside, that meant what capsules become unmovable, opposite to how they were considered before – the detachment of capsules due to individual will from any part of the building was still unfeasible by the new design, while 60~70 years lifespan coincided with the presumable lifecycle of the main cores, what would lead to the complete reconstruction of the whole building at once. The last project (also rejected to budget issues) was more related to renovation, rather than the original concept of change over time, what the capsule tower continues symbolizing by its dynamic shape. If ever the original concept can be implemented, the idea of different

lifecycles should become the core principle on which the tower should operate in the future. Meanwhile, Nakagin Capsule Tower is, undoubtedly, a valuable piece of cultural heritage not only for Japan but the common global culture, as well as it clearly describes issues with preservation of modernist heritage, as well as the populism towards the existing urban environment, impetuous urban metabolism, and endless cycle of construction and consumerism in the modern cities. Current renovation approaches are streamed to preserve the building with the potential capsules' replacement, which may be a symbolic declaration if to reconsider the current urban environment.

Renovations of Nakagin Capsule Tower

The existing renovation movement in Nakagin Capsule Tower is socially oriented and applies various DIY techniques, while the original concept of capsules' replacement is still considered as a valuable solution. Nakagin Integration to whom the capsule tower became the front and declarative building (the company even moved their main office there and used some of the capsules as showrooms and personal offices), yet in summer 2018 it sold rights for the land and 16 own capsules to another real estate developer. The new landowner by its right to do so straight banned any dealings with capsules' leaseholds between capsules' owners and began negotiations to buy the capsules by itself from the owners. Since any decisions regarding the building's future are settled through votes of owners of property rights, it is obvious that the new company intends to buy out the majority of capsules (the property rights) in order be able to perform the new construction on the plot. On the other hand, before this Management Association launched Nakagin Capsule Tower Preservation and Restoration Project which works on the persuasion of the owners towards building's cultural value and the probability of capsules' replacement what may have its own profitability. Such business plan may seem difficult to develop, however, some companies (Japanese and international ones) may be interested in using capsules for profit by either utilizing them as the second house proposed by the original concept or hotel rooms, etc. This leads to the necessity to promote the unique nature of the building, as well as the need to reach tourists within Japan and globally in order facilitate addition of this spot to their touristic roots, since many visitors of Tokyo may have heard the news regarding the building's demolition in 2007 and, hence, may be under the impression that the building already does not exist.

To attract the attention the Preservation Project works in the constant collaboration with media, artists, architects, other business partners, developers and so on. Bearing the idea of the capsules' replacement in mind, the Project collaborates with Kurokawa's family and his architectural bureau in order to keep the topic valid and discuss details regarding the probable replacement plan. In May 2019, Mikio Kurokawa (son of Kisho Kurokawa) organized Capsule Library – a small library having a collection of Kisho Kurokawa's books, including those of limited editions. Such projects limited by only one capsule are numerous, and capsules have been used for a range of purposes – hotel rooms, music studios, showrooms, lecture rooms, cinemas, exhibition spaces, event spaces, broadcasting studios, performance spaces, etc,; what clearly shows possibilities of customization of capsule spaces for different goals besides living. At some point of time, different capsules inside the building would have been used for different occasions without interference with each other – eventually, there are 140 separate capsules which function may vary drastically.

Media plays an important role to keep the public updated regarding the last developments inside the capsule tower. Management Associations tightly collaborates with a range of the common media, as Yahoo Japan, as well as interior and architectural journals – Chintai, Lives, etc. The association possesses the publication by its own – a book dedicated to the current state of things in Nakagin Capsule Tower, as well as its residents' living, and private renovations. The book's production was funded on Japanese crowdfunding platform 'Motion gallery'. The interiors of capsules are often requested for filming in a range of advertisements, music clips, cultural TV programs, etc. Similarly, due to collaboration with tourist companies many willing are provided with so-called 'capsule tours' which allow the excursion through the building and visit of capsules' spaces in original conditions.

Being a social movement, many supporters of the tower's preservation perform private renovations of interior spaces, as well as, some repair accessible from the outside as roof or pipes' repair. Some capsules due to the failure of the original heating-air-conditioning system had to install air-conditioning on the personal scale, thus, tower gradually has being run wild by hanging pipes on the building's façade. These casual renovations allow people to reuse the updated interior space as a hobby shelter, second house, holiday house, or a permanent home. On the other hand, the Preservation Project also does the interior renovations of capsules which are further used as rental spaces. Such a scheme is called a Monthly Capsule and, judging from the name is oriented for the short-time rental starting from one month. This is a compromise solution between the hotel room and long-term living in a tight capsule. The budgeting depends on a collaborator with the

project. For example, one of the monthly capsules is done by a designer from Mujirushi (the network of shops selling design products for home and also interior design bureau quite famous in Japan) and highlights Mujirushi interior design. Another project was performed by the crowdfunding on Kamakura-based platform called “Hello! Renovation” with the participation of the author of this thesis from a design part. Currently (Summer 2019) there are three Monthly Capsules being rented. The Preservation Project also organized the so-called Capsule Bank which has been provided support regarding the trading of capsules. As another activity of the project is a part of Management Associations it continues negotiations regarding the fate of the building with the company what owns the land. The table below shows the combined actual renovation approach (Fig. 40).

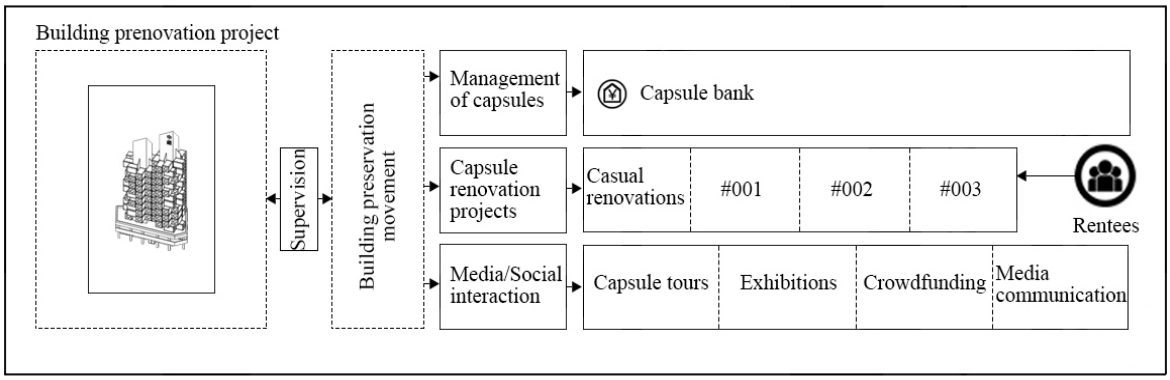


Fig. 40. Actual renovation approach regarding Nakagin Capsule Tower

Therefore the way in which the building is being somehow repaired and renovated originates from the will of separate activists aiming to preserve the building with no participation from either governmental side or private companies engaged in renovating the building for the further use. The tower from the time of construction would evolve into two possible ways – change by the implied concept what would require renewed communication between an architect, client and manufacturer after 25 years, and, on the other hand, the social movement originated inside the tower itself by its cultural and architectural value what, in both cases, aimed to prolong the building’s lifespan. Both approaches imply the ultimate update of the building through changing capsules. Therefore, it is necessary to study other built and later renovated or preserved examples of capsule architecture and trace transitions occurring from concept part to actual renovation part in order to see how the

concept of change inherent for capsule architecture currently translates on the real state of things, as it is shown in the case of Nakagin Capsule Tower.

From April 2022 the demolition of the Nakagin Capsule Tower is taking place while some of the capsules will be provided for museums and collections all over the world. Other uses of the detached capsules are also possible[12)].

Section 2 Ways of technical change in capsule architecture

As it was described in Chapter 2 of this research the concept of a capsule in architecture includes many aspects. Known well by the iconic example of Metabolism – Nakagin Capsule Tower, the capsules may not only be changeable and replaceable but also can be mobile and lightweight architecture which can slip away from any construction related paperwork and find its place in gaps of the ordinary urban environment. Equally, such architecture may serve as a tool for the expression of an individual or as a mental shelter providing temporary loneliness and physiological independence. Therefore, the capsules may be conditionally subdivided into three categories, namely, ‘mobile capsules’, ‘mental capsules’ and ‘growing capsules’. The names are arbitrary and only used to describe the different concepts which architects proposed in their designs. The last category, so-called ‘growing capsules’, implies changes in capsule architecture over time due to manipulations with capsules as it was proposed in Nakagin Capsule Tower where the capsules should have been replaced every 20~35 years by new ones. Besides this idea, there are different other applications to capsules and capsule architecture regarding the change over time. These ideas were extracted over 265 case studies. From this number, in 177 (67%) projects architects mentioned change over time. Therefore it is possible to trace similarities of different ideas and group them into several concepts regarding how capsule architecture would change with time due to its flexible nature. Some projects expressed several applications for capsules, thus, they were included in several categories correspondingly. The categories and number of cases related to each aspect are presented in the table below (Fig. 41).

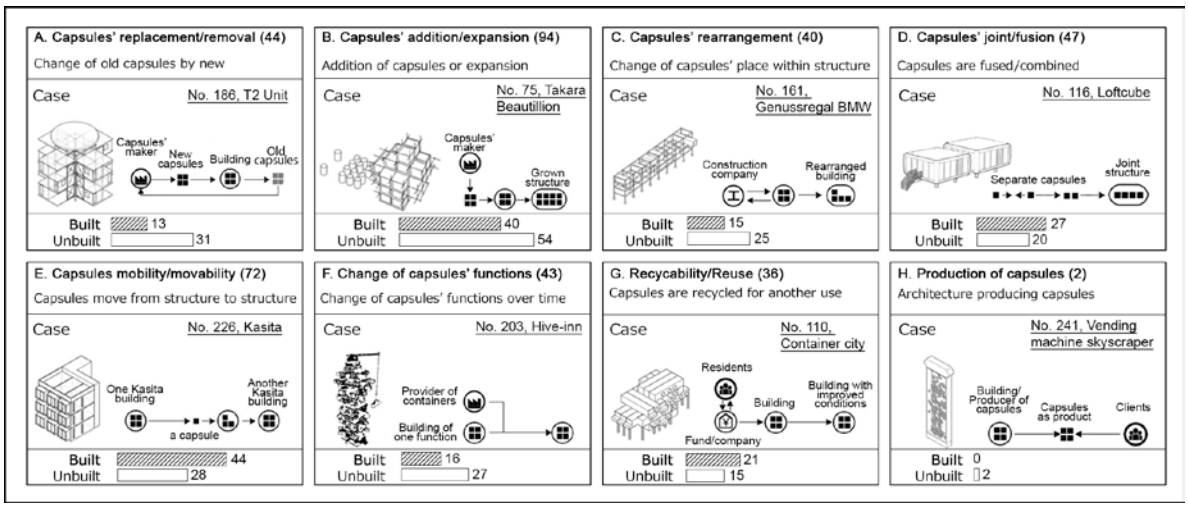


Fig. 41. Main aspects related to the concept of change with time in capsule architecture

Capsules' replacement/removal. Many studied cases imply removing capsules and change them by the new ones. Such change also means the shrinkage of the building due to capsules' removal because of surrounding conditions, etc. In Uplift Concept by Basecampzero the living units are placed into the rack-like structure which also bears plots for automobiles besides capsules. Depending on the necessity, the living units-parking lots ratio may be shifted to any side, while the capsules may be removed as well as added. Obviously, many other projects of Metabolists and Plug-in Buildings by Archigram also use this concept of replacement. In the international competition organized by Japanese Architect Magazine (新建築) in 1967 with the main topic of the compact cities of the future, Archigram-like megastructures where capsules were circulating inside a vast infrastructural framework were proposed by Japanese and International architectural teams in big quantities.

Capsules' addition/ structural extension. Such structures and architectures imply the constant growth which is possible thanks to the addition of new capsules acting as the new building blocks. Eco-Pod is an invasive growing urban organism consisting solely from capsules which can be added by the giant mechanical arms. Kurokawa's Takara Beautilion is a structure with many exposed joints meaning the readiness of the building to expand in all three dimensions. Multipurpose cells by Jean Louis Rey (Chaneac) can be stacked on each other, as well as they can form bridge-like structures or horizontal connections to continue the expansion.

Capsules' rearrangement. This change means the replacement of capsules inside the main structure without their addition or removal. This is usually may be done as a response to the change of the building's functional organization over time. Capsules if replaced to other locations may make new spatial and functional relationships. In Isozaki's Clusters in the Air together with Kikutake's Marine city capsules could change their location and form either 'family groups' or functional clusters by gathering and making new spatial connections. Genussregal Exhibition functioning as a showcase structure to present goods from different manufacturers of Austria's Styria region have several containers placed inside a metal framework. Containers' position and organization should change over time in order to offer visitors new products, attractions, and impressions.

Capsules' joint or fusion. Such change corresponds to the capsules which are usually spread onto some plane, that is, expansion of capsules as a single structure may be done in 2 dimensions. The good example of such change is Halley VI British Antarctic

Research Station where separate capsules on legs (research stations) are joined together in a row and were supposed to form longer connections as research scale expands. Another example is Wow Pod which due to its mobility may potentially form together with the temporary joint structures. Domobiles by Pascal Hausermann also could form crawling structures over time by welding in the capsules becoming a new section in a whole body of the building made from the fused capsules.

Capsules' mobility/movability. Such change corresponds to the ability of capsules to change location over time. In this case, they also can be plugged out and plugged into some structure. The good example of this change is Kasita project proposing the construction of the bearing frames all over the big cities. These structural frames can host only Kasitas (small dwelling units), thus, these capsules are able to travel long distances and find their spot in a completely different location. 3 Living Units while being able to form bigger structures together, may be first disassembled and then moved to another location where they are assembled again. Opod Tube Housing could be easily relocated using a crane, to stack on top of each other in the unused spaces between existing city buildings.

Change of capsules' functions. Such change corresponds to change in capsules' functions or their customization one by one, without the necessity to change their location. For instance, in Songpa Microhousing fourteen 'unit blocks' allow residents to either claim a single unit or in the case where a couple or friends require more space, recombine the blocks for larger configurations. Another example is Hive-inn to which capsules can be physically attached as well as they can be provided as temporal and seasonal commercial spaces, which function, as well as a physical and non-physical location in the 'hive', may change over time. This resembles a highly packed urban matter where the inner metabolism constantly reutilizes the capsule's spaces as vacant plots for any use.

Recyclability/Reuse. As an understandable matter, the capsules' lifespan also may be a subject related to change. In this case, the capsules do not vanish by the end of their lifespan or end of contract for the land use, but rather they are provided the new purpose, and often are sold to another party. The project of Container City defines the lifespan of its capsules at about few decades and proposes to use the containers elsewhere after that. Ras Abu Aboud Stadium built for the World Cup after its service will be disassembled into two new sport arenas using the components of the stadium which scale would be no further necessary.

Production of capsules. The only example describing the production facility of capsules which gradually will occupy the empty space of a structural frame below is the project of Pod Vending Machine Skyscraper. The number of capsules being produced on the top of the building depends on the demand of private buyers able to buy a house as easy as a drink in a vending machine. After construction is over the house is nested in a vacant pixel inside the same building, while the buyer becomes its resident. Therefore, gradually, more and more capsules should occupy more and more empty space until the building's capacity is full.

Section 3 Renovation approaches in cases of capsule architecture

The case of Nakagin Capsule Tower show transition from the concept describing how capsules should be changed over time, in order to update their durability, interior contents, and living conditions, and the applicable renovation approach due to the real factors which interfere with the implementation of the concept. This includes budget issues, the unfeasibility of construction, change in norms as well as urban paradigms, historical background of the building, owners will, rent of the plot, etc. Such parameters may vary in any particular case which is somehow related to renovation. In the case of capsule architecture, among the studied 265 examples, in 27 of them, capsule architecture is renovated by different approaches. These examples show how the typology of capsule architecture due to its features may evolve over time, and, therefore, the approaches applied on order to preserve a building or update a building's lifespan may be different from the conventional renovation techniques.

The studied 27 examples of capsule architecture are just a small part of all cases and occupy only 10% of the total number (18% of all 150 build cases). It partially corresponds to the experimental nature of capsule architecture, which leads to many examples being eventually demolished. Again, this also means that many examples were staying only on the paper and did not reach the construction stage, - for example, the whole activity of Archigram did not leave the field of architectural theory. That provided the architectural community with a valuable piece of theoretical knowledge but the real challenges in the realization of such concepts have remained unanswered. On the other hand, many examples appeared on the architectural stage relatively recently and they are either just prototypes to test capsular environments and other properties of such architecture, and they still cannot provide any experience regarding repairing or other manipulations with capsules in order to renew them. Nevertheless, as it is seen in the section of concepts of change in capsule architecture, architects may, in principle, provide a wide range of different ideas of how such architecture may change over time and there are examples of the practical implementations of such ideas. On the other hand, there are new renovation approaches unique to capsule architecture. The sorted 27 examples of real renovations in capsule architecture may be divided into several categories, presented in the table below (Fig. 42). Some cases may correspond to several categories as well.

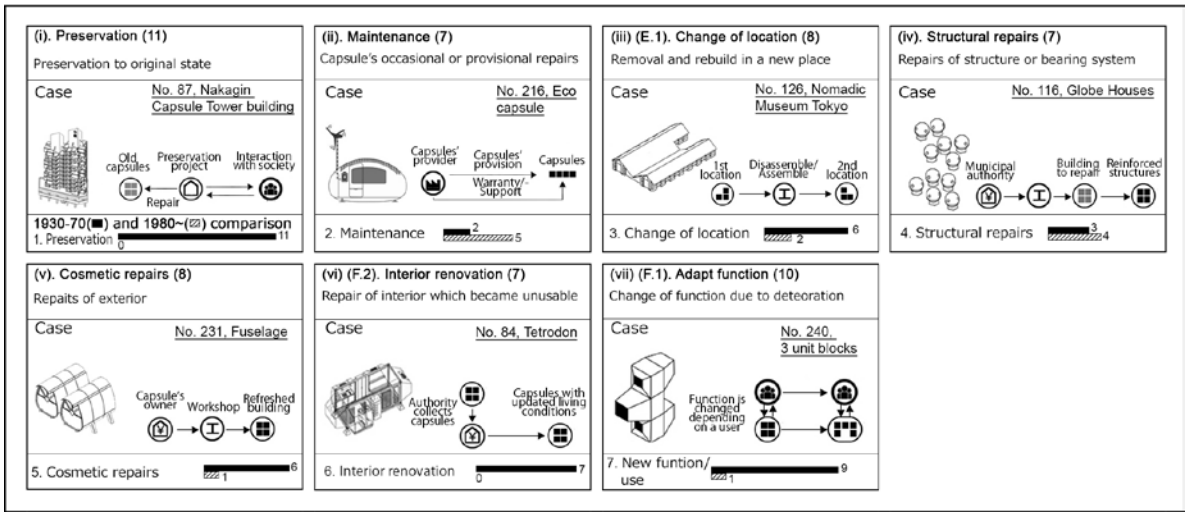


Fig. 42. Main renovation techniques applied to capsule architecture

Preservation/Social movement. This kind of renovation is currently applied to Nakagin Capsule Tower via social movement towards the renovation of the whole building. This approach generally aimed to preserve a building or capsules in the original state, or at least the one which resembles the original condition. In this case, the initiator or coordinator may be divided into the governmental side, private side, and social side. The social activity towards preservation of a valuable urban environment is currently the case with Nakagin Capsule Tower, while another example – Fly's Eye by Buckminster Fuller which was first built in 1965, later was renovated by a private preservationist Robert Rubin who after sold the dome to Crystal Bridges Museum of American Art. Lastly, government or local authorities may initiate a preservation project or collaborate with both private and public sides in order to renovate some capsules or architectural objects in order to put them on display for educational purposes. Therefore, the capsules' structures may gain governmental support and funding and eventually find their place in museums or public facilities. The good example is Tetrodon by AUA which had been produced in about 1000 copies and later spread all over France. The many capsules formed small-scale architectures for resorts and hotels which eventually were renovated in many cases by different initiators. Some Tertodon structures continue working as recreational spaces while some are put into private collections as well as exhibits for the common public. The case of Tetrodon especially shows how capsule architecture may form local clusters, which later may be disassembled and repurposed.

Warranty/Maintenance support. This approach implies the constant connection between the final consumer and manufacturer of capsules as a product. Being still a small-

scale entrepreneurships and start-ups, some capsules' manufacturers provide their houses with warranty what includes structural or cosmetic repair, support with transportation, construction, etc., what brings a capsule to the category of products which is supported by the direct manufacturer. Presumably, if such connection continues for a long time together with an expansion of manufacturing scale, it is possible that in the future the middle and large scale structures also can be provided and fully maintained by the capsules' manufacturers. Historically, all the studied cases of such capsule's producers (Tetrodon, SIHR, Hexacube, Bubble House, etc.) were cut due to the Oil Crisis (1973) and, hence, budgeting issues. The case of SIHR even includes the conspiracy theories about unfair competition which lead to the company's bankruptcy. On the other hand, it is important to note, that some examples had direct flaws (Metastadt Building System) or did not satisfy demand (Ball House, No. 145).

Change of location. This renovation technique implies disassembling the building with its new assembling on the new location. This highlights the unique nature of capsule architecture to decompose into constituent elements which can be compactly transported and composed again into the same building, as well as another shape. It is different from the inherent ability of capsules to be transported themselves via some urban medium, but this type of renovation means the update of the building's lifespan by transferring it to somewhere else where it can serve a new function or continue the current one. The good example is the Nomadic Museum by Shigeru Ban Architects which serve the goal of transportable exhibition space. The capsules in shape of containers may be shipped to other location as well as they can be temporarily borrowed from a local harbor.

Structural repairs and cosmetic repairs. These are two conventional ways to repair old architecture, and they are also applicable in the case of capsules. It usually implies the refreshment of façades and main bearing structures what in general prolongs building's service and give a new refreshed image. In the case of Globe Houses, structural repairs became necessary due to design flaws, therefore, the capsules were provided with the reinforced basement in order to better fix the spherical bodies of the capsules to the ground, while providing the new storage spaces. Cosmetic repairs are often done in the framework of the general preservation movement and bring the old and dilapidated capsules to the original state.

Update living/functional conditions. Adaptation of function. These renovation approaches often include renovations of interior spaces which lost its original purpose due to

deterioration or became unlivable. On the other hand, they may mean repurpose of capsules to other functions due to the impossibility of them to serve their original goal. The good example is Keetowen complex in Netherland – currently the biggest container city, which changes and repurposes some of its capsules with time by relocating them and changing the function of those capsules which remain. Another case is several military 20-foot ISO shelters left abandoned in the USA desert, and which later were updated and repurposed to the nomadic hotel.

Section 4 Relationship between concept of changeability and actual renovation

Capsule architecture highlights its special relationship with time due to its ability to renew, repurpose or relocate its capsules. The case of SIHR Experimental building by Claude Prouve shows how the completely demolished building may donate at least some of its part to the public and, yet quite symbolically, survive by detaching a single cell from the main structure[13]. If to continue this metaphorical comparison, this cell may serve as a seed for this structural element to become mass produced again in the future if the paradigms in architecture would require capsules as a part of the new urban environment.

This way of thinking represents how transformation in architecture is easy to imagine but quite challenging to implement. The good example is Dynamic Architecture by David Fisher who followed the other architect in the pursuit for kinetic buildings - Bruno de Franco who designed the first rotating building in 2001 in Brasil. The building was completed at half of the scale presented in the project which had two rotating towers. Even with a smaller scale, it was quite difficult to convince investors to fund such experimental construction, while when built, the rotating units were put on the market with the considerable price of 300,000 USD. Until 2007 no unit was sold, and the building eventually was abandoned and vandalized. Despite this background in the middle of 2000s, Fisher proposed his project of Dynamic Tower which completion dates as well starting dates for construction already have been postponed for a decade[14]. Named also as Da Vinci Tower the project is quite ambitions and self-proclaiming; it is proposed for Dubai, and as other large-scale projects in that area unlimited with potential. The new appearing projects of capsule architecture are also utopian and may lack technical information of how capsule architecture may find feasible ways to evolve in the near future. Yet, some fraction of projects as Container City, Keetwonen or Nomadic Museum utilizing containers, and less – Kasita, Eco-capsule or Loftcube, have found stable strategies regarding change and maintenance over time.

This section observes the relationship between concepts of change proposed by architects (as capsules' replacement or mobility; together eight types in 177 cases) together with the cases where such ideas were actually implemented (implying renovation by the concept in 32 cases) and new kinds of renovations observed in the abovementioned 27 cases (seven types). Moreover, ten cases which were renovated as it was initially proposed and also were undergone new kind of renovation were discovered. The good example of implementation of both initial concept and new kinds of renovation is student village Keetwonen (other name – Wenckebachweg). The initial concepts implemented are – (B)

Addition of capsules, (E) Mobility and (G) Recyclability, while new renovation approaches include (iii)(E.1) Change of location and (vii)(F.1) Adaptation of functions. Due to a big scale of the project containing 1034 capsules in shape of shipping containers[15)] , the commissioning and grow of the whole structure was gradual as well its removal from the site in steps what led to gradual shrinkage of the structure and several postponements of complete freeing of the land[16)]. In the process some capsules were reused as shelters for refugees while the capsules freed from the land were intended for use in different locations for other student housing or other purposes as well[17)18)]. Such projects containing some number of capsules can be dismounted and divided into smaller parts and used in other locations, or, alternatively, some of capsules may be preserved as exhibits. Therefore, there are ten projects with overlapping renovations according to a concept together with the new renovation approaches what makes the number of the buildings which are renovated to 49 cases while there are 32 cases with the renovations according to a concept and 27 cases of new renovation technics applied (together 59, ten overlapping cases).

In the concepts of change and new renovation types there were observed three similar approaches both in conceptual part and new renovation part - (iii)(E.1) Change of location, (vii) (F.1)Adapt function and (vi)(F.2) Interior renovations which can be categorized as ‘Derivative approaches’ from (E)Mobility/Movability (one derivative approach) and (F)Change of capsule’s functions (two derivative approaches) correspondingly. These renovation methods are similar to each other but differ in primary aim for the renovations. Such transition was observed in 15 cases. By composing the cases and adjusting the corresponding links we can see the nature of transition and relationship between the concept of change and renovations techniques (Fig. 43).

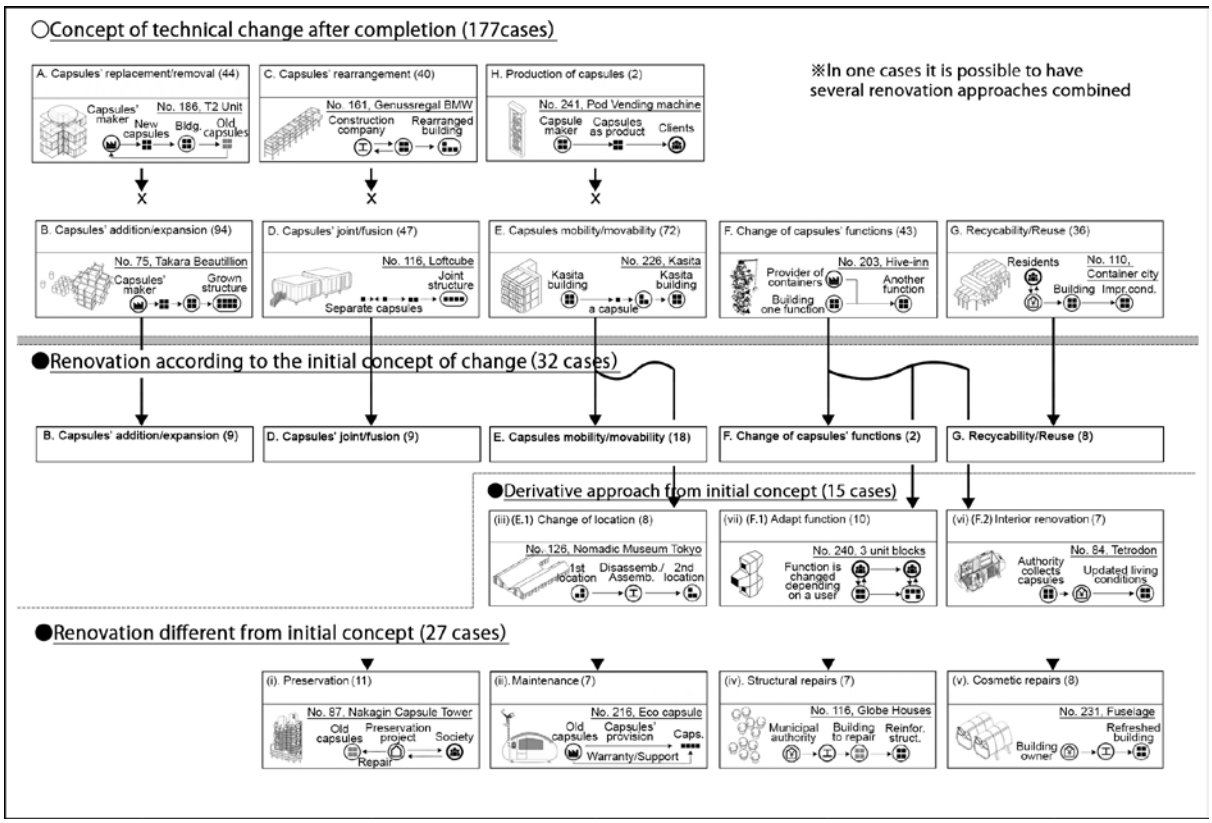


Fig. 43. Direct implementation of concept and new renovation approaches

According to the figure, initial concepts (A)Capsules' replacement/removal, (C)Capsules' rearrangement and (H)Capsules' production have not been implemented on practice. This is due to the technical difficulties and scale of the proposed renovation plans of replacement or overall manipulation with capsules what would require heavy machinery and precise implementation together with other technical and economic aspects. However, (B) Capsules' addition was observed in 9 cases. One of examples of such expansion is K67 (No. 68) which could attach new sections and sprawl like a snake on the ground. Similarly, capsules' fusion and or attachment of additional parts (D. Capsules' fusion – 9 cases), and Recyclability (G) was also partially implemented. New renovation observed in abovementioned 27 cases include 11 cases of (i) Preservation, 7 cases of renovations by (ii) Maintenance, as well as 7 cases of (iv) Structural repairs and 8 cases of (v) Cosmetic repairs which despite of being conventional renovation cases applicable for most of buildings' typologies had their features due to the nature of capsules. In case of Bolwoningen Globe houses) the renovations needed in order to stabilize the spherical structure of the homes, and in the case of interior renovations capsules of project Tetrodon were first transported to the warehouse where they were fully renovated before moving to another location. Also, in

cases of capsule architecture, if the number of capsules is great the simpler structure may guarantee more flexibility regarding renovations. In some sustainable cases of capsule architecture as Futuro or M-ch (Tree village) capsules as separate objects are more compliant for change and repairs than their agglomerations.

The different concepts of change and real renovation approaches, if compared, show how the ideas regarding the change in capsule architecture cannot be directly implemented on practice, and, therefore, other approaches of actual renovation and derivative approaches are implemented. The studied cases of renovations include several approaches towards such architectural typology and show how the extension of the lifespan of such buildings can be actually done. Undoubtedly, the preservation movements are just a countermeasure to save the valuable piece of architecture without the necessity to implement the original concept of change; however, it prevents building's demolition. Despite the concepts of change via capsules' manipulation are feasible on paper, in reality it requires the nicely thought process of such manipulation, although due to unification and already developed machinery some cases of capsule architecture (mostly container architecture) are able to directly apply the concept of change into practice – usually, it implies the addition of capsules for a bigger benefit from the building's operation. Another factor making future changes possible is compactness of capsules and their maximum mobility with lesser foundations (mostly mobile capsules and hotels).

Section 5 Conclusion

The case of Nakagin Capsule Tower shows how concept part regarding capsules' replacement to the new ones became unrealized and, eventually, was substituted by more applicable renovation approach based on social movement and public will to preserve the building. The concept part of periodically changing capsules and the renovation approach can be contrasted to each other in order to see differences between them and find how the original concept translated into the actual renovation or any other action oriented to the prolongation of a building's lifespan.

Following Section 1. Introduction, in Section 2 to 4 in 177 cases of capsule architecture mentions of the concept of change were observed (8 types) and in 31 cases the renovation according to these concepts were implemented while in 27 cases buildings were renovated by new approaches (7 types). That meant that buildings can be dismantled or partially repaired, moved to another location or undergo functional changes of capsules as their components what could not be envisioned at the time of design. Capsular buildings are flexible to renovations, however, in some cases their design may. On the opposite, interfere any interventions. The studied cases allowed creating a broader image of how, case by case, the buildings have been supposed to change over time, and which renovation approaches were eventually chosen. Additionally, in 15 cases some types of change come closer to the new renovation approaches which can be labeled derivative approaches from the original concept as a more flexible solution or a renovation tool. The abovementioned approaches highlight the typology of capsule architecture derived from its concept and actual renovation approaches. It is clear, that the concept currently cannot be realized to its full potential, however, influences flexibility (as well as sustainability) of such buildings.

Notes:

1 Nakatani N. *Severalness+ (enlarged edition)*, Kajima Shuppansha, pp.97-116, 2011 (In Japanese)

2 *Renovation;* Designing Buildings Wiki; Internet source: designingbuildings.co.uk

3 *Threat of survival! Is capsules' replacement is possible in the aged Nakagin Capsule Tower?;* Real Estate Yahoo Japan; Internet source: realestate.yahoo.co.jp (Japanese title: *存続の危機！「中銀カプセルタワービル」古くなったカプセルの交換はできない!?*)

4 *Sell-out Mansion, the First and Last Modernist Architecture – Nakagin Capsule Tower ;* Takeshi Ide. Nomu.com; Internet source: nomu.com (Japanese title: *分譲マンション、最初で最後のモダニズム建築「中銀カプセルタワービル」)*

5 Hidaka J. *Nakagin Capsule Tower;* UIA 2011 Tokyo Design 2050, 11-12 (Japanese title:*中銀カプセルタワービル」)*

6 Lin Z. *Nakagin Capsule Tower and the Metabolist Movement. Revisited;* 98th ACSA Annual Meeting Proceedings, Rebuilding, 518-520

7 *Nakagin Capsule Tower;* Docomomo Japan; Internet source: docomomojapan.com; Project number: 123.

8 *Nakagin Capsule Tower Renovation and Restoration Project;* Home page; Internet source: nakagincapsuletower.com

9 Based on interviews with involved parties and the building's residents, as well as the attended events by Nakagin Capsule Tower Renovation and Restoration Project

10 *Tangible cultural property (buildings);* Ministry of Cultural Affairs, Government of Japan; Internet source: bunka.go.jp

11 Hidaka J. *Nakagin Capsule Tower;* UIA 2011 Tokyo Design 2050, 17 (Japanese title:*中銀カプセルタワービル」)*

12 *Capsules from Nakagin Tower find new life at museums and accommodation venues*. Internet source: japantoday.com/category/features/lifestyle/capsules-from-nakagin-tower-find-new-life-at-museums-and-accommodation-venues

13 *Ludres - Option 75 - Constructions modulaires S.I.R.H. – Prouvé.* Internet source: astudejaoublie.blogspot.com/2015/01/ludres-option-75-constructions

14 *Dynamic Architecture secures patent for rotating tower in the GCC;* Middle East Architect; Internet source: middleeastarchitect.com

15 *Keetwonen*. Internet source: tempohousing.com/projects/keetwonen

16 Uittenbroek C, Macht W. *Sustainable Containers: Cost-Effective Student Housing*. Quarterly & Urban Development Journal, 4th Quarter, pp.55-58, 2009

17 *Why the containers at the Wenckebachweg are still in place.* Internet source: folia.nl/actueel/134877/waarom-de-containers-aan-de-wenckebachweg-nog-steeds-op-hun-plek-staan

18 *Student housing Wenckebachweg can stay 3 years longer*. Internet source: ad.nl/amsterdam/studentenwoningen-wenckebachweg-mogen-3-jaar-langer-blijven~a1ec00df/?referrer=https%3A%2F%2Fwww.google.com%2F

Chapter 4. Social Aspect of Capsule Architecture, its Residents and Communities

Section 1 Background and aim of research

Section 2 Role of capsule in social aspect

Section 3 Characteristics of capsules for living

- 3.1 Characteristics of small capsular spaces
- 3.2 Features of living in a capsule

Section 4 Questionnaire on living in a capsule among residents of capsule architecture

- 4.1 Composition of questionnaire
- 4.2 Results of questionnaire

Section 5 Features of communities in capsule architecture

- 5.1 Case studies of communities
- 5.2 Dispersed communities and site visits

Section 6 Capsule architecture and its users and residents

Section 7 Conclusion

Section 1 Background and aim of research

Among three described aspects of capsule applications above as ‘mobile’, ‘growing’ and ‘mental’ the latter corresponds to a social aspect and a social role of capsule architecture. While two first application approaches are related to the physical and technical characteristics of this typology, the social aspect of a capsule deals with urban, cultural, social, physiological, political, and other social-related areas. Having its roots in Prefabrication, Modernism and even before in Futurism artistic movement the living units and structures resembling capsules had a strong social role by serving as machines to ‘amplify culture, lifestyle and the condition of cities[1)]. Relying on machines Futurism’s utopian characteristic of cities emerged from poetic nature of industrial approach while, how Banham calls it “the First Machine Age”, in the early Modernism the relationship between residents and machines implied people controlling machines in their own homes via electronic devices[)2)]. After Futurism, Modernism also continued dealing with many types of urbanistic ideas both city-centric and de-urbanistic conceptions[3)]. These approaches were highly rational in a sense and proposed large-scale geometrical patterns with zones of separate functions in shape of high-rise buildings (Le Corbusier, Ville de 3 million habitants, Leonov’s radial city, etc.) what would be later complemented by more radical ideas of Yona Friedman’s Spatial City and Archigram’s sprawling Plug-in City[4)]. In Japan before the Second World War the ‘westernization’ in culture and architecture led to a broad debate between Japanese architects on how Japanese architecture should evolve in a scope of global modernism[5)], as well as regarding Japanese city planning and acquiring new territories by either military, reclaiming waterfront lands or building in the sea[6)]. Futurism and early Modernism eventually gave the required functionalist agenda and showed the power of technology what facilitated creating new radical urban concepts after the World War II.

On the other side, the industrial developments provided new technologies of units customization, Fordism, and possible mass production of precut elements in the construction area, what can be generalized by a term of ‘prefabrication’ and overall adaptability of buildings and environments. One of the pioneer developments was company General Panel by Konrad Wachsmann and Walter Gropius who created a system of elements and joints called a “packaged house”. Planned for using in cases of factories workers or solders the house was a quick tool of housing provision and deployment[7)]. Here, the naming ‘house’ implied a function rather a complete object, and the house itself could be adapted regarding its use[8)]. Modularization of housing provided additional freedom of adding more or get rid of modules what later will become topical in following practices. Other architects as Jean

Prouve and Buckminster Fuller were working on their own concepts on prefabrication and dynamic space with small quality of made prototypes which allowed some degree of freedom, and in the case of Fuller's Dymaxion House or dome structures – mobility for emerging nomadic society[9]. With the occurred interest in vernacular architecture in the era of Modernism many architects were looking for new social patterns with relation to architecture to connect, tune and harmonize societies and urban environments. This topic was present in a practice of Fuller pointing out living of so-called nomadic 'water people" Maori from the New Zealand, where many environmental forces shaped society[10], and the same topic can be traced in following works of megastructuralists applying different layers of interaction in single structure by adapting them to the surrounding environment or creating the environments anew[11].

During the war and postwar periods so-called recreation vehicles were developed in parallel with prefabricated houses but they were allowing the mobility what had become crucial in the unstable times of lack of work and, later in the emerging trend of leisure society[12]. Leisure, pop-art and consumerism society became topical in the 1950-1970s with the invention of new material for housing and interior – different variation of plastic structures and infills. Hotel cabin or mobile plastic house starting from Ionel Schein in 1956 was followed by further prototypes and working models for movable house and extra-quick inflatable membranes (as Villa Rosa by Coop Himmelb(l)au, 1968 showing an utopian idea of PVC membrane serving as a skin of a house and a controlled environment able to shrink and expand)[13] until the oil crisis in 1971[14]. In the project of Team 10 members Alison and Peter Smithons – House of the Future and following Appliances House: The Strip House and The Snowball House, these plastic houses combined approaches of mass-housing production, and changeability of space divided by closed functional elements which can be changed or reorganized if necessary, as well as the house itself could be changed[15].

With the developments of post-war architecture the topic of "dwelling" and role of architecture with a relation to a man was also reconsidered. As for the 'first machine age' by Banham the machines were used only by elites and with the advent of the 'second machine age' machines became an inherent part of a society what could bring in the new 'lore' of architecture or 'another architecture' with new ethics and placement of modern architectural theory which Banham first mentions in his book of New Brutalism and later with the reference to practice of Fuller in the U.S.[16]. By studying Fuller's works Banham developed a new framework regarding the definition on the house as a 'fit environment' controlled by machine and, thusly, nearly eliminating a house as an architectural object[17]. What comes in

a result of this architecture discourse was illustrated in a picture by Francois Dallegret - “the Environment Bubble” – seemingly a capsule containing its residents (depicted in low-technological touch as a reference to a vernacular living) with the machinery operating in the center[18)].

Another notion connecting capsule architecture and society is “nomadism” and “freedom of individual” usually describing democratic and liberal way of living together with a freedom of movement and dynamic nature[19)]. In practice of Yona Friedman and his own group Group d'Etude d'Architecture Mobile (GEAM) the mobile architecture implied changeability by urban tissue with static containers in which mobile units would be placed and organized by residents themselves with a well-known representative of such spatial urbanism as Spatial City[20)]. In megastructures of Archigram also the freedom of individual to act and organize one’s own space was topical. Warren Chalk of Archigram mentions a ‘creative system’ which should be invented for cities to address contemporary everyday life[21)]. Cedric Price’s project “Fun Palace” (1961) presented an open framework with attached capsules and other modular elements which can be organized by users depending on situation, as well as in Constant Nieuwenhuys’s New Babylon project the residents of ephemeral and almost shapeless city could become active creators of the surrounding environment in a continuous artistic process rather than a working class which could drive a city’s life before[22)]. By this city planning and organization would become a game experience what would lead to non-planning and situational city. In overall the trends in urban planning at the time in Britain envisioned highly cybernetic pluralist society with anarchic behavior and strong do-it-yourself pursue regarding operation of cities and architecture. In well-known Plug-in City by Archigram people would work about three days a week and have second houses (or, in other words, capsules) for leisure activities, while despite being a clear techno-utopia the Plug-in City was promising a balanced and quiet environment between living and functional units and infrastructure, comparing itself to busy but stiff existing cities[23)]. Archigram’s capsule homes and other developments were subordinate to the megastructures, however, a Living Pod project presented a separate leisure house, which could be put on uninhabited terrain while another project – Suitaloon was acting as a wearable house which had some basic functions of a home as protection membrane and furniture, and which could be attached to larger capsules or similar suits[24)].

Japan after World War II was undergoing another social transformation to the new society relying on most advanced technology, infrastructural approach and increasing mobility with the need of mass housing production which would become capsular units in

following Metabolist city proposals. Scarcity of land combined with big-scale redevelopments plans led to creation numerous proposals of marine cities which required artificial land and, hence, megastructures[25]. Among other projects for building new artificial lands in Tokyo Bay competition in 1960 in Kenzo Tange's proposal clear and strict structuralism divisions between main infrastructure and subordinate areas by highways and straight connection axis with massive housing blocks can be observed[26]. Similarly to Kenzo Tange's plan the ideas of Metabolists were based on refusal of old-style planning of cities in favor of creating new urban structures through more resilient, practical approach which was the idea of metabolic changes occurring in a city consisting of elements of different lifespans[27][28]. In projects of Marine cities by Kiyonori Kikutake the cities would be produced by direct imitation of the process of cells' division called mitosis while residential towers with capsules could grow, change number of capsules over a lifespan of a generation (about 25 years) and form tower-shaped communities inside the cylindrical structures which period of service was 50 years. These concrete tube structures following the endless process of Metabolism would eventually sink to the ocean floor[29][30]. In thinking of Kurokawa who provided his own capsule's definition a capsule is similarly to Archigram's 'Suitaloon' is an extension of a man and in Kurokawa's thought – a cyborg who would have integrated computer parts to a body. Kurokawa's capsules range from environments for living to functional devices attached to a human body while the new society would be constantly on the move, be diverse and based on an individual. Each individual would be free in expression of oneself and in satisfying one's spiritual requirements while a capsule would adjust the flow of required or undesired information and act as a tool against systematic thinking. Regarding a spatial organization of space in a city Kurokawa writes that "space should be divided into independent shelters, where every inhabitant can fully develop his individuality"[31]. By Kurokawa's thought a building's definition would be set by a its capsular structure consisting of more than one capsule[32]. The true representation of capsular city of Metabolism can be eventually seen during EXPO 70 organized in Osaka and designed by Metabolists. Relied heavily on various computational systems, the exhibition had a Big Roof megastructure by Tange and few Capsule Homes by Kurokawa which were attached to the main frame. Together with controlled environment and two robots Deme and Deku used for entertaining guests the EXPO contained a close image of operation of Metabolist city[33].

By a definition, in ideal, a capsule should be designed as a complete independent environment answering all the needs of its resident or user[34]. In Japan Metabolists were

viewing a capsule as an appropriate social and traditionalistic tool which can be integrated to a cycle of changes in human life. While capsules one by one could be placed in severe environments to create completely new social relations and communities, the capsular structures inside, against or instead of existing cities were declaring new brave and anarchic lifestyles closely connected to technological advances in the new social order. In both types of arrangements capsule form closed environments which can be easily set up and removed with minimum interaction with surroundings what highlights its nomadic nature[35)]. While massive capsular structures as Plug-in City or Paolo Soleri Arcologies were lacking any technical and concrete information on operation of such cities which could be quite problematic to control, capsules and infrastructure provided the necessary services for a living and communicating with others via improved and compact systems of transportation and policies while a capsule was used both as a shelter and link between community and individual[36)].

By considering the background of this chapter the research will categorize the social role of a capsule in relation to a user. It becomes clear that one of the primary functions of a capsule is a shelter and protection while a capsule itself can be considered either a consumerism product, extension of a body or a way of self-expression and organization of environment and community. From a social standpoint capsules could be used as a means of protest, democracy, and new political and cultural agenda. Capsules can reflect new nomadic, artistic and leisure lifestyle and are underlying social behaviors of their residents. To compare the social aspect to the application of mental capsules described in the Section 2, the social aspect expands further to the organization patterns of societies and environments what allows exploring all study cases whether or not the capsules are labeled as ‘mental’. Thus, a mobile home can be both a primitive hut and a luxury home which have different characteristics of lifestyle and social values. Similarly, some strictly utilitarian capsules can serve as tools in formation of new social interactions.

In order to specify the trends of a social aspect in Capsule architecture, firstly, mentions of architects of the selected 265 cases of capsule architecture will be studied in a scope of relation of a capsule to a residents and communities. In Section 2, the data for analysis will mainly consist of texts of architects and architectural critics for extracting the corresponding notions. Next, the excerpts will be grouped using KJ method for clarifying the main trends what social role or issue capsule architecture is contrasted to. Next, the research will proceed with selecting only cases aimed for residency and study their parameters as a living space. The data will include both explanations of architects together

with study on drawings and other graphic materials. Next the research will organize a questionnaire among residents of capsule architecture worldwide among 15 case studies in order to form a psychological portrait of a resident and features of living in a capsular space. Lastly, the research will study communities in capsular structures through nine study cases. The selection is bases on choosing capsular building with a formed community and long-lasting cohabitation. Data collection includes review of literature sources and internet articles, correspondence with residents, and, where it is applicable, interviews (see Appendix).

Section 2 Role of capsule in social aspect

Mobility and temporary nature of a capsule and capsular environments defines the corresponding lifestyle of its user, as well as occurring opportunities and limitations. Such 'ambiente' by De Cauter creates a closed system which can bring joy (Disneyland), feeling of exploration (space capsule), flow (airports), order or fear (ghettos, military or oil rigs), playfulness (New Babylon) or leisure and Arcadian lifestyle (bungalows or hippie settlements)[37]. The oil rigs floating in an open sea can be considered one of the closest techno-dystopian built examples of both Archigram's megastructures and Kikutake's Marine City with a directly opposite behavioral pattern. Oil rigs are usually occupied by workers coming by a helicopter for shifts of several weeks while living on the oil rigs is connected to hard work, tough living conditions, protests, fires and eventually disasters of the whole infrastructure sinking[38]. By this the living in a megastructure has a pessimistic nature with residents who are forced to come and work there for the need of making a living. In this case the cabins for workers represent a dystopian living based on circumstances rather than a free will. On the other hand RVs (recreation vehicles) and mobile houses with well-known representatives of Futuro and Venturo house by Matti Suuronen show another Arcadian lifestyle with houses providing a range of tools for a comfortable and even luxurious lifestyle either as a part of a civilization or outside it. If to compare these capsules to exploration stations as underwater Tektite habitat or Halley arctic research station the way of living and environment differs. In postwar U.S. and during Cold War among an ordinary definition of house two other housing typologies were presented as well – shelters in a case a nuclear war and travel trailers. Both typologies were providing a shelter with different nature and underlying socio-cultural background. In case of trailers the trailer populations could spontaneously form near a picturesque view in nature what partially represented the united leisure society of democratic megastructures and situational cities and which were based on an appreciation of Arcadian lifestyle what is directly opposite to a fearful nature of a fallout shelter[39]. By taking this into account the following notions regarding a social role of a capsule can be structured as shown below (Fig. 44).

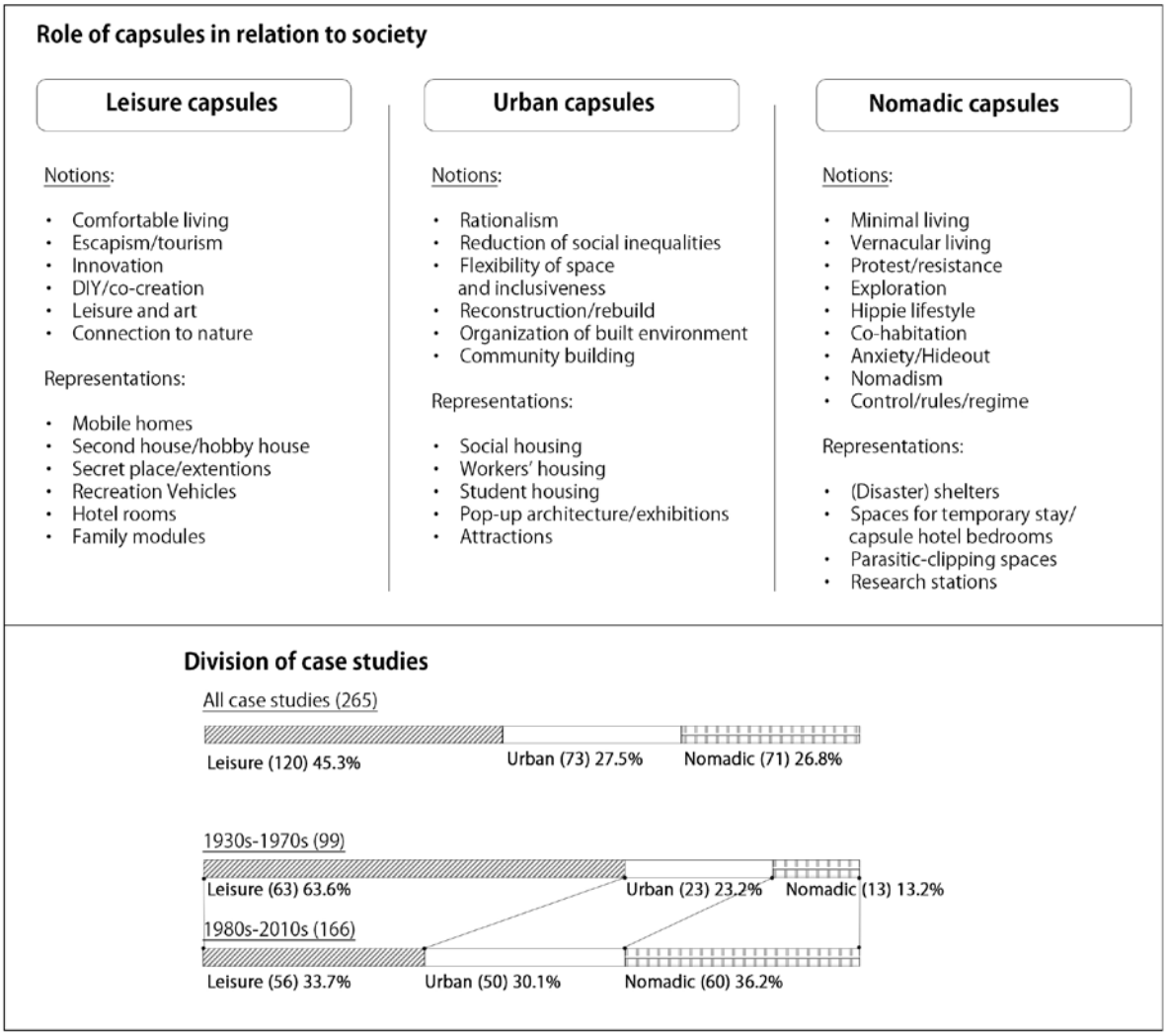


Fig. 44. Role of capsules in relation to society

The social role of a capsule can be defined by three major trends – Leisure capsules aimed for leisure activity, mobility and travelling, hobby and summer houses, capsular living units in touristic areas, family modules in capsular structures and other kinds of capsules providing enough space and functionality for a comfortable living. On the other side, the capsules expressing urban nomadism, temporary stay, flowing nature of life, vernacular or primitive living, habitation with others in a closed space, exploration in a harsh environment, protest, resistance and alternative living can be described by Nomadic capsules. Lastly, the capsules and capsular structures serving as tools for creation of rational and diverse urban environment can be categorized by Urban capsules. Such capsules can be used in social housing (temporary shelters for construction workers, students, minorities, refugees, etc.), as a utilitarian modules, pop-up environments, and attractions.

One of the early architects experimenting with plastics in construction - Arthur Quarmby in 1962 presented two projects of capsules of different nature. In his project Corn on the Cob (No.21, Tree housing tower) there are two capsules connected to a main core for one family what provides enough space and a possibility to remove the units and place them elsewhere. In another project of Emergency Mass Housing Units the architect is concerned in providing shelters with minimum living standards (bunkbeds with no other functions inside) in the case of disaster (No.22) (Fig. 45). Similarly in a project of Environment bubble by François Dallegret in 1965 although the house is depicted as a hi-tech space in the center, the surroundings are lacking any other function apart of a protection skin what highlights the (neo-)primitive nature of a house as a whole while in the project of a dome Fly's Eye (No.36, Bucky Dome) by Buckminster Fuller in the same year the similarly empty dome structure creates the fine-tuned and controlled environment for people to live and get detached from surrounding environment in a way without losing its connection to it, but facilitating comfortable habitation. In modern examples the idea of simple mobile home for living can be seen in a project by Hiteca – Egg House (No. 179, 2012) while a similar project Paco by Schemata Architects (No. 141, 2009) serves as a second house with ergonomically strict conditions but in a shape of a hobby house (Fig 46).

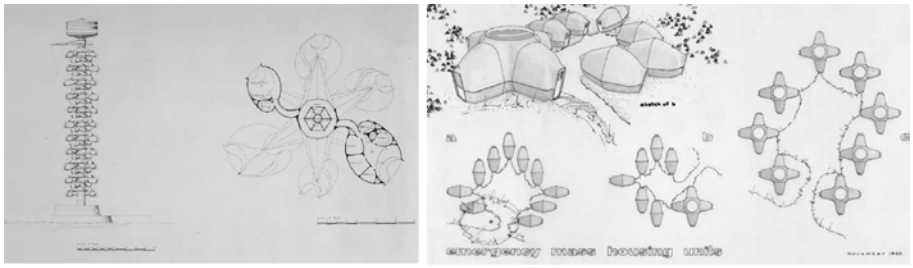


Fig. 45. Left - Arthur Quarmby, Corn on the Cob. Right - Emergency Mass Housing Units, 1962

Fig. 46. Left – Egg House by Hiteca, 2012. Right – Paco by Schemata Architects, 2009

Potteries Thinkbelt (No. 29, 1964) by Cedric Price and Archigram creates an infrastructure of circulating units along railways to organize and connect social stratum of students and academia. As it seen different projects of capsule architecture capsules can address various social issues. As it seen in a historical division of capsules' developments of two time periods of the 1930s-1970s and 1980s-2010s, the percentage of Leisure capsules shrinks in a half and substituted by a considerable increase of nomadic capsules, as well as a moderate increase of urban capsules. This shift from romantic representation of a capsule as means to support technocratic and leisure society in the postwar 20th century can be explained by a more rational approach of using modular construction to solve contemporary housing issues in modern city together with new trends of green construction, city's vivid nature and increased travelling.

Section 3 Characteristics of capsules for living

3.1 Characteristics of small capsular spaces

Capsules as usually compact spaces have features of small-scale living environments. Even in spacious capsules of bigger habitation area the well-defined capsule's monocoque structure and borders bring in the feeling of a limited space. Also, the independent nature of a capsule makes it more exposed to influences of outer environment as weather conditions, noise, vibrations and other factors. Despite a big amount of capsules' designs left on paper, there are some percentage of built cases of residential capsules and capsules for short stay which allow direct exploration of living in a capsule and actual characteristic of capsules as small limited spaces. Study on this aspect of a capsule will also help to compare unbuilt examples to their built counterparts and form a picture of living and to define the points of consideration regarding living in a capsule.

In order to select the important features of living in a capsular and closed environment, for the reference literature several studies were selected. Firstly, study on 'Sleep Environment Recommendations for Future Spaceflight Vehicles' provides a comprehensive picture on both sleeping and activity inside space capsules and research stations in harsh environments[40]. The study concentrates primary on quality of sleep and consequential influence on a resident's activity, therefore, providing guidelines regarding privacy, required volume of habitation, amount and nature of lighting, noise, temperature, and overall comfort with additional parameters as vibrations and feeling of safety what is considered to be undoubtedly crustal in case of outer harsh environment but which also can be applied in cases of capsules in nature or the capsules clipped by joints or cantilever to a bearing structure. Another study on 'Post-Occupancy Evaluation of Urban Post-Disaster Housing Prototype' was organized in 2016[41]. The study concentrates on overall quality of a house, interim premises as balconies, technical parameters as water pressure, quality of materials and quality of life, visual comfort, odor, navigation, and customization and compliance with building codes. 'Integrating Mass Customization with Prefabricated Housing'[42] deals with possibilities of customization of inner environment in tight spaces with help of prefabrication. Also, the study points out the necessity of individual needs of each particular resident or a client of a house, possibilities to plug in functional elements or elements representing location. Similarly, 'Flexibility And Comfort In Limited Dwelling Interior'[43] highlights behavioral patterns inside limited interior and possible solutions for adaptability of such space. The study selects common psychological and technical needs for

comfortable living of a modern man emphasizing on visual comfort, spatial efficiency, timely adjustments, together with expandability and saving of space. Also, there are several studies concentrating on a case of Nakagin Capsule Tower as an accessible object for direct explorations on its residents' living[44)45)]. With relation to collective living the studies point out degree of freedom of organization of space and customization of it for personal lifestyle and needs, connectivity to other residents, nature of and access to public infrastructure, and necessity of changing surroundings. Another study on 'Open-plan in Housing Architecture: Origin, Development and Design Approaches for Spatial Integration'[46)] refers to limited and closed environments forming fluid or all-in-one space in order to achieve higher functional performance of an interior and its flexibility. Research also studies residential functions inherent for a living space and clarify possible overlaps. Including mentions of architects and architectural discourse on capsules the nature of capsular home and parameters which are applied in this type of space can be grouper in the following manner (Fig. 47).

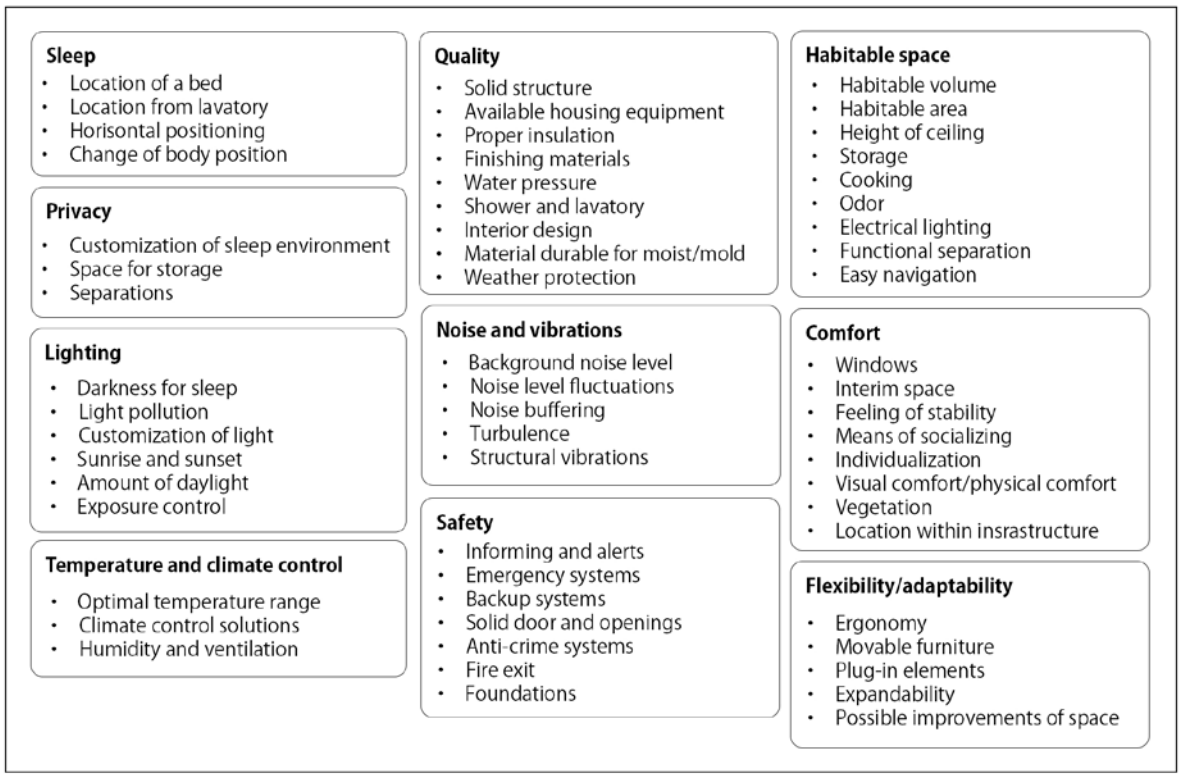


Fig. 47. Major parameters in relation to small limited spaces

The grouping above contains notions with regard of closed space which can lack sunlight, prone to mold, insufficient ventilation, variability to conditions of environment, etc.

In order to test these parameters in cases of both designs and built capsule architecture it is possible to connect them to objective features which can be studied by either architectural texts or drawings and other means of presentation. Thus, this research combines and narrows the scope of analysis by providing the following 14 technical and 1 speculative parameters in five main categories as follows: I. Sleep: 1. Bedding type, 2. Proper bedding; II. Comfort: 3. Habitable area, 4. Natural light, 5. Climate control, 6. Interim space, 7. Public space, 8. Visual comfort; III. Safety: 9.Firm structure, 10. Easy navigation, 11. Foundations; IV. Quality: 12. Water, 13. Electricity; V. Flexibility of space: 14. Movable furniture, 15. Functional diversity. All parameters except 8. Visual comfort are technical and can be extracted from either architects' texts or drawings and pictures while visual comfort despite being crucial for capsular space due to its limitations and features in organization of space is speculative and can be defined from combining different secondary judgements and their relationships as illumination, height, color scheme, furniture and materials. Below is an explanation of parameters and methods of judgements. All parameters can be divided into four levels as ● – adequate/present, ▲ – partial/poor/with reservations, × - inadequate/not present, with exemptions where this is not possible to obtain data or make a clear judgement (no information).

I. Sleep: 1. Bedding type, 2. Proper bedding. These are two parameters corresponding to quality of bedding and sleeping. Bedding type parameter show if there is a proper bed or other means of sleeping as shelfs, sofas, hummocks, etc. Proper bedding implies if sleep environment presented as a proper bedroom (in case of a capsule for independent living this remark is omitted), as a bedroom in an open plan or with no separation, and as a bunkbed or sleep environment should be shared with other residents.

II. Comfort. 3. Habitable area. This parameter is defined by literature review. In the research on habitation during space flights the minimum habitation volume is set to be 5.4 cubic meters for a bedroom or a private space and 25 cubic meters for the whole habitation area for one person what with the average height of a room of 2-2.5 meters makes the habitable area around 10-12.5 sq. m per person. In the research on post-occupancy of disaster shelter dwelling the shelter's area was 44. sq. m for two people. 'Flexibility And Comfort In Limited Dwelling Interior' study cites HATC Ltd report "Housing space standards" defining the required minimum inner space's area as 37 sq.m for one person and 44 sq. m for two residents' occupancy. Based on these references it is possible to divide the parameter's judgement in a following manner: ● – areas exceeding 12.5 sq.m area, ▲ – narrow layer of small premises between 10-12.5 sq.m while modular units of smaller areas

are labeled as inadequate area for living and needing expansion as one of the requirements ×.

4. Natural light. This parameter analyses amount and way by which light comes into a capsule. Adequate lighting is considered to be through proper windows, while small windows and ceiling lights, indirect light, technical windows and such are considered bringing poor lighting. Inadequate lighting includes premises with no windows or simulated lighting.

5. Climate control. This parameters in important to maintain the microclimate of a capsule and includes full control of the interior environment – climate control systems, ventilation shafts, air-conditioning, centralized heating system, etc. as 'adequate', basic climate control as bling's, curtains, opening of windows, local heaters and other home appliances as 'poor', and high dependence on environment as 'inadequate'.

6. Interim space, 7. Public space. These parameters are important as a medium between inside and outside space, as well as the space providing opportunities for communication and socializing. This parameter includes balconies, verandas, bridges and points of interaction with surroundings for interim space and lobbies, squares, lounge zones, open spaces and such. The visual judgement and text's analysis may direct if there any interim and public space (labeled as ●) or not (labeled as ×) with no judgement of the characteristics of such spaces.

8. Visual comfort. This parameter is speculative and based on observations of a capsule's interior regarding the organization of space and its spatial parameters. In the project of Japanese architect Kenji Ekuan – Tortoise house (1964) the modular house can expand by joining new polygonal units, which, on the other hand have influence on the interior by making it follow the pattern of various lines connecting by acute angles. This creates strict rules or organization of space and their connection what would make navigation and spaces' relationship complicated, make additional contrast, reorganized and intersecting sources of light and what together with furniture placement would interfere with overall visual comfort of the space (Fig. 48).

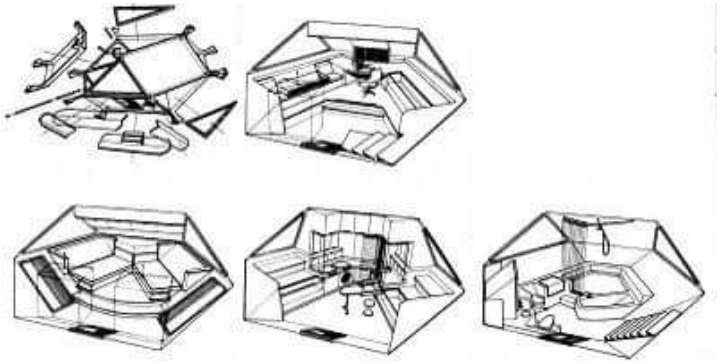


Fig. 48. Interiors of modules of Tortoise house. Kenji Ekuan, 1964

III. Safety: 9.Firm structure. This parameter implies both stable structure and its level of protection, insulation and protection of noise and other technical influences. The firm structure in the aspect of safety should provide comfort regarding impenetrable shell with firm doors and other openings, structurally complete environment without holes or gaps, and, in general, provide a feeling of completeness of space and its stable nature. Therefore, the spaces of firm materials (as composite materials, concrete, monocoques with closed structure, etc.) together with insulation can be considered as sufficient in terms of stability and safety, while one-layered shells with thin walls or wooden finishing and such can be viewed as poor, and, lastly, the spaces of plastic shells, inflatable structures and done from soft materials and such can be categorized as insufficient.

10. Easy navigation. Navigation for an exit in case of fire or inclusiveness eliminating barriers and allowing freedom in movement inside a space are studied as separate parameters. Cramped spaces and those with level difference or stairs are important in spatial organization for space saving, however, they worsen inside circulation and can influence functions' overlapping. Therefore, the spaces with even floor and which allow free navigation and evacuation are labeled as adequate, those with floor levels and over-complex interior organization are grouped as poor and non-regular planning with a range of angles in spaces' division together with complex organization of floors are labeled as insufficient.

11. Foundations. Foundations are an important part of capsule architecture and which defines capsule's relationship with environment by its way of attachment. Clipping to a space or terrain can be done through an ordinary proper foundation with anchors allowing stiff connection to a ground of a bearing structure. By this a capsule's resistance to vibrations or wind forces is considered as sufficient. However, in the case of cantilever which is common for many cases of plug-in type of connection the bearing loads' nature is

changed and considered be less stable, and is done through joints and simpler foundations, therefore, it can be marked as foundations with reservations (▲). Lastly, capsules put on terrain, and which are not attached to structure, and those having no foundations are labeled as such (×).

IV. Quality: 12. Water, 13. Electricity. Despite the fact that one of the definitions of a capsule should be well-equipped environment, in fact the connection of a capsule to communications can vary case by case. Hi-tech capsular bedrooms with enough electrical equipment in capsule hotels can lease some of additional equipment from adjacent environment (as bathrooms, shower rooms, kitchen, etc.). Therefore, capsules are divided as those having both electricity and water (●), or not having them (×) as well as depending on them from adjacent areas or environment (▲).

V. Flexibility of space: 14. Movable furniture. Flexibility and change of inner space over time is also considered important aspect and studied from the standpoint of whether furniture in a capsule movable or not. This also leads to an argument since a capsule is a movable space, all the interior elements should be attached and, henceforth, immovable, what, on the other hand, contradicts the notion of flexibility of environment and change over time. This aspect is also important to be viewed in the scope of two time periods of developments in capsule architecture, since the term of flexibility became topical in later times, what can or cannot be reflected into organizational patterns of capsular spaces through time. Therefore, spaces with all or the most of furniture which is movable are labeled as sufficient, whose where is it can be done partially are labeled as poor, and those where interior elements are immovable are labeled as insufficient.

15. Functional diversity. The number of functions and their correlation are studied independently. In case of residential capsules the number of functions is studies together with other cases of capsules from different uses. If capsule's space is diverse in function it is labeled ●, if number of functions is limited it corresponds to the label ▲ and if capsule is monofunctional, it is labeled ×.

From 265 cases of capsule architecture mostly capsules of residential functions, SOHO, hotels and other functions implying a continuous use are included in this part of the research. Also, due to the conceptual nature of some designs, some cases are excluded due to the lack of information. Lastly, in cases where some information is missing some parameters

can be undefined into the separate group as “unknown”. Therefore, the study selects 186 cases and analyses them in scope of abovementioned 15 parameters (Table 3).

Table 3. Characteristics of small capsular spaces

Number	Year	Name	SLEEP: Bedding type	SLEEP: Proper bedding	COMFORT: Habitable area	COMFORT: Natural light	COMFORT: Climate control	COMFORT: Interim space	COMFORT: Public space	COMFORT: Visual comfort	SAFETY: Firm structure	SAFETY: Easy navigation	SAFETY: Founda-tions	QUALITY: Water	QUALITY: Electricity	FLEXIBIL.: Movable furniture	FLEXIBIL.: Functional diversity
1	1930	Dymaxion house	●	●	●	●	●	●	×	●	●	▲	●	●	●	▲	●
2	1940	Mechanical wing	×	×	×	●		×	×	×	×	●	×	●	●	×	▲
3	1945	Structural blocks housing	●	●	●	●	▲	●	●	×	▲	×	●	●	●	●	●
4	1950	Rotel	●	×	×	▲	▲	×	●	×	×	×	×	×	●	×	×
5	1955	House of the future	●	▲	●	●		●	×	●	●	×	●	●	●	×	●
6	1956	Mobile hotel cabin	●	●	×	▲		×	×	▲	●	●	×	●	●	×	×
7	1956	Plastic House	●	●	●	●		●	×	●	●	▲	●	●	●	●	●
8	1960	Futuro House	●	▲	●	●	●	×	×	●	●	×	×	●	●	×	●
9	1960	Ville Spatiale															
10	1960	Stackable Multip. Cells	●		●	●		×	×	●	●	▲	▲	●	●	●	●
11	1960	Residential area	●	●	●	●		●	●		●	▲	●	●	●	●	●
12	1960	Hanging hotel															
13	1960	Cable city															
14	1961	Ball House	×	×	×	●	▲	×	×	×	●	●	×	●	●	×	●
15	1961	Helix City															
16	1961	Urban Area Reconst. Plan															
17	1962	Plastic Sky Lodge	●	×	×	●						●	●	×	●	×	×
18	1962	Clusters in the air	●	●	●	●		●	×		●	×	▲	●	●	×	●
19	1962	Ikebukuro Plan	●	●	●	●		×	●			●	▲	●	●	●	●
20	1962	Prefab. box-type apartm.															
21	1962	Tree housing tower	●	●	●			●			●	▲	▲	●	●	▲	●
22	1962	Emerg. Mass Housing Units	●	×	×	▲	×	×	×		●	●	×	×	●	×	×
23	1963	Prefabricated Plastic Cells			●	●		×			●		▲				
24	1963	Marine City	●	●	●	●		×	●			●	▲	●	●	●	●
25	1964	Pumpkin House	●	●	●	●	●	●	×	●	●	▲	▲	▲	●	×	▲
26	1964	Dwelling city	●	●	●	▲	●	×	●			▲	▲	●	●	●	●
27	1964	Village Housing	●	●	●	●		×	×		●		●	●	●		●
28	1964	Tortoise House	●	▲	●	▲		●	×		●	×	●	●	●	×	●
29	1964	Potteries Thinkbelt	●	●	●	●		●	●		●	▲	▲	●	●	●	●
30	1964	Office Towers															
31	1964	Plug-in City	●	▲	●	●		×	×	●	●	●	▲	●	●	×	▲
32	1964	Capsule Homes	●	▲	●	●		×	×	●	●	●	▲	●	●	×	▲
33	1964	Multi-purpose cell prototype	●	●	●	●		●	×		●	▲	▲	●	●	▲	●
34	1965	Gasket House	●	▲	●	●		×	×	●	●	●	▲	●	●	×	●
35	1965	Plug-in University Node															
36	1965	Fly's Eye	●	●	●	●	●	●	×		●	▲	×	●	●	▲	●
37	1965	The Environment Bubble	×	×	●	●	●	×	×		×	●	×	×	×	×	×
38	1966	Blow-out village															
39	1966	Living pod	▲	▲	●	●	●	×	×		●	●	×	●	●	×	●
40	1966	Paddington East	●	▲	●	●		×	×	●	●	●	▲	●	●	×	▲
41	1966	Hornsey Housing Study	●	▲	●	●		×	×	●	●	●	▲	●	●	×	●
42	1966	Cylindrical building	●	●	●	●		●		●	●	●	▲	●	●	●	●
43	1966	Novery Space Houses	●	●	●	●	●	●	×	●	●	▲	×	●	●	▲	●
44	1967	Hotel in Menorca	●	●	●	●	▲	×	●		●	●	▲	●	●	×	●
45	1967	Cylindrical houses	●	●	●	●		●		●	●	●	▲	●	●	●	●
46	1967	Bubble House	●	▲	●	●	●	×	×		●	●	▲	●	●	×	●
47	1967	Pneumacosm			●	●		●					▲	●	●		
48	1967	House of stacked units	●	●	●	●		×	×	●	●	●	▲	●	●	●	●
49	1967	Shizuoka Press Br. Cntr.															
50	1967	JA: 1967 Comp.1st place	●	▲	▲	●	●	×	●		●	●	▲	●	●	×	●
51	1967	JA: 1967 Honour. Mention	●	●	●	●		×	●		●	▲	▲	●	●	●	●
52	1967	JA: 1967 Honour. Mention 2	●	▲	●	●		×	●		▲	●	▲	●	●	▲	●
53	1967	JA: 1967 Honour. Mention 3	●	●	●	●		×	●		●	●	▲	●	●	●	●
54	1967	JA: 1967 Honour. Mention 4	●	●	●	●		●	●		●	●	●	●	●	●	●
55	1967	JA: 1967 Honour. Mention 5	●	▲	●	●		●	●		▲	●	▲	●	●	▲	●
56	1967	JA: 1967 Honour. Mention 6	●	●	●	●		●	●		●	▲	▲	●	●	●	●
57	1967	JA: 1967 Honour. Mention 7			●				●		●		×				
58	1968	Parasitic cells															
59	1968	Hexacube	●	▲	▲	●		×	×	●	●	●	×	●	●	×	●
60	1968	Plastic Modular Home			●	▲		×	×		●	▲	▲	●	●		●
61	1968	Residence of M. Ginet	●	●	●	●		●	●	●	●	×	▲	●	●	×	●
62	1968	Drive-in House	×	×	×	●		×	×		×	●	×	×	●	×	×
63	1968	Habitat Puerto Rico	●	●	●	●		●		●	●	●	●	●	●	●	●
64	1969	Plastic cells	●	●	●	●	●	●	×		●	▲	▲	●	●	×	●
65	1969	Mobile theatre															
66	1969	Inflatable mobile office															
67	1969	Yadokari Capsule Lodge	●	●	▲	●	●	×	×	●	●	●	▲	●	●	×	●
68	1969	K67															
69	1969	Capsule Houses															
70	1970	Modular leisure habitat	●	●	●	●	●	●	×	●	●	●	×	●	●	×	●
71	1970	Pirate bubble	▲	×	×	●	×	×	×		▲	●	▲	×	×	×	×
72	1970	Experiment 70															
73	1970	Total Housing Unit			●	▲		×			▲	●	▲	●	●		
74	1970	Expo Tower															
75	1970	Takara Beautilion															
76	1970	Capsule for living	●	●	▲	●		×	×		●	●	▲	●	●	×	●
77	1970	Steinhaym	●	●	●	●	●	●	×	●	●	●	●	●	●	●	●
78	1970	Tektite II habitat	●	×	▲	×	●	●	●	×	●	▲	●	●	●	×	●
79	1971	Venturo	●	●	●	●	●	×	×	●	●	●	×	●	●	●	●
80	1971	Do-Bausystem Pl. house	●	●	●	●	●	×	×	●	●	●	×	●	●	×	●
81	1971	Domobiles	●	●	●	●		×	×	●	●	▲	×	●	●	●	●
82	1972	AZM Offices															
83	1972	Oase N7	×	×	×	●	×	×	×	●	×	×	▲	×	×	×	▲
84	1972	Tetrodon	●	●	●	●		×	×	●	●	●	▲	●	●	×	●
85	1972	Microhouse	×	×	×	●	×	×	×	×	▲	▲	×	×	×	×	×
86	1972	Tower of Youth	●	●	●	●		×	●		●	●	▲		●	×	
87	1972	Nakagin Capsule Tower	●	●	×	●	●	×	×	●	●	●	▲	●	●	×	▲
88	1972	Capsule village	●	●	●	●	●	×	×	●	●	●	▲	●	●	×	●
89	1973	Capsule house K	●	●	×	●	●	×	×	●	●	●	▲	●	●	×	▲
90	1973	Interpod Tower I			●	●		×	×		●		▲				
91	1973	Residence Gamma			●	●		×	×		●		●				
92	1974	SIRH Option 75			●	●		×	×	●	●	●	▲	●	●		●
93	1974	Ludres-Experim. Building			●	●		×	×		●	●	▲				
94	1974	Metastadt building system	●	●	●	●	●	●	●	●	●	●	▲	●	●	●	●
95	1974	Koito Building															
96	1975	Um Al Khanazeer isl. dev.															
97	1976	Sony Tower															
98	1976	Conservatoire de Montreuil															
99	1979	Capsule Inn Osaka	●	▲	×	×	×	×	●	×	●	●	▲	×	×	×	▲
100	1980	Capsule Inn Sapporo	●	▲	×	×	×	×	●	×	●	●	▲	×	×	×	▲
101	1984	Globe Houses	●	●	●	●	●	×	●	●	●	▲	▲	●	●	●	●
102	1990	7th kilometer															
103	1991	Egg of the winds															
104	1992	Industrialized housing	●	●	●	●	●	●	×		▲	●	▲	●	●	●	●
105	1995	Res. buildings in pr. Venus			●	●					●		▲	●	●		
106	2000	Mixer															
107	2000	Morton Loft	▲	●	●	▲	▲	×	●		▲	▲	▲	▲	●	×	●
108	2001	Tree village	●	●	×	●	●	●	×	▲	●	●	▲	●	●	×	●
109	2001	Torino Porta Susa Station			●	●		×	●		●	●	▲				
110	2001	Container city	●	●	●	●	●	●	×	●	●	●	▲	●	●	●	●
111	2002	Cave															
112	2003	Challenge space architect.															
113	2003	House in Azeitão			●	●		●	●		▲	●	●	▲	●	●	▲
114	2003	DST Pods	●	▲	●	●	▲	×	×		●	●	▲	●	●	▲	●
115	2003	MDU	●	▲	●	●	●	×	×	●	●	●	×	●	●	×	●
116	2004	Loft Cube	●	●	●	●	●	×	×	●	●	●	▲	●	●	×	●
117	2004	Rotor house	●	▲	●	●	●	×	×	●	●	●	×	●	●	▲	●
118	2005	Rucksack-House	×	×	×	●	×	×	×	●	×	●	▲	×	×		×
119	2005	Riverside building															
120	2005	Expandable ISO shelter	●	×	×	×	×	×	×	×	▲	●	×	×	●	×	×
121	2005	Halley VI Antarctic Res. St.	●	▲	▲	●	●	×	●	●	●	●	▲	●	●	×	●
122	2005	Symbiotic Living machine															
123	2006	HUIK Own home and office	●	●	●	●		●	●	●	●	▲	▲	●	●	▲	●
124	2006	Freitag freeway shop															
125	2006	Papertainer															
126	2007	Nomadic Museum Tokyo															
127	2007	DH1 Disaster House	▲	▲	×	●		×	×		▲	●	×		●		
128	2007	Barier	●	●	●	●	●	×	×	▲	●	▲	×	▲	●	▲	●
129	2007	Yotel Air Gatwick hotel	●	●	×	×	●	×	●	▲	●	●	●	●	●	×	●
130	2007	Lafayette Tower															
131	2007	Hotel Everland	●	●	●	●	×	×	×	●	●	●	×	●	●	×	●
132	2007	Single Hauz	●	●	●	●		●	×	●	▲	●	▲	●	●	×	●
133	2008	Puma City															
134	2008	Sky-Village															
135	2009	Bayside Marina Hotel	●	●	×	●	●	×	●		●	▲	▲	●	●	▲	×
136	2009	Platoon Kunsthalle															
137	2009	Contained Calls															
138	2009	Pocket of Active Resistance			●	▲			●		●		▲				
139	2009	9h Kyoto	●	▲	×	×	●	×	●	×	●	●	×	×	×	×	×

(continuation of Table 3)

Number	Year	Name	SLEEP		COMFORT						SAFETY			QUALITY		FLEXIBIL	
			Bedding type	Sleeper number	Habitable area	Natural light	Climate control	Interim space	Public space	Visual comfort	Firm structure	Egress navigation	Founda-tions	Water	Electricity	Movable interior	Functional diversity
140	2009	Sleepbox	●	▲	×	×	●	×	×		●	●	×	×	●	×	▲
141	2009	Paco	▲	▲	×	▲	▲	×	×		●	▲	×	●	●	×	●
142	2009	The box office															
143	2009	Treehouse	●	●	×	▲	▲	×	●		●	●	×	×	●	×	▲
144	2009	Diogene	●	▲	×	●	●	×	×		●	●	▲	●	●	×	●
145	2009	Urban Transducer Skysc.															
146	2009	Subway Cell															
147	2010	Lookhotels															
148	2010	Pier 57															
149	2010	Tubohotel	●	●	×	●	●	×	●		●	●	×	×	●	×	×
150	2010	Plug-in Housing Dev.	●	●	●	●	●	●	●		●	●	▲	●	●	▲	●
151	2010	Capsule Hotel	×	×	×	▲	×	×	×	×	●	▲	×	×	×	×	×
152	2010	Cité A Docks	●	●	●	●	●	●	●	●	●	●	×	●	●	▲	●
153	2010	Sergo Marketing Suite															
154	2010	Container Cities (Haiti)				▲	●	●			●		▲				
155	2010	Immersive cocoon															
156	2010	Inbox capsule hotel	●	●	×	×	×	●	●		●	●	×	×	●	×	×
157	2010	Bubble suite	●	●	●	●	●	●	×	▲	×	●	▲	●	●	▲	●
158	2010	Skylodge adventure suites	●	●	×	●	▲	×	×	▲	×	●	▲	●	●	×	▲
159	2011	42/5															
160	2011	Spacebox studios	●	●	●	●	▲	×	×		●	●	●	●	●	●	●
161	2011	Genussregal Exhibition															
162	2011	Living Roof	●	▲	×	●	●	×	×		●	●	×	●	●	×	●
163	2011	Nomad Skyscraper															
164	2011	Blox home	●	●	●	●	●	●	×		●	●	▲	●	●	●	●
165	2011	Suguroku office															
166	2012	Portishead quays															
167	2012	BBC broadcasting studios															
168	2012	Boxpark Shoreditch															
169	2012	Afterlight															
170	2012	Das Park hotel	●	●	×	▲	×	×	×	×	×	●	×	×	●	×	×
171	2012	Free Spirit Spheres	▲	▲	×	▲		●	×	●	▲	●	×	×	●	×	▲
172	2012	World of Chlorophyll	●	●	●	●		×	×		●	●	▲	●	●	●	●
173	2012	Eco-pod															
174	2012	Mangal city			×	●		×	●		●		▲				
175	2012	Xi'an Youth Caspule Hotel											▲				
176	2012	City Hub Amsterdam	●	●	×	▲	●	×	●	▲	▲	▲	×	×	●	×	▲
177	2012	New bivouac Gervasutti	●	▲	●	●	●	×	×	×	●	●	▲	●	●	×	●
178	2012	Uplift concept	●	●	●	●	▲	×	×		●	●	▲	●	●	×	●
179	2012	Egg microhouse	●	▲	×	●	▲	×	×	×	×	●	×	×	●	×	▲
180	2012	Vertical community			●	●		×	●		●		▲				
181	2012	Suburbia tower															
182	2012	Mobile suburbia	×	×	×	●	×	●	×	▲	×	●	▲	×	×	×	▲
183	2012	Interchangeable Habitation			●	●	●				●	×	▲				
184	2013	Moving city															
185	2013	Toretore village	●	●	●	●	●	×	●	▲	●	●	●	●	●	●	●
186	2013	T2 Unit	●	●	×	●	●	●	×	●	●	●	●	●	●	×	●
187	2013	Office complex in Bogota															
188	2013	Aether Apparel - Proxy															
189	2013	Swiss Tubes	●	×	●	●	▲	×	×	×	●	●	▲	×	●	×	×
190	2013	A-Kamp47	×	×	×	▲	×	×	×	×	×	●	▲	×	●	×	×
191	2013	Pengheng space cap. hotel	●	▲	×	×	●	×	●	×	●	●	×	×	●	×	×
192	2013	Micro House in Tsinghua	●	▲	▲	●	●	×	×	▲	●	×	×	●	●	×	●
193	2013	Pop-up neighborhood															
194	2013	Archipod	●	▲	×	●	●	×	×	▲	▲	●	×	×	●	●	×
195	2013	Agueda concept			●	●	●	●	×		●	●	●	●	●	▲	●
196	2014	The hut factory	●	●	●	●			×		●	●		●	●	×	●
197	2014	EBA51	●	●	●	●	●	×		●	●	●	▲	●	●	●	●
198	2014	Modular home prototype	●	●	●	●	●	×	●	●	●	●	▲	●	●	▲	●
199	2014	Mill Junction	●	●	●	●		●	●	●	●	●	●			●	●
200	2014	Rotating plug-in capsules	●	●	●	●	●	×	×		▲	●	▲	●	●	×	●
201	2014	Attrap Reves Bubble Hotel	●	●	×	●	●	●	×	●	×	●	×	×	●	●	▲
202	2014	Songpa Micro-Housing	●	●	▲	●	●	●	●	●	●	●	●	●	●	×	●
203	2014	Hive-inn															
204	2014	Point9 New Bridge															
205	2014	Unit Fusion	●	●	●	●		●	●		●	▲	▲	●	●	×	●
206	2014	Casa Futebol			●	●		●			●		▲				
207	2014	Wow pod															
208	2014	B-and-Bee	●	●	×	●	×	●	●	×	×	●	×	×	●	×	×
209	2014	Containerville															
210	2015	Container skyscraper	●	●	●	●	●	×	●		▲	●	▲	●	●	●	●
211	2015	Clipper house															
212	2015	Sleeping Pod	●	●	▲	●	●	×	●	×	●	●	×	×	●	×	▲
213	2015	Common ground															
214	2015	Living Roof	●	▲	×	●	●	×	×		●	●	×	●	●	×	●
215	2015	Shiftpod	▲	×	×	▲	▲	×	×	×	×	●	×	×	×	●	▲
216	2015	Eco capsule	●	▲	×	●	●	×	×	●	●	●	×	●	●	×	●
217	2015	Sleeppod	●	▲	×	×	●	×	●	●	▲	▲	×	×	●	×	▲
218	2015	Container Skyscraper	●	●	●	●	●	●			●	●	▲	●	●	●	●
219	2015	Prouve house	●	●	●	●	●	×	●		●	●	▲	●	●	●	●
220	2015	Lifepod	●	×	×	▲	●	×	×	×	▲	●	×	●	●	×	●
221	2015	Entrance															
222	2015	Living roof capsule 2	●	●	×	●	●	×	×	▲	●	●	▲	●	●	×	●
223	2015	Exo	●	▲	×	●	●	×	×	×	×	●	×	×	●	×	×
224	2015	Sleeperoo	●	●	×	●	×	×	×	●	×	●	×	×	●	×	×
225	2016	BA Head office city															
226	2016	Kasita	●	●	●	●	●	×	×	●	●	●	▲	●	●	×	●
227	2016	QUO Container center															
228	2016	First cabin Tsukiji	●	●	×	×	●	×	●	●	▲	●	×	×	●	×	×
229	2016	Tree House	●	●	●	●		●	●	●	●	●	●	●	●	●	●
230	2016	Campera bubble suit	●	▲	×	●	●	×	×	●	×	●	×	×	●	▲	▲
231	2016	Fuselage	●	▲	×	●	●	×	×	●	×	●	×	×	●	×	▲
232	2016	Xpod	●	●	▲	●		×	×		●		▲	●	●		●
233	2016	3D printed office unit															
234	2016	Container market															
235	2017	Shipping container home			●	●	●	×	×	▲	▲	●	×	●	●	▲	●
236	2017	Quadrum-Qudauri	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
237	2017	Drivelines studios	●	●	●	●	●	×	●	●	●	●	●	●	●	●	●
238	2017	Coodo	●	●	●	●	●	●	×	●	●	●	×	●	●	●	●
239	2017	Mobile podcast studio															
240	2017	3 unit blocks	●	▲	●	●		×	×	▲	▲	×	▲	●	●	×	●
241	2017	Pod Vend. Machine Scyscr.	●	●	●	●		×	×		●	●	▲	●	●	×	▲
242	2017	Shelter with Dignity	●	▲	×	●	×	×	×	●	●	●	▲	▲	●	×	×
243	2017	Ras Abu Aboud Stadium															
244	2017	Heil-berg															
245	2017	The Capsule Hotel	●	×	×	×	●	×	●	×	▲	●	×	×	●	×	×
246	2017	Container hostel	●	●	×	●	●	×	●	●	●	●	●	×	●	×	▲
247	2017	Snoozebox	●	●	×	●	▲	×	×	×	×	●	×	×	●	×	×
248	2017	Bed and Boarding	●	●	×	▲	●	×	●	▲	●	●	×	×	●	×	×
249	2017	Inn the park	●	●	×	●	●	×	●	×	×	●	×	×	●	×	×
250	2017	Matices Hotel de Barricas	●	●	●	●	●	●	●	▲	●	●	▲	●	●	▲	●
251	2017	Blowing the building out															
252	2017	Cozy box	●	●	●	●	●	●	×	●	●	▲	×	●	●	●	●
253	2018	Kaohsiung Stereo Cont. Inn															
254	2018	Starbucks in Taiwan															
255	2018	Albang capsule	●	▲	×	▲	×	×	×	▲	●	●	●	×	●	×	×
256	2018	Silver bullet	●	▲	▲	●	●	×	×	▲	●	▲	×	●	●	×	●
257	2018	Sphere hotel	●	▲	●	●	●	×	×	●	▲	▲	×	●	●	●	●
258	2018	OPod Tube Housing	●	▲	×	●	●	×	×	▲	●	●	×	×	●	×	▲
259	2018	9h Akasaka	●	▲	×	▲	●	×	●	×	●	●	×	×	●	×	×
260	2018	Keetwonen	●	●	●	●	●	×	●	●	●	●	●	●	●	▲	●
261	2018	Cocoon modules	●	●	●	●	●	×	●	●	●	●	×	●	●	×	●
262	2018	Stackt Market															
263	2018	Home coming home															
264	2018	Rubner haus															
265	2019	Capsule hotel Lucerne	●	▲	×	×	●	×	●		●	●	×	×	●	×	×

Legend:

Names of examples: **Bold font** - built example, regular font - unbuilt example.

Parameter's value (depending on parameter): ● - Sufficient/Upper limit/Yes, ▲ - Poor/Partial, × - Insufficient/Lower limit/No, Empty space - Unknown

3.2 Features of living in a capsule

From the studied cases above it is possible to analyze each parameter and describe space of a capsule in relation to living and spending considerable amount of time. Corresponding comparisons are also conducted between two time periods of 1930s-1970s and 1980s-2010s (Fig.49).

Fig. 49. Living standards in studied capsular spaces

Regarding bedding type, it is clear that in most of capsules bedding is presented as a standard bed. In some cases the limited space may add some degree of inconvenience in using a bed (as a low ceiling above a bed, strict borders and build-in beds), however, in general, it corresponds to living standards. There are a small fraction of capsules which are specifically empty to allow flexibility of use of the space, therefore, bedding can be organized on the floor or a simple mattress. Also there is no significant change of this parameter through the studied timeframe. With regard to a proper bedding, bedroom as an independent functional component is presented in around 50% of all studied cases while in a significant percentage of cases (20~30%) the beds are put in open plan and lacking partitions or are presented as bunk-beds or multiple bed-type environments. Lastly, in 10.8% of cases capsules contain dormitory or military-type organization of beds, namely, bunk-beds in two rows as usual (Fig.50).

Fig. 50. Bunk-beds in Swiss Tubes, TCS camping, 2013

Habitable area is presented as more than 12.5 sq.m in 59.1% of all cases, while 5.9% falls in the category of 10~12.5sq.m and 33.9% of capsules or capsular modules are smaller. While in the time period of 1930-1970s the bigger capsules outnumber the capsules less than 10 sq.m (75% and 13% respectively), in the time period of 1980s-2010s due to cases of interior capsules in capsule hotels which became widely used in modern times, the number of smaller capsules slightly increased, however, the tendency of miniaturization of capsule's space as a whole is also traceable (53% and 50% respectively).

In the scope of the parameter of 4.Natural light, 81.2% of capsules have proper windows of sufficient size to illuminate a capsule's interior. In 11.8% there are spot windows and indirect light solutions while in insignificant part of cases there are no windows or the lighting is simulated. The trend is common for both time periods. With regard to climate control the important aspect to mention is a considerable amount of cases

where it was impossible to strictly define if the capsule has a proper air conditioning, ventilation and heating due to a number of conceptual designs which can lack detailed technical information. Although it can be said that in multicapsular structures on average depicted as hi-tech environments the complete climate control in capsules should be as a matter of fact, however, in order to reduce the area of speculation, the research labels such cases as those with not enough information to make a clear judgement. Such cases occupy 35.5% in general and 60.5% in 1930s-1970s and 17.3% in 1980s-2010s. In the cases where such information is available the climate control is achieved in 46.2% cases what is much more comparing to capsules with partial or no control of their microclimate.

Next, the interim space is usually unavailable (66.1%) versus 30.6% where some intermediate spaces can be observed. The trend is common for both time periods. The similar picture can be viewed in the aspect of a public space, that is capsules are usually separated from a public space within area or structure, or do not have any public space within capsular clusters (59.7% - no public areas, and 33.3% with public space respectively). This is worth mentioning that pathways, corridors, lobbies can be still available, however, they do not fully satisfy the meaning and purpose of a public space, therefore, they are excluded from counting in this regard (Fig. 51).

Fig. 51. Lobby on the first floor in Nakagin Capsule Tower, 1972, Kisho Kurokawa

Next, visual comfort is observed through pictures and visual data available for analysis. While there is considerable amount of cases where such judgement is hard to perform (40.3%), in defined cases the 35.5% of capsules are considered comfortable, 10.2% cases as partially comfortable and 14% as insufficient for a comfortable living. The case of

Oil Rig Capsule hotel is a harsh marine cabin-like environment which in overall provides feeling of nomadic lifestyle with peculiar visual parameters (Fig. 52).

Fig. 52. Oil Rig Capsule Hotel, 2017, Denis Oudendijk

Next, capsules are divided in scope of the parameter of a firm structure as follows: 73.1% cases with firm structures, 12.9% with thin or relatively stable structures and coating, and 10.8% of capsules with soft, shaky and such structures. The trend between two time periods remains comparatively the same with slight increase in percentage of less firm structures in 1980s-2010s. Next, regarding the navigation inside capsules, the cases are divided as those with simple planning for navigation – 70.4%, those with a complex interior – 16.7% and 5.9% with interiors having several layers and which are hard to navigate through. Custom made interiors of capsules in 1930s-1970s occupy the notable percentage of all cases, but in modern times simple interiors usually prevail.

Foundations are, due to the nature of capsule architecture, mostly presented in a form of joints, legs, and connections what does not fully satisfy the definition of proper foundations (50%). The capsules having foundations are 14.5% and those with no foundations are 35.5%. In 1980s-2010s the separation of cases with proper foundations is even smaller – 12.7% versus 17.2% in the 20th century. Number of capsules with no foundations or proper attachments to a terrain or structure increasing in the 1980s-2010s from 23.7% to 43.6%. Analysis of capsules from this aspect again underlines a mobile nature of a capsule and its temporary nature.

Water supply and electricity are mostly presented inside capsules with less percentages for water – 64.5% of all cases against 87.6% of cases having electricity. Regarding movable furniture, in majority of cases the furniture is partly movable, or movable and customizable within small range, as well as some interior elements can move, while some part are inbuilt (53.8%). Capsules with flexible interior occupy 23.1% of all

cases while capsules with mostly unchangeable interior come to 11.8%. This immovability and difficulty to change capsule's interior originates in various conceptual aspects as capsule as a consumer goods, ergonomic justifications, movability, and structural limits. On the other hand, functional diversity of a capsules' interior is achieved in 59.7% of all cases together with partial diversity – 14% and 17.2% of monofunctional capsules. It is also possible that additional functions can be added to main body of a capsule, as well as some capsules of different functions can agglomerate in one multifunctional cluster (Fig. 53).

Fig. 53. Few monofunctional units added together to the main core in Capsule house, 1970, Kisho Kurokawa

If to summarize the findings into the groups of Sleep, Comfort, Safety, Quality and Flexibility the following conclusions can be made. Regarding the sleep environment capsules as a concept and built cases can provide sufficient conditions for uninterrupted and comfortable sleep. Being envisioned as a complete house, the level of comfortable living in most cases of capsule architecture is achieved. Regarding comfort, habitable area remains one of the arguable and important aspects regarding design of capsules, while criteria of natural light, and climate control are sufficient, and the same can be partially said for Visual Comfort although this aspect remains speculative. On the other hand, interim space and space for communications can be often omitted in design of capsules and capsule architecture. Regarding 'Safety' simple foundations cannot fully guarantee structural stability while structures themselves suffice. Easy navigation in a compact capsular space also supports easy evacuation in the case of emergency. While water and electricity as basic needs for a modern house together with functional diversity are achieved, low flexibility of interior interfere with its change and update over time.

Section 4 Questionnaire on living in a capsule among residents of capsule architecture

4.1 Composition of questionnaire

In the previous section of this chapter capsules as actual environments for living were studied including build and unbuilt examples. As it was shown in the chapter of 'concept and physical characteristics of capsule architecture' the built examples of capsule architecture include only 55 built cases with majority of which had no occupancy record (due to the fact that they usually were prototypes and experimental architecture). Other cases can have some record on actual living inside the capsules as in the case of Dymaxion house by Buckminster Fuller (1930, 1945) the house built on the latter period and which is known as Wichita house, was a place to live for a former Fuller's employee William Graham who modified the house and whose son - Bill Graham remembered the Dymaxion as a wonderful house to grow up in and run circles in on wet days". Also Graham mentioned that during winter it was very hot and that his father was saying that a house was safe in case of a tornado because of a round shape while "at Christmas the Grahams draped the house in flashing lights, like a flying saucer"[47) 48)]. Such post-occupancy evaluation and commentary brings in the actual aspect of using of and living inside an actual capsule outside the rhetorical realm of architectural discourse. The commentaries provide the additional information on capsules' features as environment, however, on the other hand, the circumstances of moving in, lifestyle and psychological portrait of a resident also resonate with the concept of a capsule from the sociological aspect. In another built example of container architecture – EBA51, despite the fact that it is provided for students, residents have rights to continue living in their flats even after graduation, and many of residents have connections to creative jobs[49)]. Many of residents of such capsular buildings may realize their peculiar lifestyle in a capsule and adjust their habits to the closed environment while becoming a valuable source of information regarding actual testing of build examples of capsule architecture. Therefore, the questionnaire among residents of built cases of residential capsule architecture was organized in order to form a picture of its residents worldwide.

The research selected from previously studied 265 cases of capsule architecture 34 built cases with residential function and SOHO spaces what implies long staying in a capsule. From these 34 cases in total 102 people were asked to participate and 47 responded (46.1% response rate; from built 15 cases in total). Two cases which are not included in the general cases' selection - Banga house (1970) by Pamela Voigt and Casanova Unit (1975)

by Peter Hübner (both contacting persons are architects and residents of the houses) were added as well. Majority of respondents (30 respondents) were from Nakagin Capsule Tower. The means of contacting were: email and social networks (Instagram, Facebook, LinkedIn, Line). This part of research was organized in a form of a questionnaire as a Google Form with 15 compulsory and 4 arbitrary questions and was divided into 3 parts - Resident, Use of a Capsule, and Circumstances of Moving in. The questionnaire was available in English and Japanese (Fig. 54). The whole structure of the questionnaire in English and Japanese can be seen in Appendix (Questionnaire. Corresponds to Chapter 4).

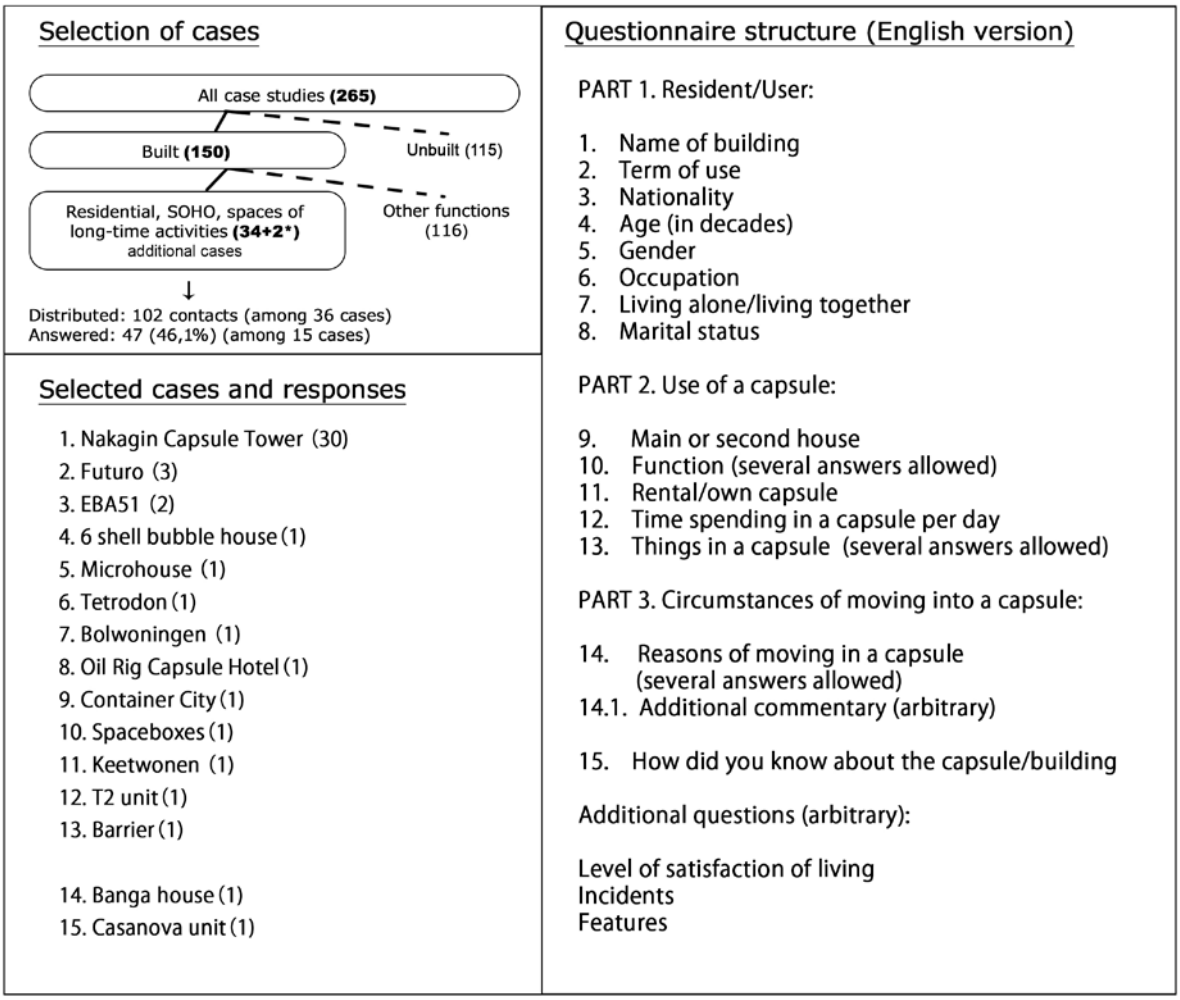


Fig. 54. Details on the questionnaire's structure

4.2 Results of questionnaire

The results are organized in following graphs and divided into three parts for analysis (Fig. 55-57).

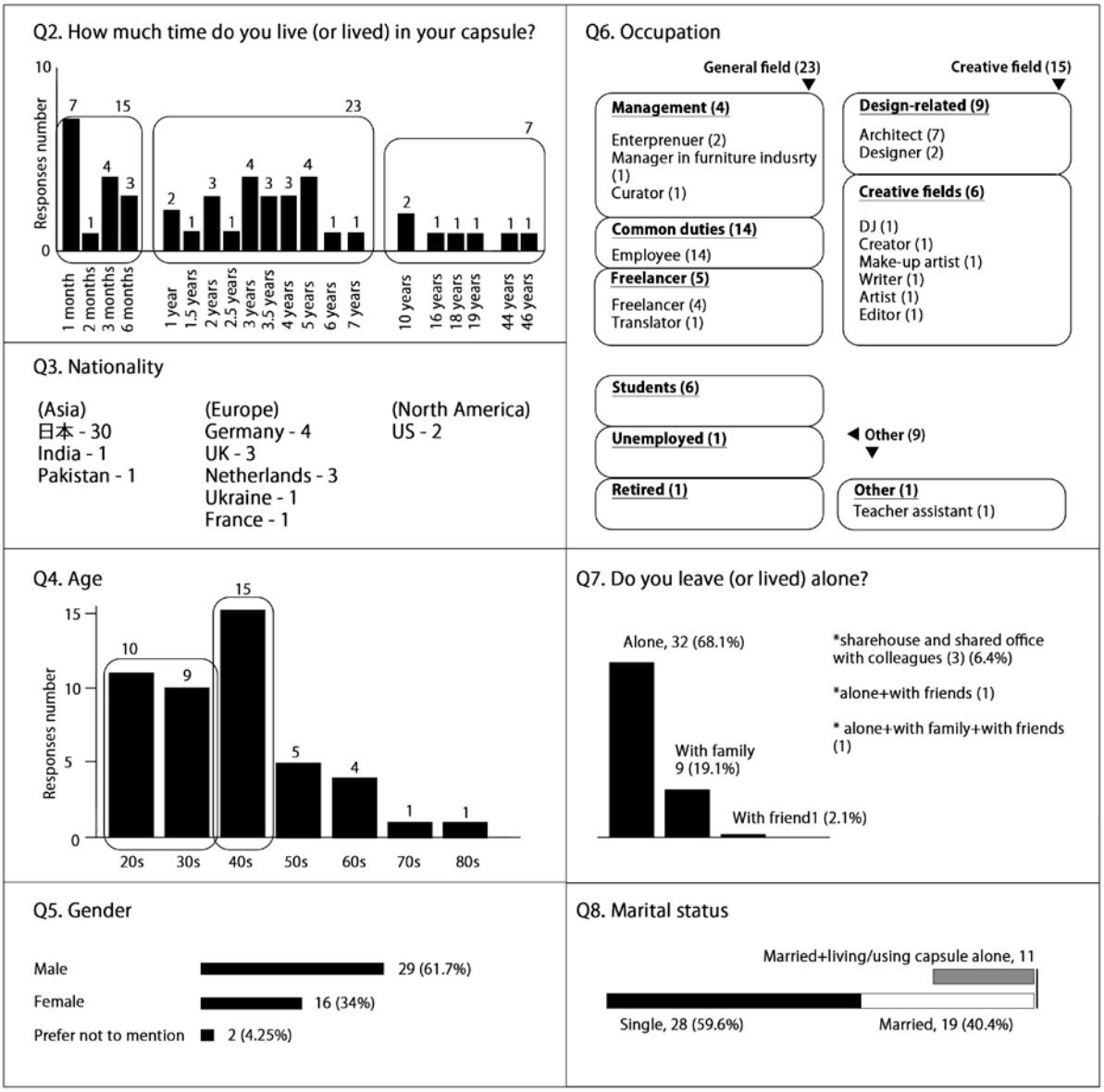


Fig. 55. Results of questionnaire for questions 2-8.

The Part 1 of the questionnaire is called Resident and collects basic information about residents (questions 2-8; the question 1 is the name of the building or a capsule). Question 2 regarding amount of time lived in a capsule showed three groups of the length of living – short-term of one to six months, average-term from one to seven years, and long-term with responses ranging from 10 to 46 years. Here, the short-term (15 responses) stay implies temporal occupancy before moving to another place, or in order to test the place (in cases of Nakagin Capsule Tower – the monthly capsule system (more details in Chapter 3.2) while the majority of cases (23) include long-term stay which can be yet described as relatively short and not related to life-time occupancy and can be regarded as temporary occupancy as well. Long-term stay corresponds to a significant amount of time

lived in a capsule which can be judged as a main and constant living. From the judgement above it can be said that in majority of cases residents did not lived for a long time in a capsule what can confirm the relatively temporary nature of a capsule as an environment in terms of living.

Question 3 regarding the nationality shows geographical distribution of cases with a significant part coming from Japan as well as many responses coming from citizens of Europe. Question 4 provides information about average age of respondents. It is clear that many residents are in their 20s and 30s what corresponds to a young age, however, as a separate answer the category of 40s independently prevails. These findings partly confirm the concept of a capsule with relation to society as a home solution suitable for young people. Question 5 clarifies the proportion of men and women as 67.1% of male respondents and 34% of female respondents which shows the dominant male population inside capsule architecture with the reservations of the small scale of the questionnaire. In principle, capsules should be prone to follow the common tendency of occupation of flats with small-area and the proportion can range from case to case. Occupation for residents in Question 6 may help see backgrounds of residents and confirm the following hypothesis that capsules due to their cheapness or location can be fit for students and young employees, as well as that the capsules can be occupied by people with creative professions. In fact, the majority of respondents works in companies of different fields (23), while creative professions are in 15 responses. Only six respondents are students. These results are based on the selection of 15 cases where only three (with four respondents) cases are student dormitories, however, it is thought not to be a significant factor as far as the proportion of respondents which are students does not prevail, and additional research with more respondents may be required to confirm the average kind of population living in capsules worldwide. In Question 7 results show that 68.1% of all respondents live alone, while mostly those who are married live together with families (19.1%), and only one person shares a capsule with a friend (other options include share the office among several renters and those who live either alone or with a friend or a family periodically). Marital status also shows that single persons occupy 59.6% while married people are 40.4%. Among those who are married about 58% still live alone or use capsule as a second house or hobby house.

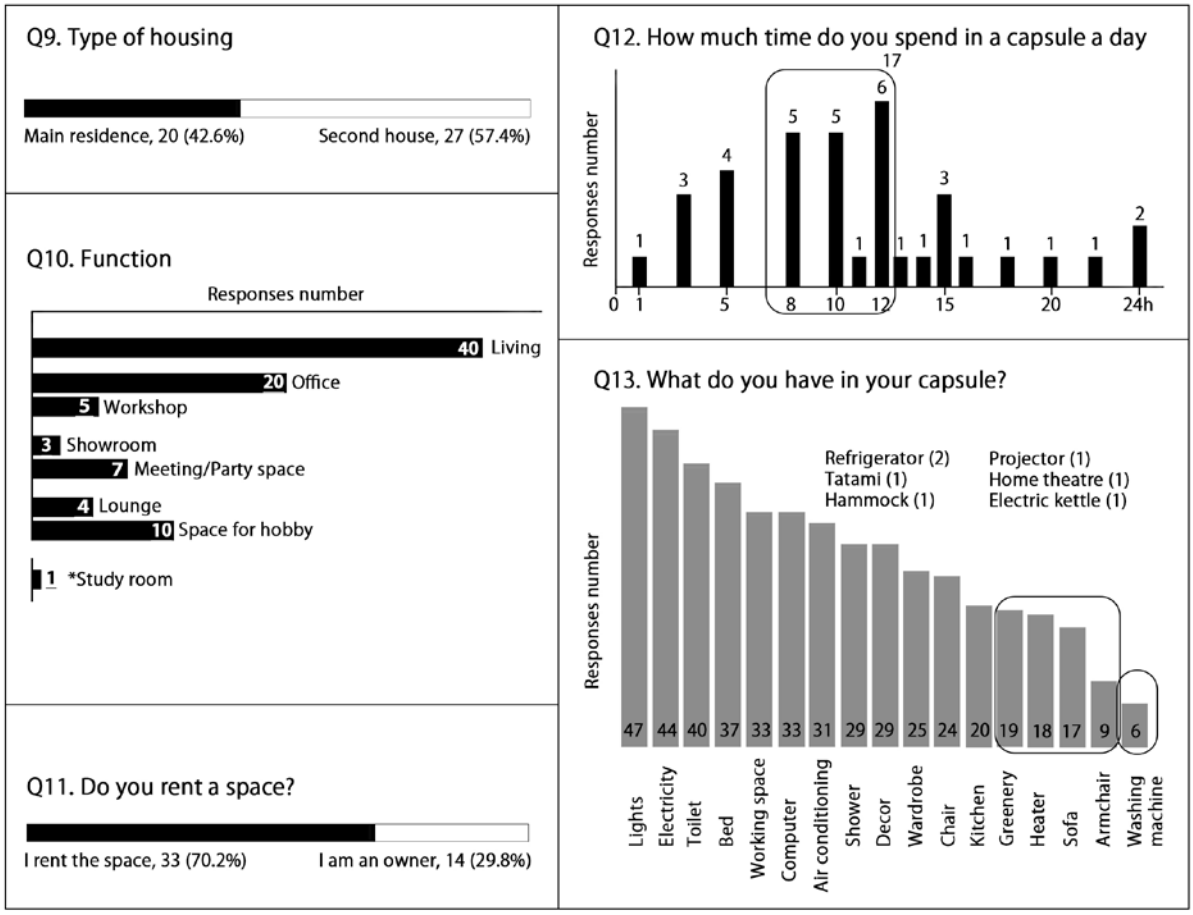


Fig. 56. Results of questionnaire for questions 9-13.

Question 9 starting the Part 2 – Use of capsule includes type of housing where 42.6% of users live in a capsule as a primary residence and 57.4% use the capsule as a second house. This confirms the aspect of a capsule which can be treated as consumer goods which can be bought as an additional function to the main residency. Question 10 explored the primary use of a capsule and follows as a living space in 40 cases, office in 20, space for hobby in 10, meeting and party space in 7, with lesser cases of workshops, lounge, show rooms and study rooms. The question allowed several answers and multiple responses show the multifunctional nature of a capsular space. Question 11 shows that majority of residents rent the space (70.2%) and fewer people actually own a capsule (29.8%). Together with the Question 9 of residency type, it is clear that many usually rent a capsule as a secondary space without buying it. Question 12 about average time spending in a capsule a day ranges from 8 to 12 hours with many cases of more and less time. It can be said that time spend in a capsule corresponds to an average housing while this time can change depending on capsule's use (function, secondary or primary residency, lifestyle of a resident). Question 13 helps to see what kind of things can be seen in a capsule, as Lights (47) and Electricity can

be seen in almost all capsules. In lesser cases (40) a sanitary unit is also present following by bedding (37) and working space (33). Computers or laptops for work are in 33 cases, while air-conditioning is present in 31 cases (66%). Shower, Wardrobes, simple furniture and kitchens are present from 60% to 40% of all cases. Greenery and big furniture as armchair and sofas are present in 40%-20% of all cases. Heating is present in 18 cases (38%). Washing machine is less present (6 cases, 13%) and followed by custom objects – Kitchen parts – Refrigerator (1), Kettle (1), equipment – Projector (1), Home theatre (1) and substitution to bedding – Tatami (1) and Hammock (1).

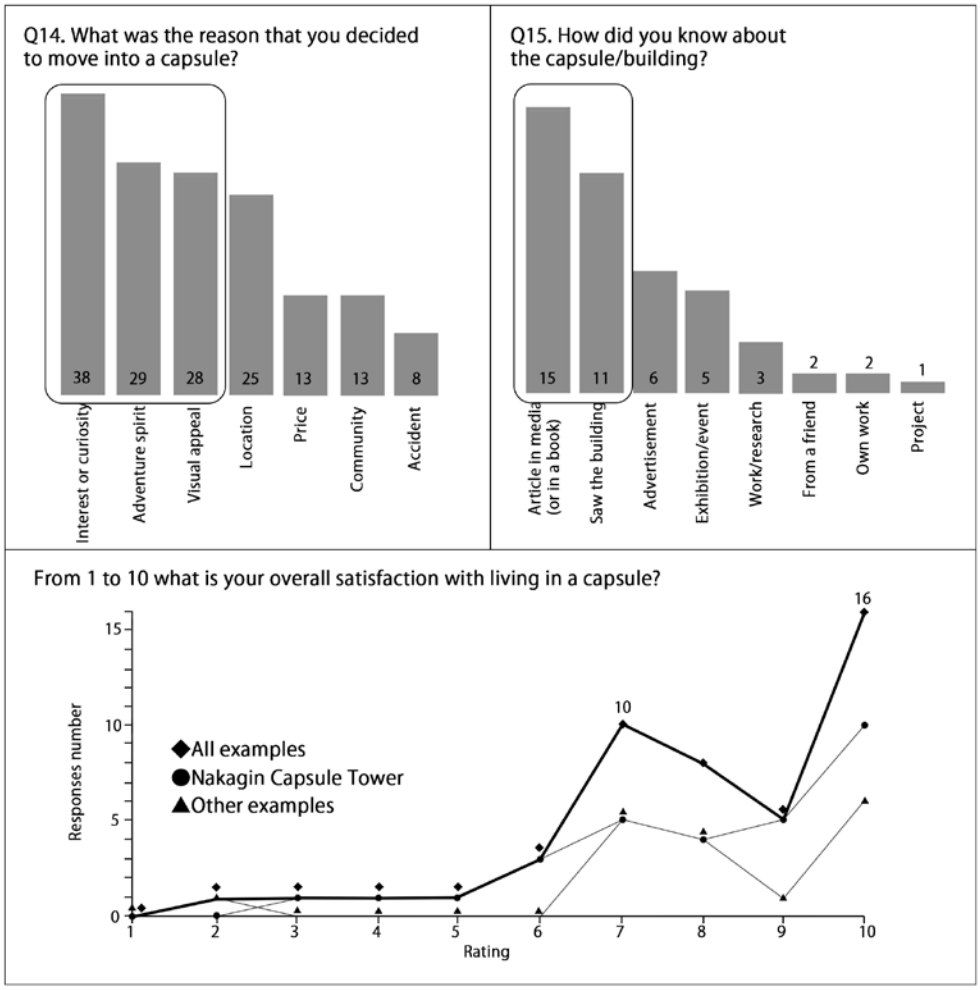


Fig. 57. Results of questionnaire for questions 14-15 and arbitrary questions.

Question 14 asks about the reasons of moving in a capsule with multiple answers allowed, as well as it was possible to add custom answers and commentary. Despite the fact that there were rational options as location and price, many respondents often chose less

rational and romantic options as curiosity, adventure spirit and visual appeal of the building which come in 38, 29 and 28 cases respectively. These choices are followed by location (25), price (13), community and neighborhood (13) and as many aspects combined together in 8 cases. It is seen that respondents were interested in living in a capsule as an experiment or new experience besides common needs of accommodation. Commentary also include notions about building the capsule oneself and living in there as an experiment, purchase and followed living in a capsule, energy efficiency and nice interior, using a capsule as an exhibit, participation in a project of a restoration of a capsule or personal project, place where it was possible to concentrate, living which would be a good memory and experience (Nakagin Capsule Tower), place good for spending time and sharing with friends, as a good place to study, and living in famous architecture (Nakagin Capsule Tower). Question 15 proceeds with asking about the circumstances of getting to know the building and includes following options and proportions: Article in media or a book (15), seeing the building itself (11), Advertisement or real estate pamphlet (6), Event (5) with custom answers as through research or work (2), hearing from a friend (2), and as an a project (1). It is clear that media played a significant role for people getting to know about capsules, presumably, due to wide coverage about uncommon buildings in media and journals. Seeing building itself on a street also brought many future capsules' residents inside.

Additional arbitrary questions start from rating own environment on a scale from 1 to 10 in order to understand how people rate their lifestyle and living. It is seen that mark of 10 prevails among residents (16 marks) with the second rate of 7 (10 marks) as indication of mostly satisfactory living. Lesser marks for 8 and 9 are understandable as intermediate numbers between fully satisfactory living and mostly comfortable living. Marks from 6 to 1 are presented less from case to case with additionally commentary about negative points which are described in the next questions. On average it can be said that residents mostly like their living with similar graphs for separate case of Nakagin Capsule Tower and other cases combined.

Next arbitrary question asks about accidents occurring during living as "Do you have any accidents worth mentioning while living in a capsule?". Mentions about accidents include: Positive mentions: 17 (Keywords: (making) friends, inviting people, community, coziness, experience, active living, unique lifestyle, safety, uniqueness), Neutral mentions: 4 (meeting with other people, regarding history of a building, change in lifestyle's rhythm), Negative mentions: 6 (humidity, rainwater, mold, earthquake, malfunction of equipment (toilet, heating, minor unpleasant incidents).

Regarding the question “What do you think is a feature of a living in a capsular space?”, residents and users describe their living in three main categories: 1) about small and minimal space, 2) about inconveniences of living and 3) about community and neighborhood. Common keywords include: simple, minimalism, common shower, people relationship, strange people, community, communication, narrow and stuffed, compact, calmness, price, DIY, unusual space, inconveniences, small space, science fiction, less things, social interactions, easy cleaning. One of the respondents who built one’s own capsule describes own lifestyle in a following manner:

“Your living space gets smaller, but the world outside gets bigger. I spent a lot more time eating out, visiting friends etc - however, this may be because the design <…> was not well suited to <…> climate, so it was not always comfortable to be inside”.

Another commentary include: “you can put it (Author’s edit: a capsule) anywhere, especially as hide-away from town life and stress”, “Less hoarding. Focus on project or career rather than home. Good for people living alone as a lot of social interaction with others living next to you. No travel to office or work.”, “The living conditions is so unique, unlike any apartment or house living, the way you move around the building and around the capsule units. Also the construction method, you can really see how the building is built.”, “The vaulted shell interior though the house is only 26 feet diameter has a cathedral effect. It lends itself to mural painting of a morning sky at sunrise”, “it is simple and has only what it needed (*translated from Japanese)”, “there is no hot water and shower room is common (*translated from Japanese)”, “getting along with other residents of a building in uncommon for ordinary blocks of flats, problems as humidity or a bath became shared topics to get to know neighbors <…> (*translated from Japanese)”, “<…>you notice that it is not a luxury to be surrounded by things (*translated from Japanese)”, “you lose sense of direction and feel unusual (*translated from Japanese)”, “Love is blind. It's very inconvenient if to think rationally but I can forgive it because it's a capsule (*translated from Japanese)”, “I feel that the flow of time is different in the capsule <…> It makes you feel better (*translated from Japanese)”, “You can have time when you are separated from the outside everyday time and space. (For that reason, I decided not to bring in a TV and a computer.) (*translated from Japanese)”, “Yellow water, no hot water, even without any rain – rainwater, malfunctioned pipeline, still you have to survive these events. Because in Japan, if you stop doing this the building which is not used will become scrap (*translated from Japanese)”, “this is the simple place with good view and there you have all you need for city life (*translated from Japanese)”, “All things you need are at a range of your hand stretched <…> (*translated

from Japanese)", "A place where you can enjoy the inconvenience. I think it can't be helped (*translated from Japanese)", "Perhaps it was reaction to the closed nature of the room, so I became more active in interacting with people in the shared space", and others.

Respondents left many comments about why they move in and many of them mention the desire to live in this particular property from pure interest. Yet, after some time some residents became discouraged with living conditions, and some get accustomed to it and changed their lifestyle. However, the satisfaction rate of living in a capsule is relatively high with the 7 to 10 grades' range. Although there are 2 times more male respondents than female, it cannot be said that capsules usually accommodate only men. Also it does indicate big incline towards young generation since many people rent or own a capsule in their 40s. Next, there are a lot of already employed people than students. As usual, the residents are living alone and more than half of them are single. From the sociological point of view, most of capsules' residents are aware about the unusual environment of their residency and tend to make connections with their neighbors and form a local community. Such community can be online via Slack (Nakagin Capsule Tower) or have own website and SNS pages (Futuro, Venturo, EBA51, Bolwoningen, etc.). As capsule architecture can be viewed as another architecture fitting different social norms living in capsular buildings have own nature. People have to adjust their lifestyles which can also have some behavioral changes (reevaluation of life and living, notion of house, being alone and in community). Here, it can be concluded that from the questionnaire among residents of capsule architecture helped to get feedback of actual living in a capsule and found out clear features about resident's changed lifestyle and conditions of living.

Section 5 Features of communities in capsule architecture

5.1 Case studies of communities

Despite the fact that there are many designs of capsules, in built cases their aggregation to structures for cohabitation is relatively rare. The living and community similar to the well-known case of Nakagin Capsule Tower can be traced only in 26 examples. In some examples which were built in 20th century it is difficult to extract the necessary data about the community and nature of cohabitation, therefore, for this section the research selected the following nine cases of capsule architecture in order to study these agglomerations of capsules from the aspect of a community. The closed nature and high degree of capsularization of such environment may show the strong community ties between neighbors and their better organization in terms of cohabitation. The selected case studies are: 1. Nakagin Capsule Tower (No.87), 2. Bolwoningen (No.101), 3. Mill Junction (No.199), 4. Spaceboxes (No.160), 5. Keetwonen (No.260), 6. Cite a Dock (No.152), 7. EBA51 (No.197), 8. Container city (No.110), 9. Drivelines (No.237). The study is organized through literature and media review.

The basis and methodology of research consists from three main points: concentrating on data regarding 1) inner communication of residents, 2) their management and connection to managing company, as well as 3) outreach to surroundings and outcomers. According to previous studies on communities the following aspects forming a community can be extracted: sense of place, shared interests, diversity, backgrounds of residents, common management, rules, self-expression, events, means of interactions, local chat, ethics, values, participation[50) 51)]. Since the notions of communities vary from different standpoints the research concentrates on the description of community from the viewpoint of cohabitation and social interactions which can occur based on a place of residency. From Kagohara's research[52)] it is clear that values of communication to neighbors and change in social values was present among residents of Nakagin Capsule Tower and living in the building was closely connected to shared interests (for example – in architecture or age-wise) together with similar challenges occurring while living in a capsule. By this the building became the means of interactions and strengthened community although the percentage of people participating in local events or management of a building can vary and be both majority and minority. The research also look through the traces of community buildings typology inside the chosen cases in order to define which aspects can be present in

the primary residential nine cases. Case study analysis is shown below for each case (Fig.58, 60-67).

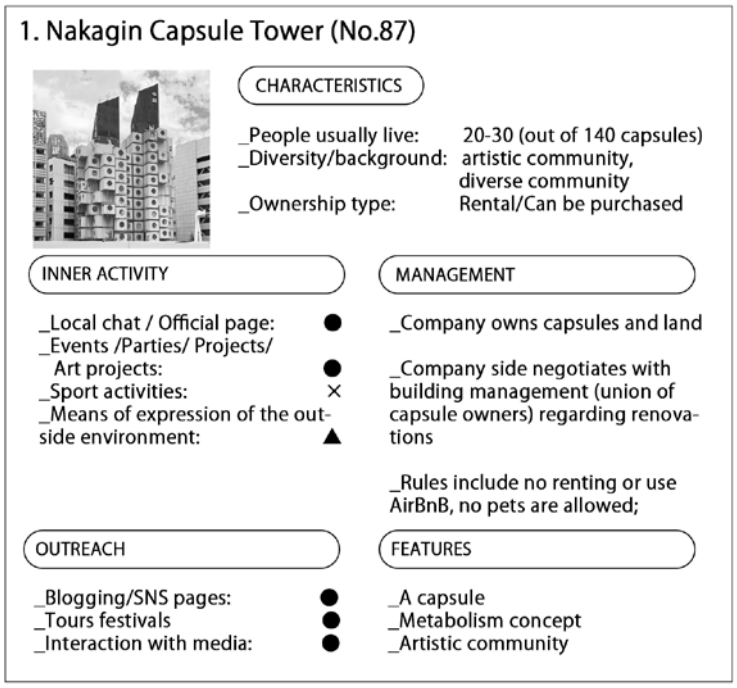


Fig. 58. Case study on community in Nakagin Capsule Tower

Nakagin Capsule Tower has a strong community, however, it consists from minority of residents and mostly initiates from activities of union of capsule owners and people who rent capsules for living. The abovementioned Nakagin Capsule Tower Preservation Project managed official page of the building and events connected to media engagements, art projects, etc. Most of residents constantly living in the building were active members were involved in the activities inside the building. There is no sport activities related to the community of the building and less means of expression in the exterior. On the occasion windows of capsules could be decorated (Fig.59). The managing company had frequent negotiations with the side of capsules' owners regarding the buildings maintenance and renovation. Rules imposed by the managing company included no short-time rental of capsules and prohibition of outsiders coming inside the building for excursions with one exception of tours to capsules organized by collaboration with a company specializing in architectural tours. Pets were also not allowed. Among the features of the building, according to the interview with a resident, a capsule and architectural concept of Metabolism together with building's architect – Kisho Kurokawa can be named the symbols of the place.

Fig. 59. One of the windows decorated as a jack o lantern.

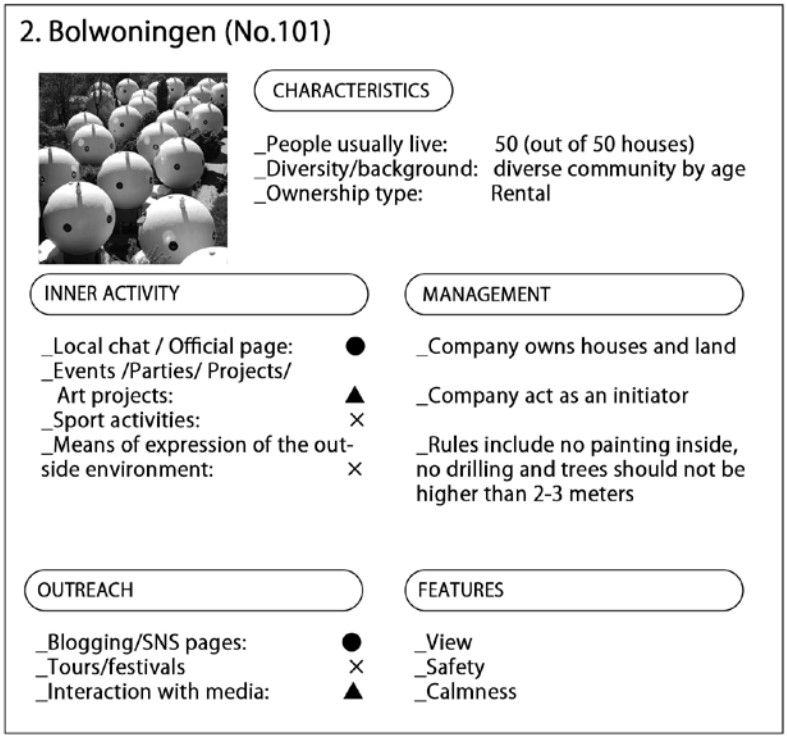


Fig. 60. Case study on community in Bolwoningen

Bolwoningen (Globe houses) is fully occupied area with 50 houses which are managed by an operation company and protected by UNESCO. The community is diverse in age. Houses cannot be bought and can be only rented. The residents have a local chat, there is no official page of the area, but due to the fact that this is a well-known architecture it is featured on internet pages of architectural magazines and encyclopedias. Events and

meetings are organized periodically – barbeque and chats by residents and a gardening day by a managing company.

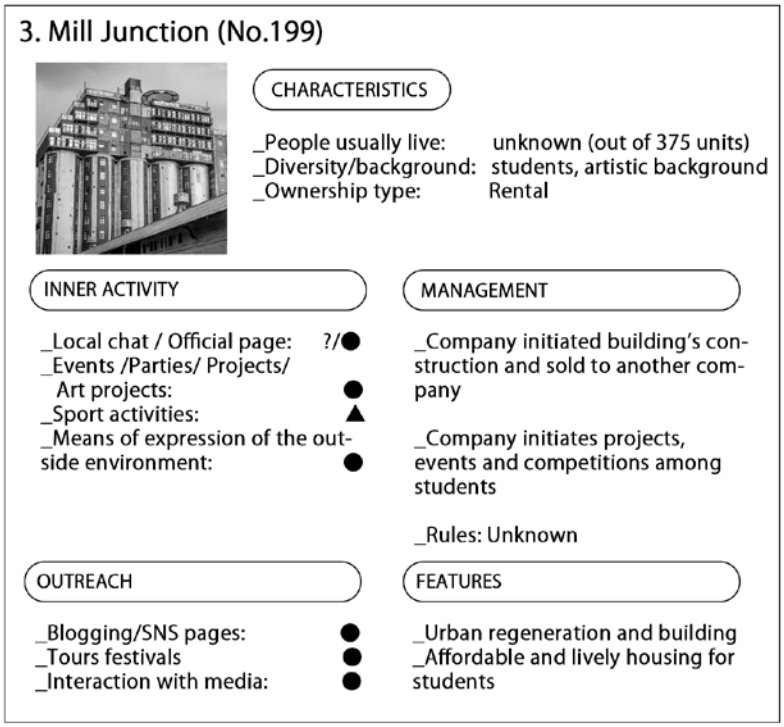


Fig. 61. Case study on community in Mill Junction

Mill Junction can be occupied by 375 units at maximum but there is no information how many students usually live in the place. Starting from 2013 the facility accommodates students of Johannesburg mainly from two local universities. Rooms are shared and rental. The official page is run by managing company and initiates events for students. There are indications that sport activities as sports' clubs could be at some point of time active in the facility. The building has gym. Occasionally residents post on social media the pictures of the building and use rooftop for filming. Parties organized on the occasion of new semesters attract people outside the facility (including students from different 'junctions' which are named so by the operating company). There are several media reports about the building with interviews of residents. The features of the building include notions of urban regeneration and lively place fit for students' active lifestyle.

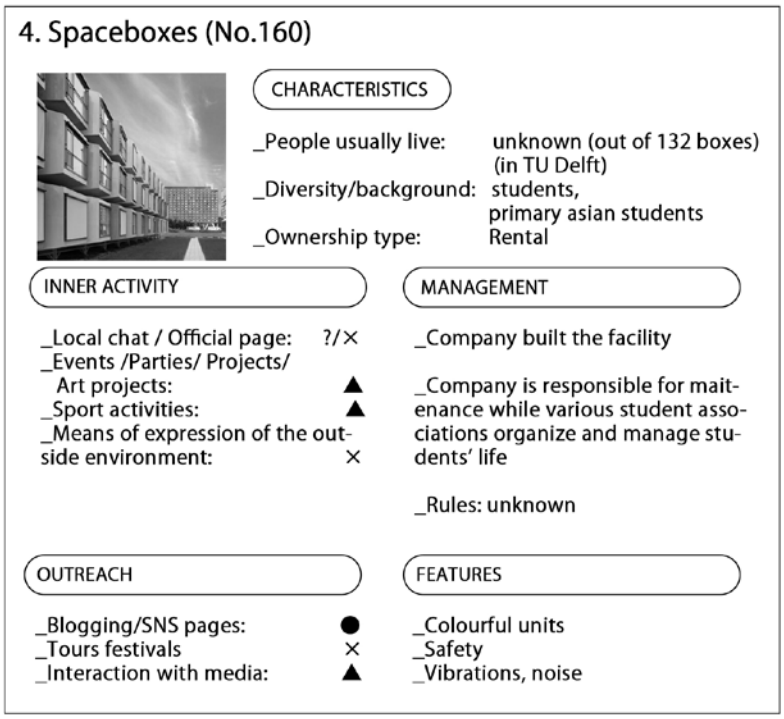


Fig. 62. Case study on community in Spaceboxes (TU Delft)

123 spaceboxes are occupied by students of TU Delft with seemingly full capacity. The boxes are inhabited mostly by Asian international students what was leading to feeling of segregation. Ownership type is rental. There are no indications that residents have local chat and there is no official page of the facility with the reservation that TU Delft's journal Delta often highlights news regarding the units. There are sometimes local parties organized both by student associations and university, as well as sport activities which are related to the student clubs. Spaceboxes are painted in different colors what becomes one of the features of the place. The interaction with neighbors is primarily local (close neighbors or aisles). There are no indications of specific rules imposed on residents. Media Delta plays the major role regarding showcasing the residents life and highlighting problems connected to the living, smallness of the space, vibrations and noise.

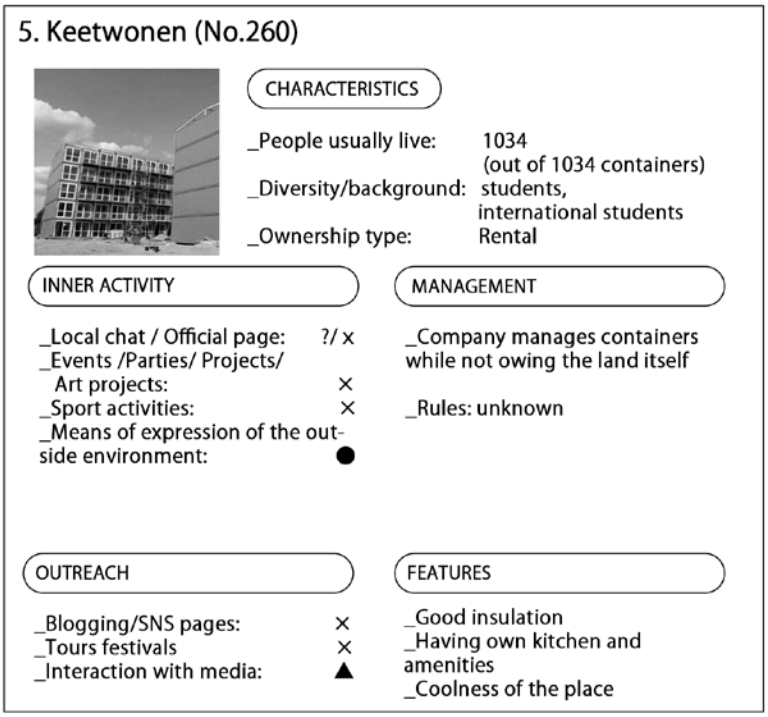


Fig. 63. Case study on community in Keetwonen

The building has full occupancy and it was reported that queue for moving in to the facility was ranging from 6 months to 3 years. The student city has a lot of international students from different universities. Ownership type is rental. The company owns only containers and in charge to make students to move out from containers. There are no indications of local chat among residents and there is no official page or page on SNS. Also there are no mentions of any kind of organized events or projects highlighted in media. Sport activities are narrowed to presence of a basketball field. Some open spaces between container agglomerations are used as spaces for greenery or bicycle parking. Students use their balconies for putting flower pots, flags, furniture and other kinds of decorations. Being the well-known accommodation for students the building is occasionally presented in news, as well as personal videos or reports from students themselves. According to residents the features of the space include the good quality of living, and peculiar feel of the space which can be described as cool (on the opposite to living with parents).

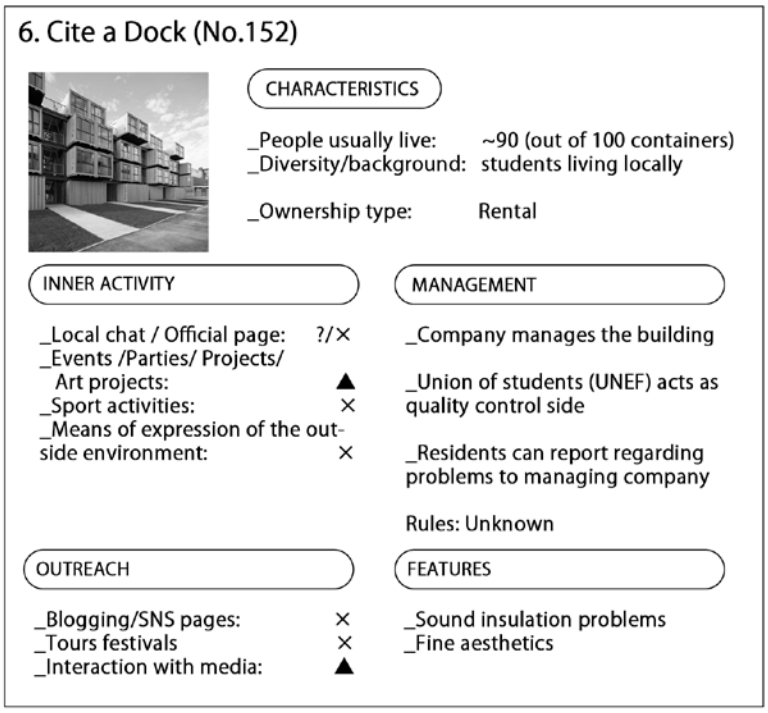


Fig. 64. Case study on community in Cite a Dock

The building has almost full occupancy with around 90 students living in 100 apartments. The community consists from students living locally. There is no indication of any pages on social networks or sites while all inner activities are localized in meeting space outside the main facility. Students tend to have local groups of friends and neighbors who often meet at the place of some of the residents. There are no decorations put outside, presumably due to municipal regulations. The building is owned by operating organization to which students can address regarding the problems connected to living. As a mediator the student union (UNEF) also traces conditions of living inside the building. The interaction with media is narrowed to occasional reports. Residents find aesthetic of place as one of the feature of living but complain about several structural and technical problems with the building.

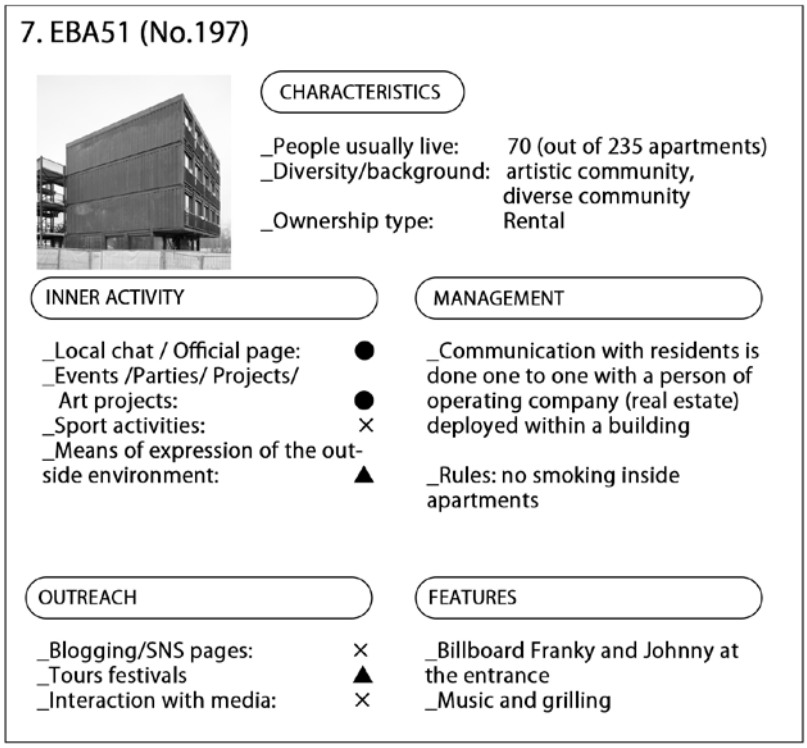


Fig. 65. Case study on community in EBA51

The building consists of two long blocks of containers which can be combined to form bigger apartments. From 400 containers there are 265 flats with around 70 people living in them. The community is diverse and consists of international students and company employees. The community has local chat and organizes grilling sessions and music sets often. There are no related to the building itself sport activities, and less decoration of outside space by residents. A real estate company manages maintenance and building of new residential blocks while residents can communicate with its representative regarding living. There are no strict rules except smoking inside apartments. Residents do not manage internet pages; however, there are links on social media showcasing the building which are managed by the company. There is a demonstration container for those who seek residency and parties which attract people from outside the facility. Features of the building include billboard in Las Vegas style highlighting the artistic nature of the surroundings and occasional meetings and parties.

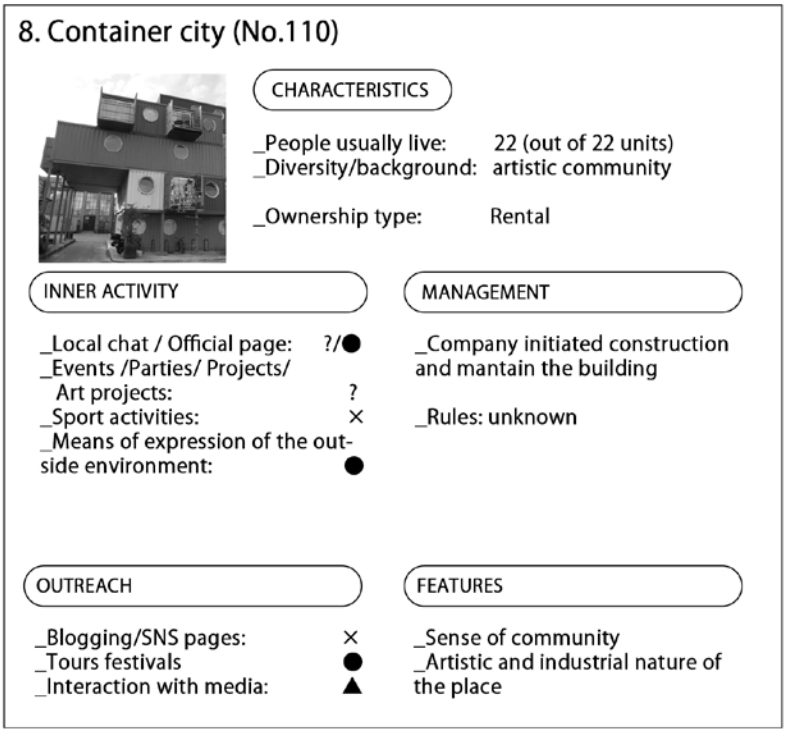


Fig. 66. Case study on community in Container City

The building is built by a company responsible for the management and interaction with residents. There are 22 studios which are fully occupied while type of ownership is rental. There is an official page of the location featuring the building among other attractions. There are no indication of initiative from residents side regarding events and projects but interactions with outsiders and tours are organized periodically and cane be viewed at the official page of the location. Containers are decorated from outside. Residents may have their own pages on social networks but that activity is related to their studio life and for business purposes. Among features of the place the sense of a friendly artistic community is often mentioned.

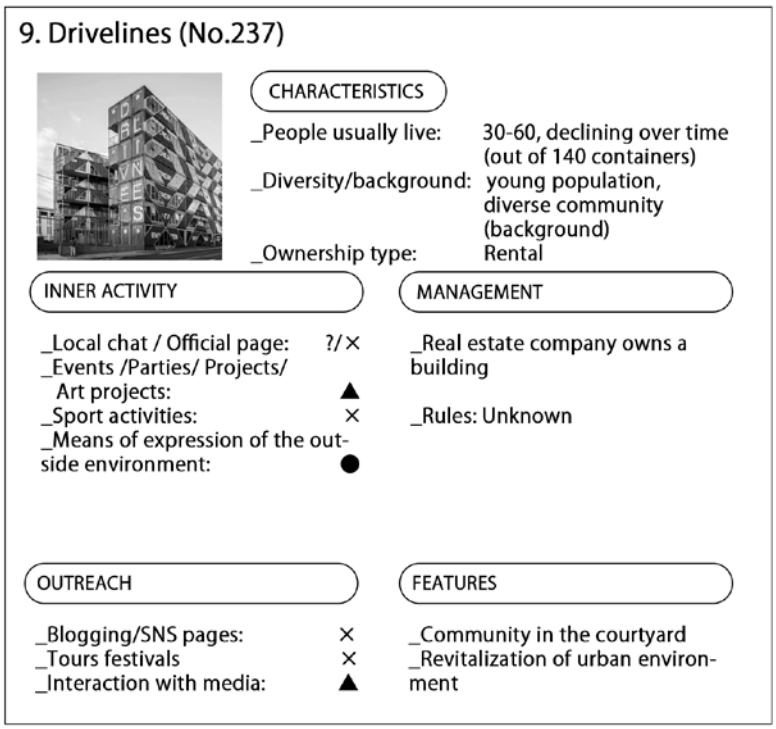


Fig. 67. Case study on community in Drivelines

The building was not fully occupied all the time and due to economic pressures and climate eventually building was left empty without forming community. The residents consisted from young employees and students. Ownership type was rental. There are no indications of local chat or other means of communication between residents and there is no official page or sport activities inside the facility. There are occasional parties organized at the courtyard. Means of decorating outside environment include simple decorations and putting furniture for viewing courtyard and surroundings. Residents do not post on social networks and interaction with media is occasional. Place has features as a community point in a courtyard and sense of revitalization of urban space. The uncommon appearance of the building adds artistic and lively image to the facility.

The conducted analysis of nine case studies showed that shared interests and problems related to living facilitate more social interactions together with the presence of a public space which can be a meeting point. The formed public space can be viewed in five out of nine examples and is used in all cases with exception of Nakagin Capsule Tower and Cite A Dock where public space can be organized inside a flat of one of the residents. Outer decorations are less viewed in all examples with reasons including norms, overall nature of the building and smallness of outer spaces. Nature and concept of building has usually a

strong relation with the community occupying and art projects, music or culture become one of the basis on which the communities are formed.

5.2 Dispersed communities and site visits

In separate cases of capsule architecture the community can be formed around the topic of capsule architecture rather than one particular location. Such communities emerge online and share common enthusiastic attitude towards capsular living and appreciation of such architectural community. The most well-known examples include Futuro Project[53)] around Futuro house (No.8) and which is aimed to search locations and histories of separate cases of Futuro houses around the world. Despite the fact that each case is different, the community frequently interacts by the common spirit of architecture's appreciation and treasure hunt. Sites on plastic houses as Bubblemania or Astudejaoublie also make records on modular architectures throughout the 20th century. Also pages on separate cases of capsule architecture on SNS make local forums of people interested in the typology. Another type of dispersed community can be related to periodical events where capsular structures are used for pop-up architecture with a representative example of Pop-up Neighborhood (No. 193) what brings in aspects of festivals, heterotopia and pilgrimage. Some of such structures can be permanent (as markets) with a representative of 7th kilometer wholesale market (No. 102) with own division and changing nature of container aisles depending on location.

The abovementioned Futuro house is one of the most successful implementations of capsule architecture with many examples sold for locations in various parts of the world with one of which located in Japanese city of Maebashi. The Futuro is used as an attraction attached to an architectural school. In the scope of the research the site visit and recording of the facilities were organized (see detailed report in Appendix).

Section 6 Capsule architecture and its users and residents

This chapter explores a capsule as an architectural object in relation to its users and residents as one of its inherent features. The capsular structures can create an alternative environment and influence a resident's lifestyle or the organization of communities. In this aspect, capsules can be divided into three main trends "leisure", "urban", and "nomadic" capsules. It became clear that the capsule as a tool for relaxation or a preferred rather than compelled lifestyle prevails in a social aspect of capsule architecture. Next, the capsules were studied as environments and were observed from 15 various parameters which should be considered regarding closed and small spaces. It became clear that in some aspects capsule's characteristics closely follow a capsule's definition (they are relatively small, and well-equipped) but have limitations such as the compactness of capsular structures narrowing flexibility of public or interim spaces, and the flexibility of interior, proper foundations, visual comfort. Furthermore, in the scope of residents' living or spending considerable time in a capsule, the temporary and experimental nature of living can be traced. This is reflected in short-term occupancy, relatively young age of residents, rental type of ownership, and way of using (second house, hobby house, leisure space, etc.). Lastly, the sense of communities in capsular structures is present both due to the structural organization, as well as the initial type of housing provision (dormitories, social housing, and rental spaces). Hence, the social aspect of capsule architecture is one of its major features in the applicability of architecture and can be summarized in the scheme below (Fig. 68).

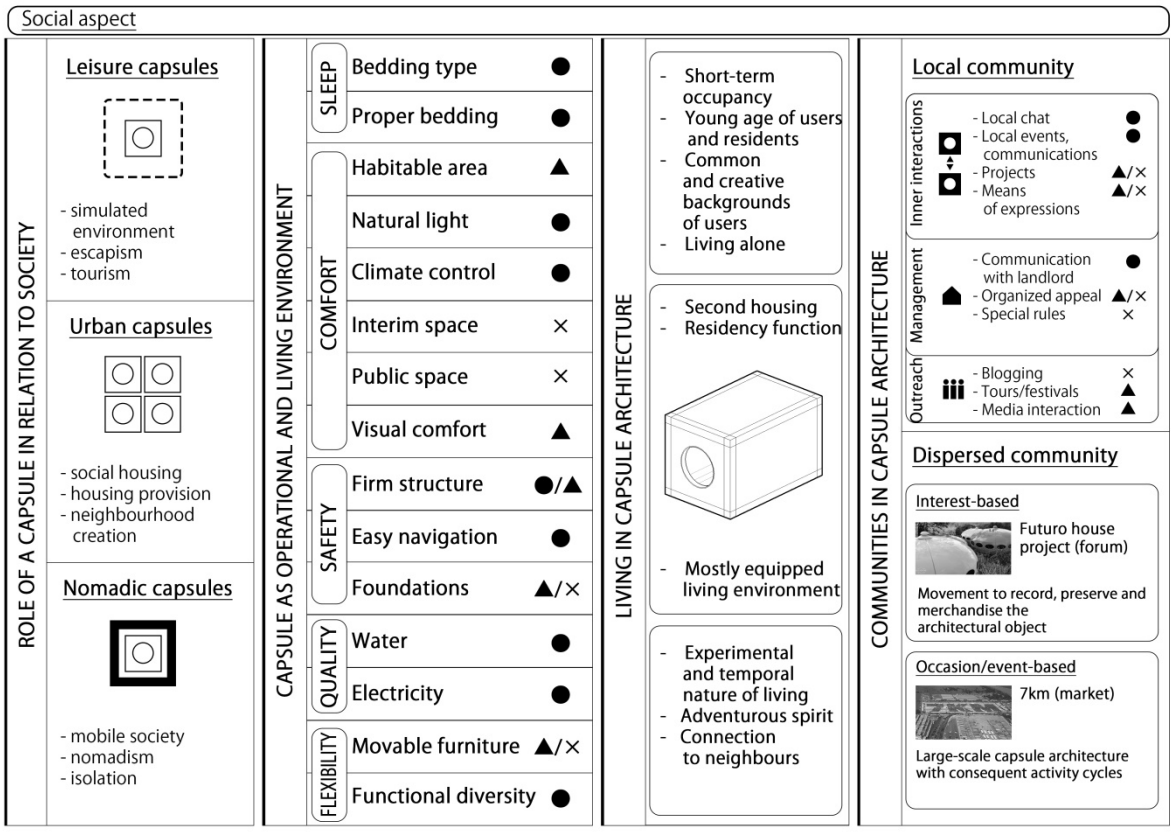


Fig. 68. Main features related to a social aspect of capsule architecture

Section 7 Conclusion

The research underwent a multidisciplinary analysis of the social aspect of capsule architecture in terms of its conceptual part with relation to society, its technical capacities as a living space, the lifestyle of its actual residents and communities which they can form. Firstly, the research studies all examples of capsule architecture regardless of function by looking at any notions about relation of capsule architecture to people using or inhabiting it by extracting the following categories related to a social role of a capsule: Urban capsules Leisure capsules, and Nomadic capsules. Next, the research aims to evaluate capsules as spaces for living and continuous stay (including SOHO, hotels, etc.). For this the several previous studies were chosen in order to define parameters which should be considered in the case of small capsular spaces. The study selects 186 cases and analyses them in scope of 15 parameters which are graded as sufficient, poor or insufficient. Next, the research selected from previously studied cases of capsule architecture 36 built cases with the occupancy record. Respondents left many comments about why they move in and many of them mention the desire to live in this particular property from pure interest. Yet, after some time some residents became discouraged with living conditions, and some get accustomed to it and changed their lifestyle. It can be concluded that psychological portrait of residents of capsule architecture can be described as more flexible and adventurous towards change. Lastly, the analysis on communities in nine selected cases of capsule architecture showed that shared interests and problems related to living facilitate more social interactions together with the presence of a public space which can be a meeting point. Nature and concept of building has usually a strong relation with the community occupying and art projects, music or culture become one of the basis on which the communities are formed. There are also a presence of so-called dispersed communities which include architecture enthusiasts and preservationists collecting, sharing and tracing separate cases of capsule architecture worldwide via means of SNS and internet.

Notes:

1 Asim F., Shree V. *A Century of Futurist Architecture: from Theory to Reality*, Journal of Civil Engineering and Environmental Technology, Volume 5, Issue 6, pp.338-339, 2018

2 Miller T. *Modernism Under Review: Reyner Banham's Theory and Design in the First Machine Age (1960),* Modernist Cultures, 12.3, p.333, 2017

3 Ivanov-Kostetski S. *Prerequisites for the Future Development of the Architectural Environment of Modern Cities*, Bulletin of the National University "Lviv Polytechnic", 793: Architecture, pp.141-142, 2014

4 Marcolin P., Flores J. *20TH CENTURY NEW TOWNS. From Archetypes to Uncertainties*, Conference Proceedings. Oporto, May 22-24, pp.6-8 2014

5 Kajiya K. *Posthistorical traditions in art, design, and architecture in 1950s Japan*, World Art, Routledge, Volume 5, pp. 4-5, 2015

6 Pernice R. *The Issue of Tokyo Bay's Reclaimed Lands as the Origin of Urban Utopias in Modern Japanese Architecture*, Journal of Architecture and Planning, AIJ, No. 613, Mar., p. 260, 2007

7 Imperiale A. *An American Wartime Dream: the Packaged House System of Konrad Wachsmann and Walter Gropius*, 2012 ACSA Fall Conference, p. 38, 2012

8 Ibid, p.42

9 Gjakun M. *Flexibility and Comfort in Limited Dwelling Interior*, Ph.D. dissertation, Politecnico di Milano, p.20, 2015

10 Brennan A. *Dymaxion House. Ship Shape*, The Companions to the History of Architecture, Volume IV, Twentieth-Century Architecture, John Wiley & Sons, p.2, 2017

11 Banham R. *Megastructure: Urban Futures of the Recent Past*; London Thames&Hudson, pp.22-23, 1976

12 Smith R. *Prefab Architecture, A Guide to Modular Design and Construction*. John Wiley & Sons, p.15, 2010

13 Savorra M. *Leisure in a Time of Utopia*, Architecture and Dystopia, Actar Publishers, pp.138-139, 2018

14 Ibid, p.135

15 Mattsson H. *Another Architecture: Mass Production and Architecture as a Service, (Arkitektur och konsumtion: Reyner Banham och utbytbarhetens estetik)*, Stockholm/Stehag: Brutus Östlings förlag Symposium, p.16, 2004

16 Langevin R. *Reyner Banham: In Search of an Imageable, Invisible Architecture*, Architectural Theory Review, April 2011, Taylor & Francis, p.6, 2011

17 Ibid pp.8-9

18 *A Home is not a House", by Reyner Banham and François Dallegret, 1965*. Internet source: socks-studio.com/2011/10/31/francois-dallegret-and-reyner-banham-a-home-is-not-a-house-1965

19 Peña Fernandez-Serrano M. *The movable Theatre from Emilio Pérez Piñero. A space-time journey*, p.3. Internet source: academia.edu/25017685/The_movable_Theatre_from_Emilio_P%C3%A9rez_Pi%C3%B1ero_A_space_time_journey

20 Ibid, pp.5-6

21 Patras A. *Are contemporary architectural concepts, an inspiration of the futuristic ideas of experimental architects from the mid-20th century?* Bachelor degree thesis, Indus Valley School of Art and Architecture, p.6, 2016

22 Sadler S. *Open Ends. The Social Visions of 1960s Non-Planning*, Non-Plan. Essays on Freedom Participation and Change in Modern Architecture And Urbanism, Architectural Press, pp. 139, 149, 2000

23 *Plug-In City Study*, Archigram Archival Project. Internet source: archigram.westminster.ac.uk/project.php?id=56

24 Zeinstra J. *Houses of The Future*, OASE journal, #75, pp. 218-223, 2008

25 Lippa C., Scaroni F. *Japan After The Bubble. What Has Remained Of The Metabolist Epic In The Post-Crisis Age?* [CO]HABITATION TACTICS Imagining future spaces in architecture, city and landscape, TAW2018 International Scientific Conference, p.350, 353, 2018

26 Pernice R., *The Issue of Tokyo Bay's Reclaimed Lands as the Origin Of Urban Utopias in Modern Japanese Architecture*, Journal of Architecture and Planning, AIJ, No. 613, Mar., 2007, p.263, 2007

27 Kurokawa K. *Metabolism in Architecture*, Littlehampton Book Services Ltd, p.32, 1977

28 Kalantari S., *Tajik S. Japanese Architecture after World War II: Significant events and Ideologies from 1955-1970*, Master degree dissertation, pp.6-7, 2017

29 Nyilas A. *On the Formal Characteristics of Kiyonori Kikutake's 'Marine City' Projects Published at the Turn of the 50's and 60's*, Architecture Research 2016, 6(4), pp. 100-104, 2016

30 Senk P. *Capsules. Typology of other architecture;* Routledge, pp.65-69, 2017

31 Kurokawa K. *Metabolism in Architecture*, Littlehampton Book Services Ltd, p.79, 1977

32 Ibid, pp.75-85

33 Furuhata Yu. *Multimedia Environments and Security Operations: Expo ’70 as a Laboratory of Governance*, Grey Room 54, Winter 2014, pp.65-67, 2014

34 Kolosova I. *Capsule System and its Implementation in Various Directions of Architectural and Design Activities*, Vestnik TGASU No. 1, p.81, 2011

35 Senk P. *The Concept of Capsule Architecture as Experiment*, Prostor, pp.353-357, 2.46, 2013.21

36 Senk P. *Capsules. Typology of other architecture;* Routledge, pp.151-152, 2017

37 De Cauter L., Patteeuw V. *The Capsular Civilization: On the City in the Age of Fear;* NAi Publishers, The Capsular Civilization V-VII, 2005

38 Beal J. *Oil and Water: Offshore Architecture, Transportable Environments 3*, Taylor & Francis, pp.34-37, 2005

39 Chester A. *Arcadia and Anxiety: Travel Trailers and Fallout Shelters in Midcentury America*, Dialectic V: The Figure of Vernacular in Architectural Imagination, University of Utah Press, pp.53-55, 2017

40 Flynn-Evans E., Caddick Z. *Sleep Environment Recommendations for Future Spaceflight Vehicles*, Technical Memorandum, National Aeronautics and Space Administration, Johnson Space Center, December 2016

41 Wener R. *Pilot Post-Occupancy Evaluation of NYC Emergency Management Urban Post-Disaster Housing Prototype*, Tandon School of Engineering, NYU, 2016

42 Huang J., Krawczyk R. J., Schipporeit G. *Integrating Mass Customization with Prefabricated Housing*, Illinois Institute of Technology, 2007

43 Gjakun M. *Flexibility and Comfort in Limited Dwelling Interior*, Ph.D. dissertation, Politecnico di Milano, 2015

44 Maeda T., Yoshida Yu. *Heritage in Danger;* Docomomo 65, 2021/2, 2021

45 Kagohara R. *A Temporary House That Will Disappear in the Future: The Value of Living in Nakagin Capsule Tower*. International Christian University, 2018

46 Alfirevic D. *Open-plan in Housing Architecture: Origin, Development and Design Approaches for Spatial Integration*, Arhitektura i Urbanizam, January 2016

47 *Living in the Dymaxion House*. Internet source: www.thehenryford.org/collections-and-research/digital-collections/expert-sets/10247

48 *A House in the Round Comes Full Circle*. Internet source: www.nytimes.com/2001/11/08/garden/a-house-in-the-round-comes-full-circle.html

49 Based on interview with a resident at EBA51

50 *10 Traits That Make a Positive Community*. Internet source: positivepsychology.com/10-traits-positive-community

51 Eight Aspects of Community Life. Internet source: www.simcoe.ca/LongTermCare/Pages/AFC-Appendix-1-Eight-(8)-Aspects-of-Community-Life.aspx

52 Kagohara R. *A Temporary House That Will Disappear in the Future: The Value of Living in Nakagin Capsule Tower*. International Christian University, pp.22-32, 2018

53 Internet source: thefuturohouse.com

Chapter 5. Theory and Practice of Capsule Architecture

Section 1 Introduction

Section 2 Combined concept of capsule architecture in the studied cases

Section 3 Conclusion

Section 1. Introduction

This research explores the typology of capsule architecture through its practical side by the main trends in its concept as applicability, changeability and inhabitability. A capsule is thought to be an alternative or substitution to an ordinary living or a functional unit, and through studying many cases of capsule architecture it became clear that the reason of architects to use capsules in their designs widely ranges and that required the categorization besides a capsule's definition. It became clear that the trend of using capsules continued and reemerged in modern days in pursuit of sustainability and rationalism in modern paradigms. From the time after capsules as a concept were fully developed in 1960s, new trends as capsule hotels, pop-up architecture, parasitic architecture and container architecture were introduced to the architectural practice and had close characteristics applicable to a definition of a capsule. That allowed creating a categorization related to a definition of a capsule and expand it to not only definition of singular capsules but capsular buildings as well. By this judging, capsule architecture can be both a single capsule as a complete architectural object itself or capsular clusters that allows a conglomeration of capsules to form a combined architectural object. The categorization of capsules as "mental", "mobile" and "growing" in relation to its application does not fully explain another aspect of a concept of capsule architecture – "changeability" which can combine several ideas which could be related to mobility of capsules or change of their environment. It is, definitely, a crucial capacity of capsule architecture due to a high-degree independence of elements and its modularity; therefore, it was put as a separated part of a concept. The practical change occurring in the built examples of capsular buildings showed how many of ideas are left on paper while the same can be said about the social aspect what showed the features of an actual inhabitability of capsules what became a final part allowing fully describing the main idea and capacities of capsular structures. Therefore, it is possible to compare each aspect of capsule architecture in scope of its theory and practical implementation and complement to the understanding of a concept and its practical side in capsule architecture.

Section 2. Combined concept of capsule architecture in the studied cases

Firstly, this part of the research aims to show a closed relationship between applicability, changeability and inhabitability (social aspect) of capsule architecture through the studied cases. This sections starts by tracing the relationship between capsules' applicability and changeability. Application of capsules can be divided into three categories 'mobile', 'mental' and 'growing' and if to compare it to the aspect of changeability – mostly 'growing' and 'mobile' features are most often utilized. In the case study of Takara Beautilion (No.75) capsules in shape of cubes could be continuously added to a structure which itself could expand by adding new standardized structural units. Here, the conglomeration of capsules and their semi-independent circulation inside a structure is most important, therefore the in scope of applicability this building can be defined as 'growing>mobile>mental'. This, on the other hand, is reflected on its characteristics of change over time as 'A.Capsules' replacement/removal', 'B.Capsules' addition/ structural extension'. By this, the relationship between applicability and changeability in capsule architecture can be clearly defined.

In another two projects which are consisting from the same capsules (containers) – BBC Broadcasting Studios (No.167) and Clipper House (No.211) the capsules are labeled as growing and mental correspondingly while their principle of change over time is 'G.Recyclability/Reuse'. In the former example the capsules were reused for a new building and, thusly, they belong to the "growing" category. In the case of Clipper House, the same capsules without changing their color were replaced and rearranged to an office building what implied change of the environment of capsules and their function. This approach highlights the importance of recyclability; therefore two buildings are a good example of a direct practical application of capsule architecture as 'growing>mental'.

If to consider only mobility as a main application of capsule architecture, the project of nomadic hotel Hotel Everland (No.131) is a parasitic architecture which as a ghost travels from site to site and lands on roofs of existing buildings. Being an actual working architectural object (that is not an exhibit) the building found a way to overcome attachment to a single place and showed how mobility of capsule architecture can work over time inside a developed operational framework. Lastly, in Songpa Microhousing (No.202) fourteen 'unit blocks' allow residents to either claim a single unit or. in the case where a couple or friends require more space, recombine the blocks for larger configurations what can be changed over time depending on changes in family structure or number of residents. This is

a mental approach in application of capsule architecture combined with the change through fusion of capsules (which is not primarily physical but conditional separation of habitable capsular space through claiming vacant spots used for common use). This is clear that the idea of changeability in capsule architecture is closely related to the methods of its application on practice while some of three categories in application can prevail before others.

Next, the research compares capsules' applicability with inhabitability. Social aspect plays an important role in relation to capsules' applicability and the 'mental' category in capsules' application may usually prevail. The good example of such relationship is social housing what derives from combination with 'growing' category of capsules. The 'mental' category can be expressed in a shape of 'capsule' hotels or immersive capsules (private pods, portable offices, etc.), while the 'mobile' category can be in a shape of mobile homes and microhouses. The first type of the relationship can be seen in a well-known student housing called Keetwonen (No.260) consisting of around 1000 individual containers able to provide housing for students belonging to several universities in Amsterdam, as well as international students. As a temporary solution of housing provision, the project was successfully implemented until its complete deconstruction and removal to either containers' bank for repairs and storage or directly to other projects (provision of housing for refugees and workers).

If to combine principle of 'mental' capsules and their social roles, capsule hotels and other interior capsules are commonly put as an example. With the emergence of remote work in recent times, the temporary spaces for work or business trips can be seen often near big transportation hubs, as well as in the capsule hotel chains as Capsule INN (No. 99,100) which for a long time have been providing a stable business models for contemporary urban nomads making frequent business trips as a part of both their working style and the current organization of operation of companies in Japan.

Lastly, the aspect of 'mobile' capsule together with an aspect of change is expressed in numerous examples of mobile houses and micro-dwellings. The Eco-capsule (No. 216) being firstly developed as an experiment gained much media attention and followers around the world due to its new ecological view on living and actual mobility realized in a portable house. Currently, the project shows a stable business model providing both the capsules as second or summer houses together with the provision of means of their mobility (as helicopter). The similar background can be seen in another project of successfully developed

microhouse – m-ch (No.108) having already a history spanning over two decades. Therefore, despite the fact that social aspect is mostly related to a lifestyle of an inhabitant, it includes both changes occurring in a building's structure and mobility principles which can be applied in capsule architecture, and many demonstrative examples can be seen in combination of social aspect with mobility of capsules and their relationship with a structure.

Lastly, inhabitability and changeability are reviewed together as a part of a concept of capsule architecture. Leisure capsules corresponding to independent comfortable environments connected to either rural areas or urban structures as a new definition type of a house can be presented through recreation vehicles with one of the most sustainable business model – Silver Bullet by Airstream (No. 256) which is a typical recreation vehicle have been updated to a new models depending on current needs of its users. In some places of the world the trailers fully furnished as houses can be seen separately (temporal vacation spots) and their more nomadic counterparts can create complete settlements (events, remote work areas, low-income suburban areas, etc.).

Urban capsules combined with changeability can be exhibition and pop-up architecture as in the project of Unit Fusion (No.205) which implies a constant change of capsules' position every five years to create new social bonds, reduce inclusion and promote circulation inside an active urban organism. In projects of Kikutake using tower-shaped community (Ikebukuro Plan, No.19, Marine City, No.24, etc.) the capsules are prone to move around a central core over time for better social and functional organization of urban matter concentrated around the central round core. In another aspect of inhabitability, capsules as a living space or a space of long-term habitation showed that changeability of such spaces influences several important parameters crucial for the required standards of living spaces, namely, inflexibility of interior elements, absence of proper foundations, lesser visual comfort, or absence of interim and public space. In a project of Loft-cube (No.116) while the capsule itself is a complete home, it can fuse with other similar capsules for a space' expansion or cohabitation. Changeability and a capsule as a living space creates new frameworks how space can be expanded through time as additional elements or capsules can become new rooms or second floors. Lastly, evenly sized capsules are considered to be a good candidate to form strong connections in terms of communities and cohabitations. In project of EBA51 (No.197) the residents of the containers usually are the same social stratum (income, occupation, etc.) or can be combined by the common issues associated with similar type and organization of housing (coping with smallness of space, technical issues, etc.).

The definition of a capsule and types of their connections inside a single structure or terrain makes it closely related to other types of transportable environments and mobile architecture. In an original meaning capsule architecture commonly uses the capsules of unique design which corresponds to the similar custom-made structure. Yet, there are cases of capsules which can use existing structures or buildings as a means of connection to a system, or capsules themselves can be in form of other objects – one of the most recognizable is a shipping container converted into a habitable space. Therefore, the typology of capsule architecture has the following directions of the concept development as container capsules, parasitic capsules, interior capsules, and pop-up capsules. These directions inside the concept show the practicability of capsule architecture as a whole – its ability to utilize existing objects, clipping to existing structures, create an independent environment inside another environment, etc. By considering the relationships of the studied aspects in a concept of capsule architecture and its typology the findings can be summarized in the following case study examples which correspond to the main directions in the concept of capsule architecture as 1)container capsules, 2)parasitic capsules, 4)interior capsules, 4)pop-up capsules (Fig. 69-72).

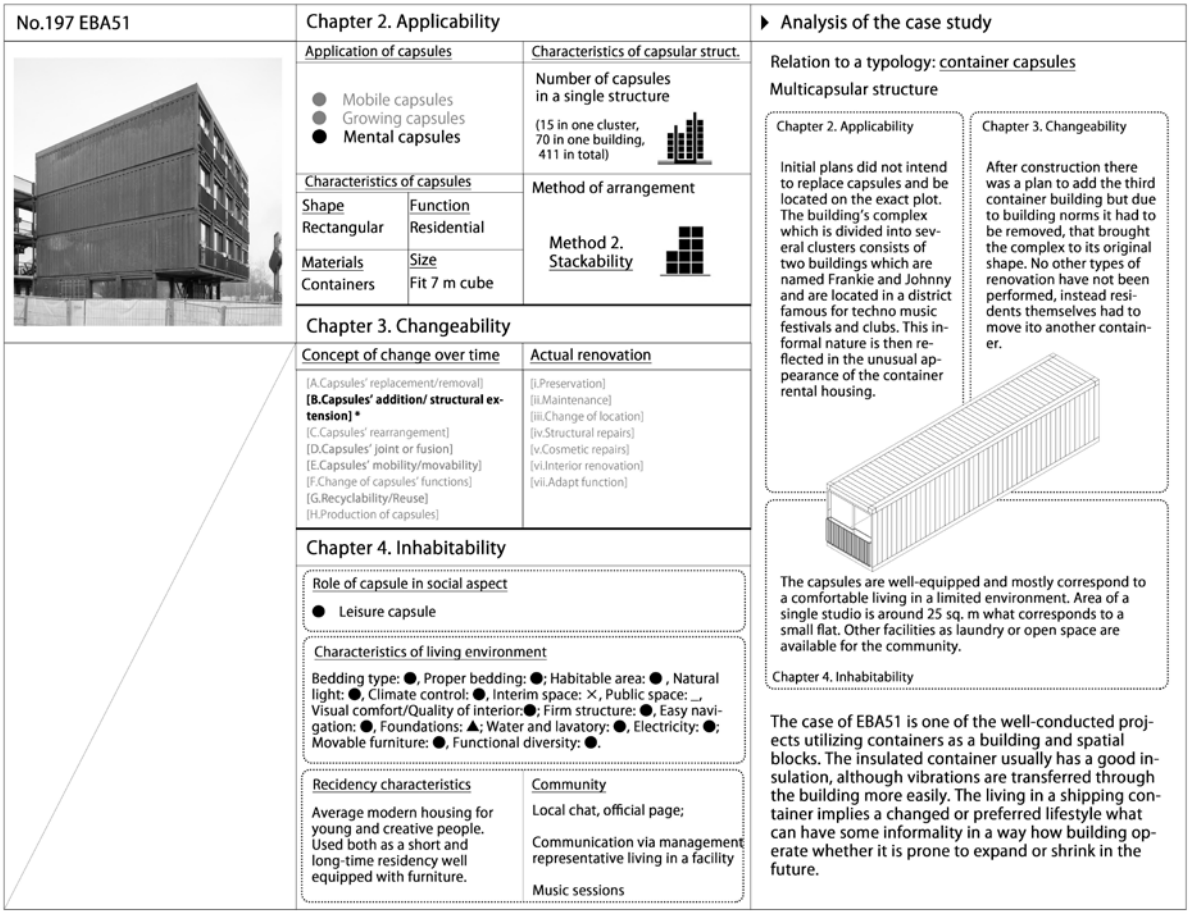


Fig 69. Overall analysis of case of EBA51, Holzer Kobler Architekturen, 2014

EBA51 is a representative of so-called container architecture which puts the main building block – a container as a form-shaping object. In this research it is argued that customized containers equipped with communications as long as they hold their integrity and can be potentially detached from a structure, can be considered capsules. In theory the project utilizes the appearance of a container as an informal image of architecture, thus, the mental aspect in its applicability is strong. This is reflected on lesser influence of the aspect of change, since the building originally was planned to stay on the same plot, and later the third building could be added as the project expanded. This indeed happened but due to conflict with building codes, half-built the third building was dismantled. In practice the containers became a comfortable living of sufficient size and illumination, although sometimes it is prone to molding and require different treatment and means of maintenance. The project is a good realized example of capsule architecture which borrows some projects from container architecture (this research includes 44 projects made from containers).

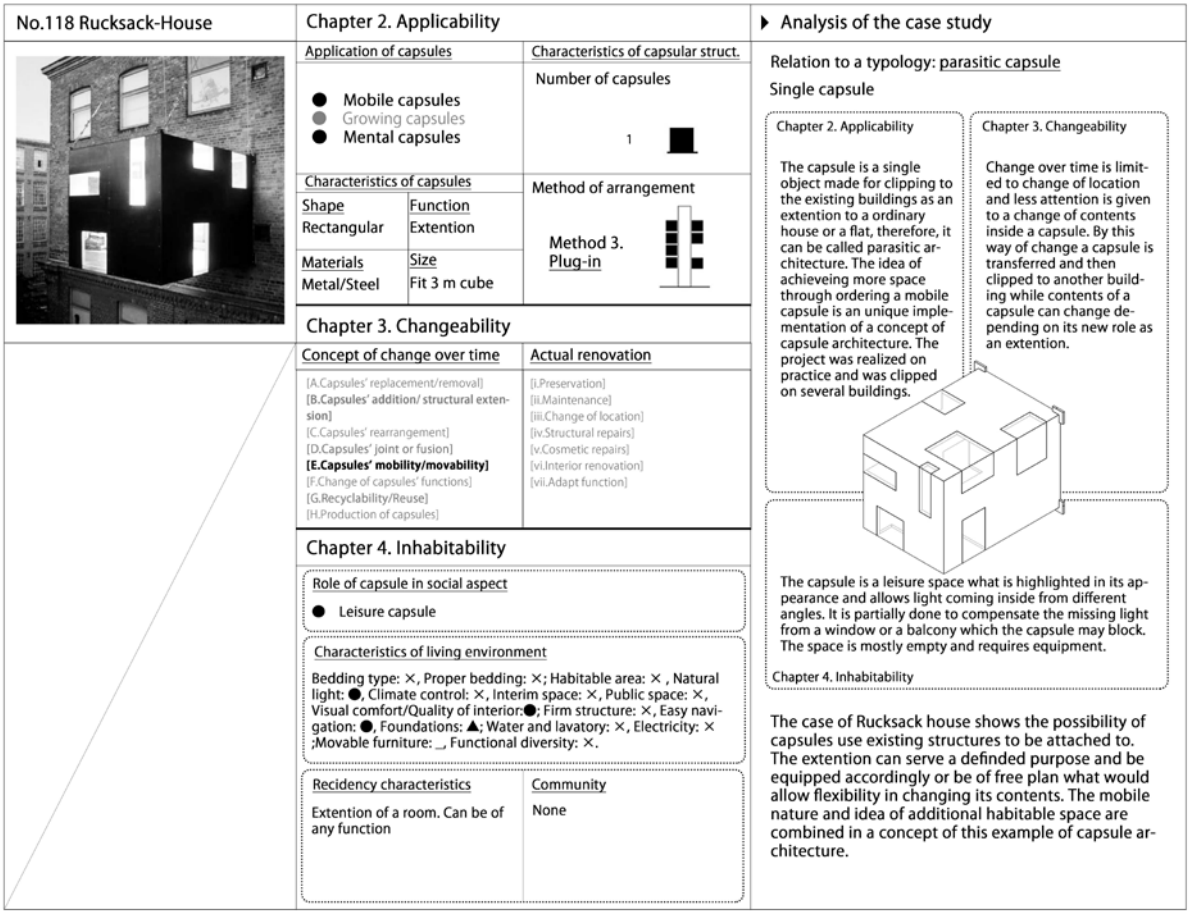


Fig 70. Overall analysis of case of Rucksack House, Stefan Eberstadt, 2005

In the project of Rucksack house the aspect of applicability prevails before its concept of change or social aspect. The capsule is mostly empty and can have different functions. The main idea of an extension and parasitic architecture is fully realized due to the small scale of the project (only one capsule) and its size which is easily transportable over a defined span. On similar projects as 42/5 by Lot-Ek or Shelter with Dignity by FramLab the agglomeration of capsules occupy empty walls of existing buildings what makes them less mobile since their long-term service while Rucksack house is a symbolic project to show the importance of flexibility of interior and the possibility of its expansion by technical means as additional physical space due to capsule's attachment.

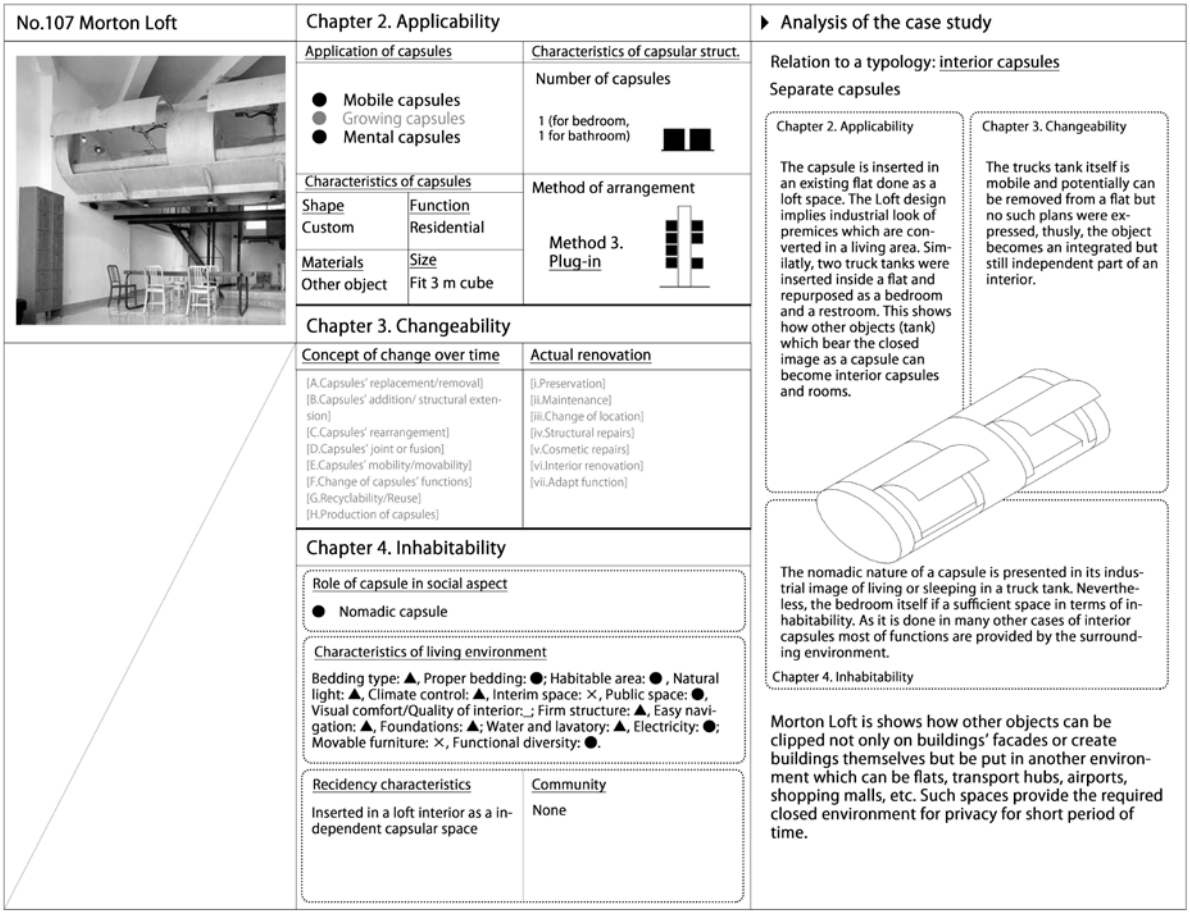


Fig 71. Overall analysis of case of Morton Loft, Lot-Ek, 2000

Interior capsules and capsule hotels usually do not have enough functions for an ordinary living and they, hence, borrow some of them from the environment in which they are put into. The closed nature of a capsule allows creating an extremely closed private space inside another medium by, how it is shown in a project of Morton Loft, another objects with the same closed nature. If customized it becomes either a restroom or a bedroom what shows another alternative to most common containers as building and spatial blocks used in modular structures.

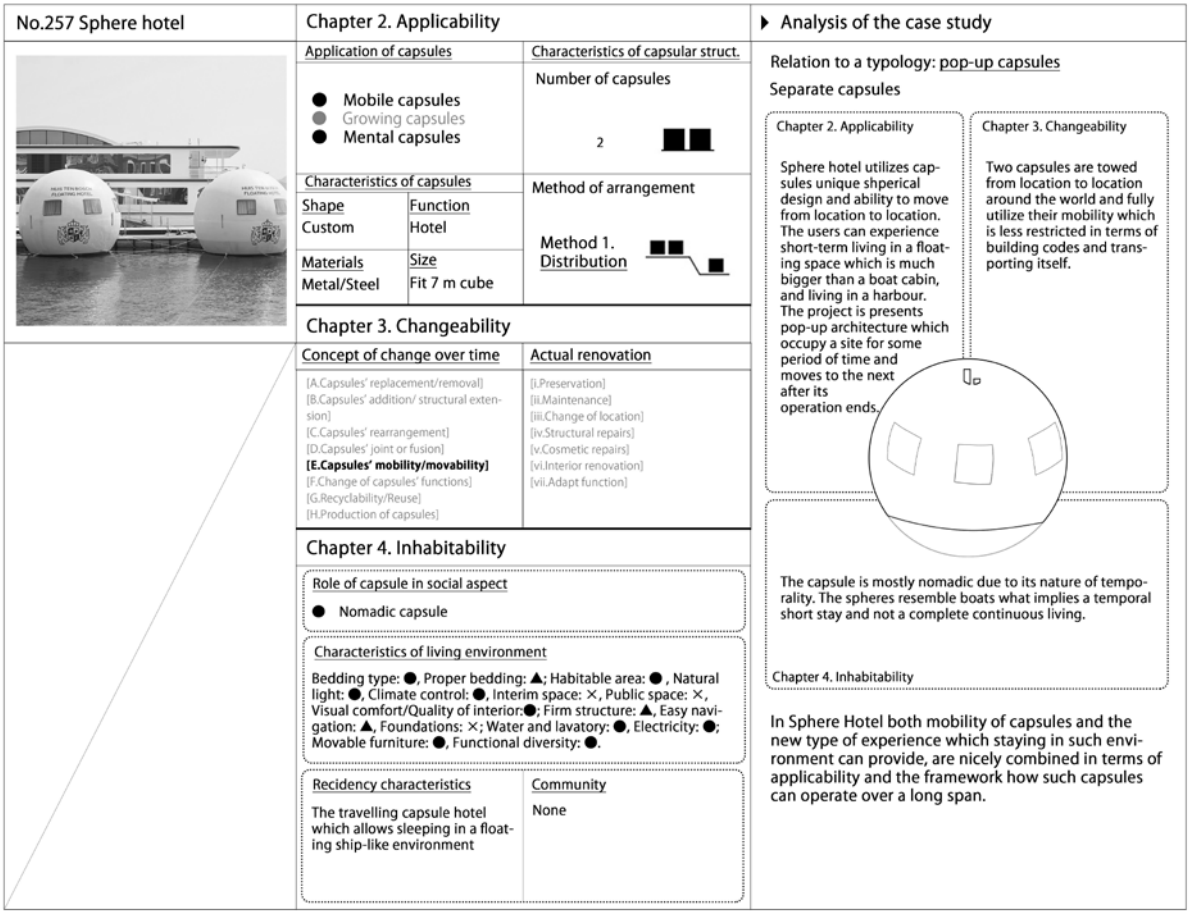


Fig 72. Overall analysis of case of Sphere hotel, Huisten Bos (HTB), 2018

Sphere hotel is an unique example combining the notion of a capsule hotel and pop-up architecture. The hotel travels itself from place to place and stays there for a short period of time allowing locals to experience staying in a floating capsule and living in a harbor. The fact that the capsule, in principle, serves a function of a boat, it does not brought on land and, hence, can be easily transportable and towed.

The examples above show several kind of typologies related to capsule architecture through studying them from the three aspect of the concept as applicability, changeability and inhabitability. The projects showed their relation to a definition of a capsule and how the concept and main idea of such capsules can be implemented on practice. By studying such examples of capsule architecture several working models of operation which unutilized the concept of capsule architecture were shown.

Section 3. Conclusion

Capsule architecture is presented as a unique concept of organization of urban matter, construction and nature of buildings, as well as a changed lifestyle of residents and citizens of vast capsular cities and structures. The concept reflecting the capacities of a capsule apart of philosophical or rhetorical discourse, in this research, is studied from its practical aspect in three main approaches - applicability, changeability and inhabitability. Such explanation of the phenomenon of capsule architecture complements and expands the concept, by defining a capsule in a broad way – it argues if container architecture and capsule hotels can be added to the typology of capsule architecture, how smallness and mobility are related to technicality and how capsular buildings can practically change over time.

In this expanded overview on capsules fully formed in 1960s and their predecessors in 1930-1950, and new modular developments from 1980s regarding the definition of a capsule, the following commentary can be made: smallness of capsule, highlighted in previous studies is closely related to its potential mobility, however, in some observed cases, capsules range broadly and, thusly, smallness become strongly dependent on its mobility what can be achieved by technical means. Taking into account that with the emergence of shipping containers, the corresponding heavy but highly mobile machinery was developed correspondingly, that allowed mobility even of the relatively big capsules. Next, regarding the mobility, this definition fully depends on a structural characteristics in each case of capsule architecture, therefore it is highly dependent on structural aspect of capsule architecture. On the other hand, specified by Senk and Feuerstein, structural and autonomous environment is one of the crucial characteristics of capsule architecture, however, its equipment (although, as it was observed in Chapter 4. Section 2, the studied cases of capsule architecture are well equipped environments) is less critical as far as the autonomy of the environment is achieved. Therefore, both structural and interior autonomy can be considered the primal definition of a capsule.

Next, in the study of the concept of capsule architecture, its features are observed in three main approaches – applicability (trends of decisions of architects to use capsules in their designs), changeability (combining mostly capsule's concept of mobility and agglomeration), and social aspect (what social value a capsular home can have and what social issues it can solve). These approaches show how practical capsule architecture is in a sense, and what design or technical limits it can have if implemented on practice. In modern times, various capsular structures can be seen emerging in architectural practice and it is

clear that modularity and capsularization as architectural tools are being used again. The rate of operational examples of capsule architecture as a pop-up structures, exhibitions, container homes or extensions show how previously an ambitious idea of radical capsular space finds its implementation in organizing contemporary urban environments. This practical side of a concept of capsule architecture is summarized in the figure below (Fig.73).

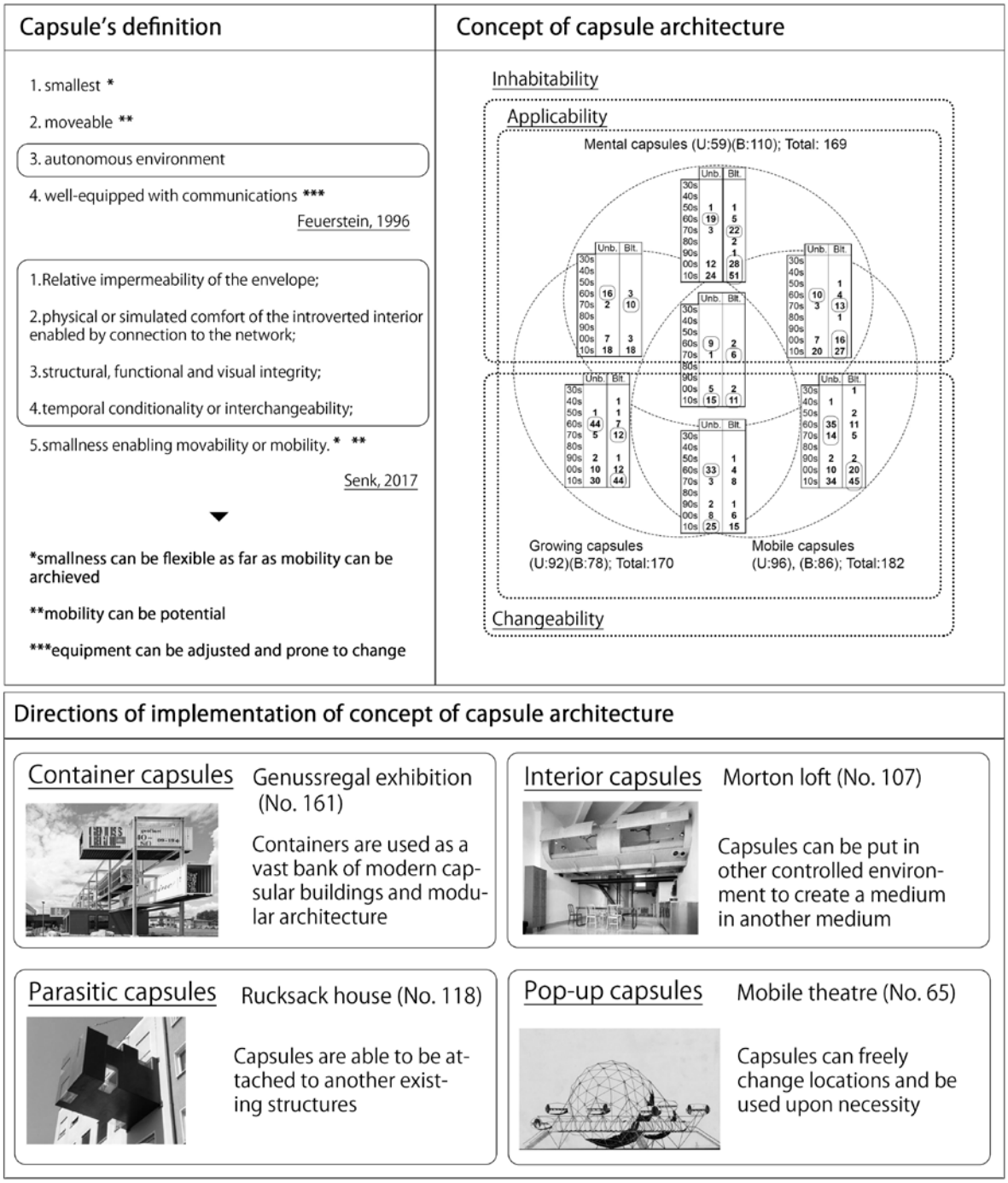


Fig 73. Practical side of the concept and definition of capsule architecture

Chapter 6. Conclusion

Section 1　Conclusion

Section 2　Special case and renovation project of one capsule in Nakagin Capsule Tower

2.1 Features of Nakagin Capsule Tower and ways of its renovation

2.2 Overview of renovation project

Section 1 Conclusion

More than one decade passed from the first news regarding the possible demolition of the icon of the Metabolist Movement and example of so-called capsule architecture – Nakagin Capsule Tower in Tokyo. By its concept, the building rather than be demolished by its conditional lifespan ought to renew itself by replacing its capsules by new ones. This concept plays one of the main roles in capsule architecture combining method of change with time, and this fusion is also directly reflected on a building's shape. With the new recent developments of capsular and modular buildings, the topics of capsules, minimal living spaces, nomadic shelters, etc. rise again in modern society. Therefore, this is important to evaluate such topology regarding its concept and actual change over time, what coincides in meaning with a renovation approach.

In Chapter 1 the case of Nakagin Capsule Tower is put as an example of capsule architecture undergoing renovation. This case introduces the still poorly known typology of capsule architecture and shows other examples of similar buildings. The chapter also explains the background of the development of such architecture as well as connects it to the recent grown interest in modularity and flexibility of buildings. Here, the author specifies the importance of the research as a topical study reflecting the current trends in architecture. The done analysis may contribute to an understanding of principles applied in modular and capsular buildings, as well as the challenges they encounter in the real practice. Therefore, this research filter and collects 265 examples of capsule architecture from its early developments in the 20th century until nowadays without specification on whether the building is built or unbuilt, as well as the geographical affiliation. The collected data includes basic building's characteristics as well as the commentary regarding the concept of change included in the design as well as done renovation approach where it is applicable.

Chapter 2 narrows the topic of capsule architecture to its basic concept about capsules themselves and their nature (as mobility, replaceability, or smallness of space). The main goal of the chapter is to explicitly describe the capsule architecture in order to develop a tool for sorting in the corresponding examples of this typology. This part of the study relies on research background about the capsules as a whole as well as through separate references and literature regarding the independent studies and architectural movements applying capsule architecture. As an additional goal, the chapter answers the question of why architects choose capsules as a design tool and which advantages they specify. Therefore it is possible to separate different concepts regarding capsules into 3 arbitrary

categories, namely: ‘growing capsules’, ‘mobile capsules’ and ‘mental capsules’ which include different aspects of capsular spaces. The so-called ‘growing capsules’ are connected to the concept of change over time and are of importance due to their connection to renovation and periodical renewal. Chapter also studies physical characteristics of capsule architecture, namely: the characteristics of capsules themselves – shapes, functions, materials, and sizes, as well as the properties of capsule buildings as a whole – number of capsules per single structure and ways of capsules’ arrangements. It became clear that rectangular shape prevails in most cases, while the function is similarly mostly residential. On the other hand, the materials are presented in the wider range, specifically plastics and metal structures. Sizes of capsules can be divided into two conditional categories as capsules prone to gather and connect with each other to form larger spaces and the capsules which are relatively large by themselves alone. As the measurement tool for sizes, the cube with different side length was chosen. This allowed measuring not the only area of capsules but also their actual volume. Therefore, there can be distinguished the two following kinds of capsules: as those fitting in 3 m^3 and 7 m^3 cubes. Regarding capsule buildings, the number of capsules usually cannot exceed 50 pieces per structure, specifically in the built examples. Also, there appears to be a lot of cases where capsules are presented just as prototypes which are, in principle, able to form infinitely large structures, and are grouped in a separate category of ‘1+(no limit)’. Lastly, capsule architecture may be formed in four different ways of spatial relationships between the capsules which can be: separately spread on topography, stacked on each other, connected to bearing structures or be plugged in a three-dimensional grid. The latter appears to be the rarest case, while the first three are evenly applied.

In Chapter 3, starting from the case of Nakagin Capsule Tower, inside the single project the concept part is compared to the actual renovation part. It shows a gap and shift in the way of prolongation of the building’s lifespan by the new means. In Nakagin Capsule Tower it is done through occurred social movement towards preservation of the building. From 265 cases the cases where a building undergoes renovation were extracted and studied regarding their concept about change over time as well as an actual renovation approach. Therefore different concepts regarding change over time and different concepts of actual renovation were observed. As a next step, both parts were connected to renovation approaches through the chosen study cases. This allowed showing how concept parts change into actual renovations and what trend may be found in this case. It showed that mobility of capsules plays an important role in their ability to withstand longer over time, by changing their location, function or updating their warranty if applicable. In overall, the renovation

approach through the preservation of capsule architecture as valuable buildings show the experimental and unique nature of such buildings.

In Chapter 4 the social aspect of capsule architecture is studied. Regarding the social role of the capsule three main categories can be extracted namely Leisure, Urban and Nomadic capsules. Next, a capsule is analyzed as a place for living from a range of technical aspects – Bedding, Habitable area, Natural light, Climate control, Interim and Public space, Visual comfort, Firmness of structure, Navigation, Foundations, Water and Electricity, Movability of furniture and Functional diversity. This is followed by a questionnaire among residents of capsule architecture in the selected 15 cases and 47 responses. The findings showed actual state of living inside capsules, their contents and psychological portrait of residents. Lastly, study analyzes 9 case studies of capsular building is terms of cohabitation and community. The results showed partial correlation of strong community and concept and capsular nature of the buildings. As a part of the same section the site visit to Futuro house in Japan was organized.

In Chapter 5. Theory and Practice of Capsule Architecture three aspects of the concept of capsule architecture – applicability, changeability and inhabitability were reviewed through the chosen case studies in order to show how the concept can be realized on practice through the working operational frameworks. The chapter also allowed adding commentary regarding the key principles applied in the definition of a capsule (as mobility or equipment) and defining the direction of implementation of a concept of capsule architecture to the several fields – container capsules, interior capsules, parasitic capsules and pop-up capsules. By this the research argues that capsule architecture can be regarded as an independent typology which becomes topical in modern times in pursuit of new sustainable models in fields of architecture, construction and urban planning.

The abovementioned text outlines the done research.

Last century had a big influence on the lifestyle and surrounding paradigms of modern times. The dashing development of technology and industry together with trends of sustainability and flexibility entrusted to the modern cities would influence the future urban environment as never before even considering lagging and inertia of construction methodology which always evolves slowly. The conventional buildings and urban environments in their organization patterns still have many similarities with the same ones from many centuries ago. Therefore, although it is still feasible to imagine, the future cities consisting of ever moving capsules, as well as 3d printed cities or entirely marine cities will,

probably, remain in the conceptual realm. Rather than the drastic change of urban matter proposed by many urbanists and architects in the 20th century, the cities are thought to gradually tune themselves into more eco-friendly, sustainable entities, while the capsule architecture will be something ‘other’ related to this ‘normality’. Yet, the capsule architecture already has its practical applications in the provision of nomadic, closed spaces, moveable spaces, and temporary dwellings. The understanding of its property will allow creating the architecture of higher quality as well as the one which will adopt some principles of capsule architecture. The more important question that capsule architecture raises is the temporality of buildings which have their defined lifespan, therefore, architects also may give consideration about life and eventual death of their architecture, or, on the opposite, reincarnation into something what fits current time and purpose. In a sense, this is also a sustainable architecture.

Section 2 Special case and renovation project of one capsule in Nakagin Capsule Tower

2.1 Features of Nakagin Capsule Tower and ways of its renovation

The case of Nakagin Capsule Tower initially gave impetus to this research. The building is thought to be one of the typical examples of capsule architecture and despite the fact that the building is being demolished in 2022, the preserved capsules in a process show how the flexibility inherent for the concept of capsule architecture allows it transform into other types of operation or buildings. The concept of capsule architecture is in many cases theoretical and touches the topics of ultimate mobility and changeability of home together with social transformation but provides less information regarding realization of such ideas on practice. In case of Nakagin Capsule Tower the new ideas of renovation or reuse of capsules have been developed after the building was built. The text about consists of polemic regarding practical approach in Nakagin Capsule Tower regarding its concept in terms of applicability, changeability and inhabitability combined in few possible redevelopment plans and the project of renovation of one capsule of the building.

The building is still struggling to find the right countermeasures which would help to preserve itself and implement the concept of changing capsules. The replacement of capsules to the new ones is already outside the framework of the original Metabolism concept and is solely structural matter since the building continues dilapidating. Even if the capsules are replaced it would not mean that the Metabolist's principles work since the only building can symbolize but cannot indicate its success in the modern architectural paradigms. Yet, it will indicate that capsule's replacement is possible within the limits of the typology of capsule architecture. This either can trigger the similar developments in the future, or may not have such influence and be as the example of the rotating tower by Bruno de Franco, just the special case in the whole architectural map. At the time of writing the thesis the capsule tower is being undergone demolition, or, to be more exact decomposition with some part of the capsules being preserved for further use as either exhibits or other speculative projects. Yet, it is possible to address the background of the building and the done research and propose few possible alternatives for the Nakagin Capsule Tower's unfortunate fate.

Capsule as a product having warranty. If to consider the capsule as a 'package' described in the Noboru Kawazoe's essay on capsule architecture in SD–Space Design 69'[1)] a capsule may become a product as a car which is usually connected to the bigger network of technical support and other services. Capsules as Wow Pod or Airstream's RVs (Recreational Vehicles) fuse a living space and a car, and, in the case of Airstream they are

provided with long-term technical support (some RVs are already 70 years old and still intact). As far as author knows due to his own research and interviews with the representatives of the renovation movement for Nakagin Capsule Tower, initially Kurokawa gave up some ideas regarding the capsules' replacements in the next 25 years and did not have any long-term contracts either with Nakagin Integration or Daimaru Engineering Department regarding capsules' repair or maintenance. For these reasons no Management Association was created at the time of buildings' completion, neither an accumulative fund towards the future replacement was established. Author may suggest that in the case of capsule architecture the capsules as a product (in the time of construction capsules were transported to the construction site at 90% completion in order to avoid taxation, since if fully furbished they would be considered as a high-quality furniture[2)]) may be provided with the necessary warranty which would ensure enough budget to update or replace a capsule in the future. The capsules may be bought via households which would include such warranty as a part of a purchase. Two questions arise in such a case. The first one corresponds to monthly price should be paid in order to secure the capsule's update in the future. In the highest price of 6,414,000 yen (~59,000 USD) per new capsule what was proposed by Kurokawa himself in his capsule replacement project (2006), the monthly maintenance fee (over the regular maintenance fee of about 2000 yen (18 USD) per month) would come to 21,380 yen (197 USD) per month in order to collect enough funds to replace a capsule by the new one in 25 years. In the case, if capsules are provided for 60 years (according to the same plan of Kurokawa who designed the new capsules to withstand 60 years instead of 25), the monthly fee will come up to 9000 yen (83 USD) per month. Both sums are too considerable to be so abstract and correspond to some future redevelopment which even may be eventually obstructed by inflation or some accident. The second question is whether capsules' owners would agree to pay some 'future capsules replacement' fee if the capsules often traded as it has been seen in the recent decade. In this case, it would be considered as an excessive payment if owner, for example, intends to sell their capsule in a couple of years. Eventually with the accumulation of the 'capsules' replacement' fund the prices of the capsules also would skyrocket since the new owners would soon obtain a completely new capsule. This will lead to the precedent when the price of the building will actually gradually increase with time, while currently, buildings tend to lose their full value after 50 years of service. In such case the warranty for capsules to be replaced by new ones in the future should be both supported by the industry and business part via, for example, renting capsules what should accumulate enough monthly revenue in order to cover production cost

in the future. Nevertheless, the span of 25 years makes both sides to be equally accessible at the time of the required change.

Realization of a capsule village project. The peculiar matter about capsule architecture and, especially, Nakagin Capsule Tower is the fact that some separate buildings can nest the same capsules. It is true for Nakagin Capsule Tower having three ‘siblings’ buildings – Capsule Village in Usami, Capsule House K in the outskirts of Tokyo and Sony Tower (sometimes called sister of Nakagin Capsule Tower) in Osaka. These three built architectures (the capsule tower, the capsule house K, and Sony tower (demolished in 2006) and the project of the capsule village have different variations of the capsules’ design from Nakagin Capsule Tower. Therefore, it is, in principle, feasible to detach some capsule from one building and replace it with the capsule from another building. Utilizing this concept it may be proposed to use the capsules from Nakagin Capsule Tower in order to reuse them (renovation concept – adapt function, change location) as the leisure capsules in the Usami project. The capsules may be bought by some entrepreneurship which will receive the iconic capsules and do corresponding repair to them, while the sum received from this deal will be directed to the production of the new capsules for Nakagin Capsule Tower. The original capsules are valuable for their pioneering nature as first capsular living units started the whole trend of capsule hotels worldwide, therefore, even reused capsules may be able to continue their service as separate units on the uplifted platform of the technocratic capsule village (Fig. 74).

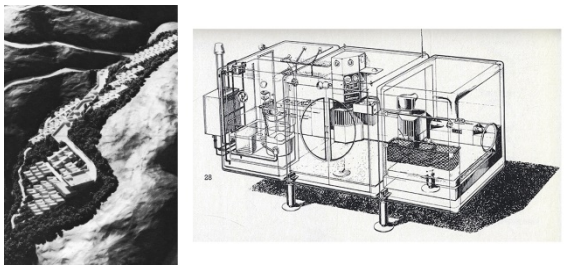


Fig. 74. Capsule village, Kisho Kurokawa, 1972

Making the building an architectural heritage. Preservation is common for many unique built examples including the studied cases of capsule architecture but Nakagin Capsule Tower currently has only public support without engagement from private sponsors

or governmental side. By Japanese law, the requirements for a building to be included in the list of the country's tangible cultural properties (building) are:

- Building should be more than 50 years old – what is the basic requirement which has to be satisfied before the building can be reviewed to correspond to any of the three following aspects:

1. Contribute to the historical landscape of the country
2. Became an exceptional modeling standard
3. Difficult to reproduce

All the criteria fit the capsule tower quite well, therefore, the only condition remained is the age of the building. Following the guidebook issued by Agency of Cultural Affairs of Japan[3)] the procedure for registering a building as cultural heritage relies on research, papers and speculative observation of the candidate building. The parties may be engaged in the consideration upon building's cultural values may include Agency of Cultural Affairs itself, Local public bodies (as an instance – Preservation project), and the owner's side who have to be interested in converting the building into the cultural property of the country. Additional sources also include the report from Architectural Institute of Japan, as well as academic publications, papers and theses. The latter corresponds to this doctoral thesis highlighting the background of capsule architecture as a whole, as well as a distinguished position of Nakagin Capsule Tower on this architectural map. As a report in favor of the building's preservation, this document might deepen understanding of the potential cultural and touristic value of the building as a part and a notable representative of the whole typology. It would also argue to preserve the current operation of the building (what is possible by the guidelines).

Update of capsules' living conditions. Upon the reality that currently the many of the capsules are abandoned and uninhabited, the building has no profit both for capsules' owners and the owner of the land. The residents staying in the building on a daily basis have to cope with the asperity due to the absence of hot water, sometimes, air-conditioning, and air-circulation, what is unfit for many potential residents. For these reasons, many capsules which stayed intact were modified, or rather 'metabolized' inside, by getting new interior design, structural and envelope repairs (where it is possible), removal or sealing of asbestos, creating openings for the proper air flow, roof repairs and provision of new functions to capsule spaces. Such small-scale renovations allowed updating the building one capsule

after another, what temporary allowed rehabilitation of the building's functioning. Although it does not solve the global issues as building's structural repairs of bearing elements and capsules' joints, it facilitates the building's operation and some profitability. The redesigned capsules were still mostly the same from the outside (some of them could have recreated original elements like the circular blinds, some capsules may have additional small windows or openings, etc.), while inside the capsules took different shape and environments (Fig.75).

Fig. 75. (Left) One room renovation (Japanese title: 一室のリノベーション), Room 810 Design Office, 2016; (Right) Capsule's interior design by [d'ores] spatial director (Instagram: @dores0806), 2017

2.2 Overview of renovation project

The examples above show how capsules are customized and redesigned inside opposite to the original design which was the same for almost any capsule with some minute adjustments. The new capsules designed by Kurokawa in 2006 in his capsules' replacement project were also empty inside and were allowing owners or residents to decide the style of their space. With the connection to this research, the author was participating in the renovation project of one capsule, where he acted as a designer. The initial goal was to envision capsular design from now for the next 25~50 years.

The concept of the new capsular design has different aspects, however, most of all it utilizes the round window on the side by making it a storage space with a round sofa (Fig. 76). Henceforth, the nickname of the capsule is "Round window sofa capsule" (Japanese title: 丸窓ソファカプセル) which became a part of the "Monthly capsule" framework allowing to rent the capsules for a short period of time.

Fig. 76. Round window sofa capsule (Japanese title: 丸窓ソファカプセル), Dereznichenko Volodymyr, Shiozaki Lab., Tokyo Institute of Technology, 2019

Project initiation and contents

In 2017 Nakagin Capsule Tower Preservation and Restoration Project (onwards – Restoration Project) collaborated with the Kamakura-based real estate developer Enjoy Works via its crowdfunding platform “Hello! Renovation”. On September 2, 2017, during the explanatory meeting at Nakagin Capsule Tower, the visitors were asked for ideas of how one of the dilapidated capsules owned by Restoration Project could be renovated and used. Simultaneously, the site Hello! Renovation created an entry form for submitting the projects. The deadline was set to September 29 and gathered two entries on the site in total ‑ both from foreigners[4)]. After this during October, several meetings with potential capsule users were conducted and in November of the same year one of the two submitted projects entitled “Capsule’s view” was eventually chosen (author’s project) (Fig 77).

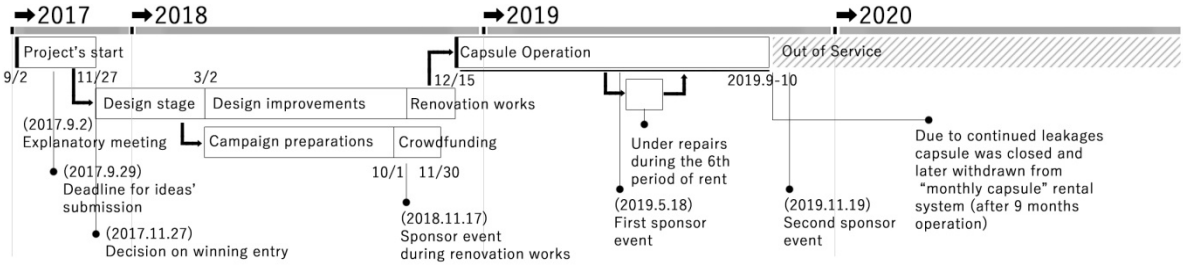


Fig. 77. Project flow

As usual, capsules were renovated by owners who either hired interior designers or did renovations by themselves. However, the named capsule was the first one put on public crowdfunding. Originally the capsule was thought to be rented at 50,000 yen on a common

basis while the sum gathered via crowdfunding would be returned to bakers in a form of benefits as site visits, souvenirs, participating in events, etc. However, due to the lack of potential renters at the time and due to the fact that from September 2015 the building association prohibited short-time stay in capsules (i.e. Airbnb), as a compromise solution the "Monthly capsule" rental system allowing staying for one month only was implemented by the Restoration Project and Enjoy Works throughout 2018. In autumn 2018 first monthly capsules started operation (periodically with a total of 10 capsules rented simultaneously at most). Eight of the available capsules were fully or mostly of the original design, one was redesigned by Muji and the last one was the capsule from the crowdfunding. By March 2021 the capsules which were being operated all the time reached the 30th phase of the one-month rent. The monthly capsule system showed the more flexible approach how to attract those who would like to experience living or staying in a unique environment and overcome the imposed limitations regarding short-stay rent. The tenants tended to actively share their new lifestyle in a capsule via SNS and much benefited from the new system.

The renovation team consisted of four parts responsible for 1. Management (Restoration Project and Enjoy works), 2. Crowdfunding (Enjoy Works), 3. Design (led by Ukrainian architect Volodymyr Dereznichenko, Tokyo Institute of Technology), and 4. Renovation works (Callac company, Hayama city). Restoration Project provided premises (usually own capsules or the capsule for renovation) for site visits while Enjoy Works developed and shaped the flow of finances and organization matters (as well as communication with the bakers). All team members contributed to the design through consultations, mainly between Dereznichenko and Enjoy Works with help and advice from Shiozaki Laboratory (Fig. 78).

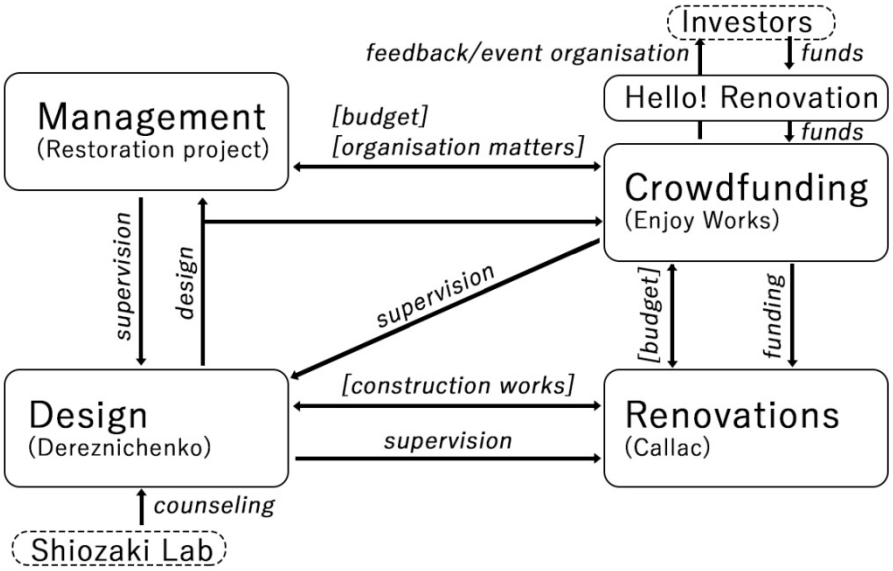


Fig. 78. Team members

The crowdfunding named “Capsule preservation and restoration fund #001 [Investment type]” started on 1st October 2018 and lasted for two months. The required sum was set to 3,500,000 yen with the end sum of 3,800,000 yen (108.6% funded) provided by 43 bakers in total[5)]. The minimum amount of investment was 50,000 yen. The bakers/investors expected to receive an annual interest of 3-4% each year (originally 6.14% if the capsule was constantly rented at 90,000 yen per month). The time of operation of the capsule was set for 2 years 11 months and 15 days. Later, at the start of the operation, the rent was raised to 120,000 yen per month.

The project and crowdfunding were widely promoted via social networks and the events organized by Restoration Project and Enjoy Works. One of them was a meeting (2018.11.17) with sponsors inside the capsule under repairs. Also, a separate Facebook page featuring the design stage, as well as later - renovation works was created[6)]. After the capsule became rentable several interviews with residents were organized by Enjoy Works[7)].

New design of capsule

The capsule’s structure is a rigid frame (square hollow beams of 10 cm side) with metal corners welded to the outer shell made of 0.8 mm steel sheets covered with Kenitex glossy spray from outside and asbestos insulation from inside8). All interior parts are made

from wood structures and veneer as an inner coating material. The floor was a lightweight concrete blocks hiding pipeline. On some walls, there were several plasterboards presumably left after previous unfinished renovation works.

The capsule was not in use for a long time and was completely unlivable. Since the capsule did not have any elements from the original design except the plastic bathroom unit, it was decided to preserve the unit and create the new updated design and not recreate the original design of 1972. Taking into account the previous examples of capsules' renovations it became clear that different capsule owners tended to create the new environment rather than recreate the original design as if metabolizing or tuning their capsules to their identity and lifestyle[8)]. This concept together with the thinking by Kisho Kurokawa of natural periodic update of capsule's interior became the main concept in the new design.

The round window of the capsule was the only source of light as well as it was the brightest spot. Thus, in the initial design, a bonsai tree was put there in order to highlight that part of the interior. However, during the consultations with Taishin Shiozaki and architect Takao Matsushima from Enjoy Works it was decided to insert a sofa with a round seat following the curve of the window (Fig. 79).

Fig. 79. Left – initial concept, right – design with round sofa

The capsule experienced severe leakages of rainwater, leaking pipes above, and humidity. Therefore, roof repairs were needed, however, they were impossible due to the small amount of space (around 30 cm) between lower and upper capsules in order to insulate the ceiling from outside. Hence, the two possible solutions were suggested: Maeda who renovated capsules by himself before proposed creating a plastic plane inside the ceiling

(making a two-layer ceiling) and which would incline towards a bathroom via a vertical pipe from the bathroom's ceiling to the bath basin. Shiozaki proposed a similar idea of creating the second shell made from fiber-reinforced plastic (FRP) as a second skin of the capsule. After some negotiations taking into account the available budget, it was decided to use the plastic plane variant as the most flexible and affordable solution at the time.

Following the concept of metabolizing the space, the final design was a seemingly empty room that could transform into any function due to foldable furniture. The main features of the design are as follows:

1. New furniture design was inspired by the original design but all the electronic devices (telephone, tape recorder, etc.) were replaced by a user's mobile phone which could control capsule's lights, air-conditioning, and speakers installed inside walls. The pamphlet explaining the capsules' features and procedures for the installation of mobile applications to control the environment was composed separately.

2. Round sofa was made for short-time rest. Futon, which was placed in the storage below, could be unfolded on the floor.

3. Foldable chair, desk, and kitchen table designs allow more flexible use of space.

4. Ukrainian traditional pattern on a cloth called "vyshyvanka" covers one of the walls and gives the capsule its own identity. The pattern of 1.8x2 m was created by a Ukrainian artist and imported to Japan with the help of the embassy of Ukraine in Japan. Figure 80 highlights the main features of the new design and shows the plan and sections.

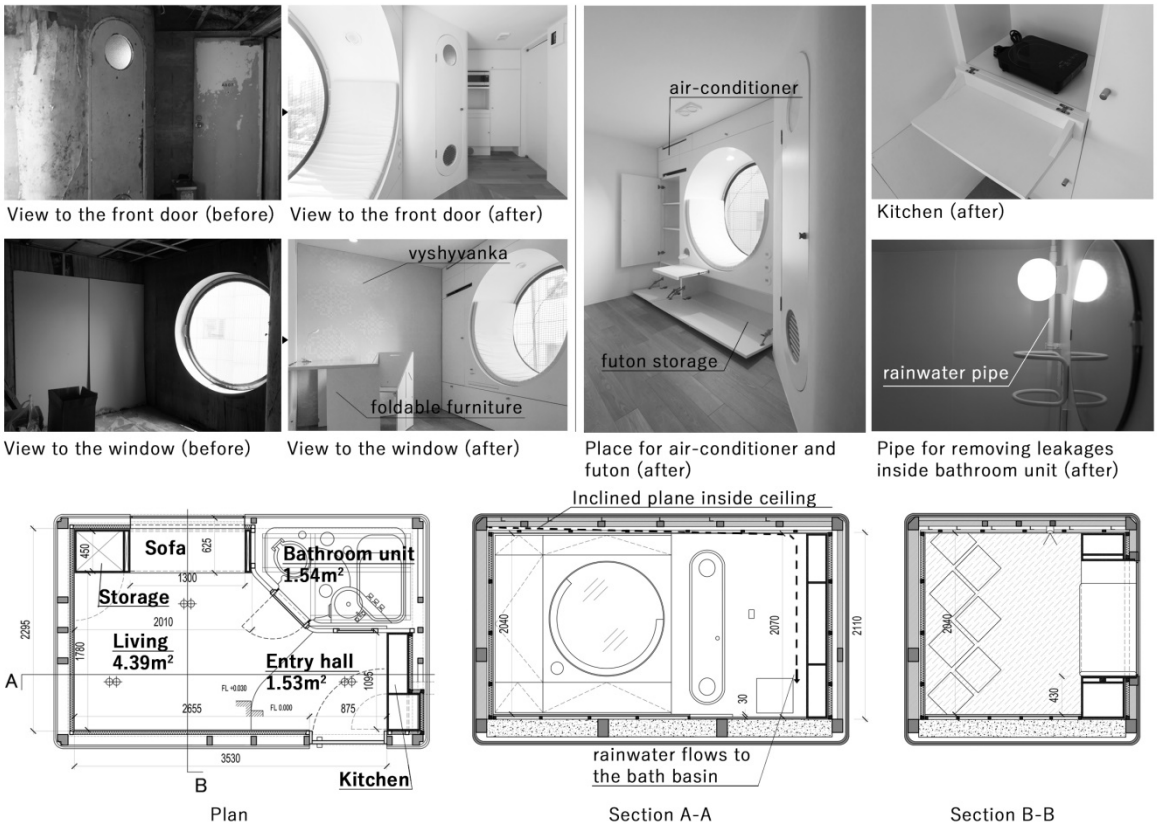
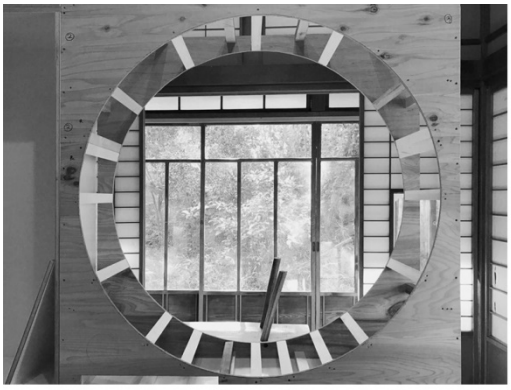


Fig. 80. Capsule's photos before and after. Drawings

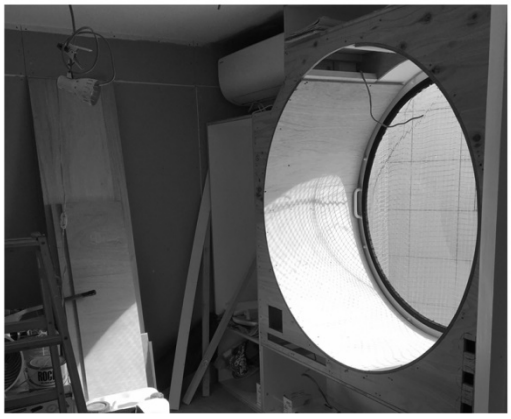
Renovation works

Renovation works started shortly after the beginning of the crowdfunding campaign and were mostly finished by the 15th of December 2018. Vyshyvanka was made in Ukraine at the same time and it was added about a month later after it arrived in Japan. Apart from the realization of the new capsule's design, renovation works targeted technical problems in order to make the space livable by fixing pipes, insulating the ceiling from the inside, installing a plastic plane to lead the rainwater, etc. The capsule's window as a rule could not be opened, thus, the problems of the capsule's microclimate and ventilation were solved by installing an air-conditioner, as well as a fan under the kitchen. From the design standpoint in order that the air-conditioner did not propagate from a wall, it was placed in a niche with the openings allowing airflow. Installation of air-conditioning in Nakagin Capsule Tower was difficult, thus, Daiwatech company that had installed air conditioning system in the building before made the corresponding works. The wooden wall separating the bathroom unit was completely remade due to the fact that the existing wooden structure was heavily damaged by moisture. Various repairs and painting works were done inside the bathroom

unit as well, including the installation of a ceiling. The main feature of the new interior design – round sofa and storage was made in a workshop in Hayama city, then dismantled and reassembled again inside a capsule (Fig. 81).



Creation process of round sofa (Photo: Callac)



Walls and ceiling finishing: plaster boards on wood frame.

Floor: wood flooring planks

Fig. 81. Capsule under renovations

Capsule's operation

The new system of monthly rent attracted potential residents willing to experience living in a capsule. During the operation period, two interviews with residents who lived in the round sofa capsule were conducted by Enjoy Works. Ms. K. described the new design as very futuristic comparing to the original design of the 70s, as well as she liked the round sofa. Mr. T. used a capsule as a "satellite office" while having the main office in a neighboring building. He also used the space as a meeting room with friends. Both respondents decorated the capsule in their own way. In total seven people stayed in the round sofa capsule, and two of them prolonged their stay to two months, thus, the capsule operated for nine one-month periods in total.

The capsule performed as usual at first but in June 2019 after 6 months of operation, it was closed for repairs (performed by Callac). After a month it was reopened and operated for three more periods, however, eventually, it experienced heavy leakages due to the storm Hagibis which hit Tokyo on the 12th of October 2019. Before the leakages started the first sponsor event (2019.05.18) and after the capsule was closed due to leakages - the second sponsor event (2019.11.19) was organized by Enjoy Works. The latter one was devoted to the possible solutions to prevent the leakages in future[9)].

The renovation project and new design of a capsule reflected the unique nature of the renovation process occurring inside Nakagin Capsule Tower when, despite Kurokawa's concept of the replacement of all the capsules at once, the capsules are renovated one by one in their own way and pace. This may be one of the representations of the concept of Metabolism inherent to the building, that is while the building was under the real threat of demolition the building's supporters and its community found a way to prolong the building's lifespan by using the power of SNS, collaboration, the introduction of "monthly capsule" rental system and creation of the new designs of capsules' interiors via renovations. As well as it showed the implications and limitations regarding renovation works which could not be fully done to the design features of the building. The problems of leakages could be potentially solved by accessing the roof from outside, however, even so the dilapidated thin metal shell could not guarantee the solution to the leakages.

Notes:

1 Kawazoe N. *Capsule as an anti-value;* SD–Space Design (03/1969), 50

2 Hidaka J. *Nakagin Capsule Tower;* UIA 2011 Tokyo Design 2050, 8 (Japanese title: *中銀カプセルタワービル」)*

3 *Tangible cultural property (buildings);* Downloadable PDF file with instructions for registration process. Ministry of Cultural Affairs, Government of Japan; Internet source: bunka.go.jp/seisaku/bunkazai/shokai/yukei_kenzobutsu

4 It is worth mentioning that the whole project was fully accessible in both Japanese and English, as well as the submission was allowed to be in English. Yet the project originally aimed to find potential long-time users for the capsule, that is the person submitting the project would also live or use the capsule afterward. Therefore, it was not applicable to both submitted projects since both applicants did not intend to use the capsule but just submitted ideas for the interior design.

5 *Capsule preservation and restoration fund #001 [Investment type]*, Internet source: qrgo.page.link/Eg3J7 (in Japanese)

6 *One Capsule*. Internet source: facebook.com/OneCapsuleProject

7 Although the sponsors expected to receive annual interest from the capsule operation, in fact about half of the sponsors donated the money in order to facilitate the preservation of the building. Interviews can be accessed here: hello-renovation.jp/topics/detail/7748, hello-renovation.jp/topics/detail/4274 (in Japanese)

8 Renovations done by owners and residents can be seen in two books by the Restoration Project: Nakagin Capsule Tower Building, Seigetsu-sha, 2014; Nakagin Capsule Style, Seigetsu-sha, 2021

9 *Hello Reno Sponsor Event Vol.2 report – [Preservation Fund for Capsules] in Nakagin Capsule Tower*. Internet source: qrgo.page.link/djHNZ (in Japanese)

Selected literature sources:

Aitchison M. Prefab Housing and the Future of Building: Product to Process. Lund Humphries, 2018

Banham R. Megastructure: Urban Futures of the Recent Past; London Thames&Hudson, 1976

De Cauter L., Patteeuw V. *The Capsular Civilization: On the City in the Age of Fear;* NAi Publishers, 2005

Feuerstein G. *Der Mensch in der Kapsel;* Wieviel Raum braucht der Mensch?:Wohnen fur das Existenzminimum; Munchen: Aries, 1996

Hidaka J. *Nakagin Capsule Tower;* UIA 2011 Tokyo Design 2050

Hoogenboom O. *R. Buckminster Fuller*; American National Biography

Hosoya H,, Schaefer M. *Tokyo Metabolism;* Taschen, Project On The City 2

Ishida A. *Paradox of a Landmark that is not: the life of the Nakagin Capsule Tower;* EAAC 2015

Kagohara R. A Temporary House That Will Disappear in the Future: The Value of Living in Nakagin Capsule Tower. International Christian University, 2018

Kawazoe N. *Capsule as an anti-value;* SD–Space Design (03/1969)

Koolhaas et al. *Project Japan, Metabolism Talks;* Taschen, 2011

Kronenburg R. Portable Architecture, Design and Technology. Architectural Press, 2008

Kurokawa K. Capsule declaration; Metabolism in Architecture, Littlehampton Book Services Ltd 1977

Kurokawa K. *Oh! The Code of the Cyborg;* SD–Space Design (03/1969)

Lemes de Olivera F. *Of Metabolism: future cities for our contemporary world;* NSCO, 14

Lin Z. *Nakagin Capsule Tower and the Metabolist Movement. Revisited;* 98th ACSA Annual Meeting Proceedings, Rebuilding

Mori Art Museum. *Metabolism, the City of the Future: Dreams and Visions of Reconstruction in Postwar and Present-Day Japan;* 2012

Nakagin Capsule Tower Preservation and Restoration Project, Shigetoshi I. et al. *Nakagin Capsule Tower Building;* Seigetsu-sha, 2015. (Japanese: 中銀カプセルタワービル保存・再生プロジェクト, 石川茂利 他. *中銀カプセルタワービル 銀座の白い箱舟;* 青月社, 2015)

Nitschke G. Transience and Renewal in Japanese Form; KYOTO Journal 50: Transience - Perspectives on Asia, 2002, 2-12

Pernice R. *Metabolism Reconsidered. Its Role In the Architectural Context of the World;* Journal of Asian Architecture and Building Engineering, November 2004

Russell S. *Metabolism Revisited: Prefabrication and Modularity in 21st Century Urbanism;* Without a Hitch - New Directions in Prefabricated Architecture

Schalk M. *The Architecture of Metabolism. Inventing a Culture of Resilience*; Arts, 3

Schmidt R., Austin S. Adaptable Architecture, Theory and Practice, Routledge, 2016

Senk P. *Capsules. Typology of other architecture;* Routledge, 2017

Senk P. *The Concept of Capsule Architecture as Experiment. Origins and Manifestations with Selected Examples from Slovenia and Croatia;* Prostor 2[46] 21[2013]

Smith R. Prefab Architecture, A Guide to Modular Design and Construction. John Wiley & Sons, 2010

Periodicals:

Shinkenchiku 1967(1, 12), 1969(11), 1970(1), 1975 (1), 1991(12), 2000(1), 2003(7), 2004 (3), 2005(12), 2006(12), 2007(5), 2007(1), 2012(1), 2018(5), 2019(2); Separate volume 1981(3)

SD (03/1969)

A+U: 574, 576, 578

Internet journals:

Archdaily, Archello, Architects Magazine, Architectural Review, Architizer, Contemporist, Curbed, Designboom, Dezeen, Dwell, Inexhibit, Inhabitant, Mas Context, Pop Up City, Tabi-Labo, The Spaces, Treehugger, Uncube, Uniq Hotels, Weburbanist, Wikiarquitectura, Yadokari,

Internet portals:

Agency for Cultural Affairs, Archinform, Astudejaoublie, Britannica, Bubblemania.fr, FRAC Centre-Val De Loire, Hidden Architecture, Spatial Agency, The Archigram Archival Project, The Buckminster Fuller Institute, The Futuro House, Wikipedia

Other:

Internet home pages of architectural studios used for references for projects descriptions with preserving copyrights

List of figures:

Author used the following copyright materials with provision of full credits of the source publisher as well as the original copyright holder where it is applicable (f.e. in the 'materials for press' section on the home page of an architectural bureau whose illustrations have been used'). Author apologies for any errors and omissions regarding the illustration credits and would be grateful if notified of any corrections via email: vladimir.dereznichenko@gmail.com

Fig.1. Archdaily; Internet source: www.archdaily.com/110745/ad-classics-nakagin-capsule-tower-kisho-kurokawa

Fig. 2. © Kisho Kurokawa Architects and Associates

Fig. 3. CC BY-SA 3.0; Internet source: en.wikipedia.org/wiki/Container_City

Fig. 4. © 9h Nine Hours

Fig. 5. © Squared Design Lab

Fig. 6. ©Nau2

Fig. 7-9. Author's own

Fig. 10. The Archigram Archival Project; Internet source: archigram.westminster.ac.uk/project.php?revID=210

Fig. 11. ©Ralf Roletschek; Internet source: en.wikipedia.org/wiki/Montreal_Biosphere

Fig. 12. CC BY-SA 3.0; Internet source: en.wikipedia.org/wiki/Dymaxion_car

Fig. 13. Invention Pod; Internet source: inventionpod.com/blogs/it-existed-the-churchill-egg.htm

Fig. 14. Public Domain

Fig. 15. (smow); Internet source: smow.com/blog/2013/06/diogene-by-renzo-piano-building-workshop-and-vitra

Fig. 16. Archdaily; Internet source: archdaily.com/782589/the-paradoxical-popularity-of-jean-prouves-demountable-houses

Fig. 17. © Stephane Herbert

Fig. 18. Archiwatch.it; Internet source: archiwatch.it/2014/02/07/avanguardie-e-pippe-mentali

Fig. 19. Internet source: andreasangelidakis.blogspot.com/2006/03/metabolist-concept-vs-urbs-eterna.html

Fig. 20. Koolhaas et al. *Project Japan, Metabolism Talks;* Taschen, 2011

Fig. 21. © IDEO Design Consultancy

Fig. 22. © Framlab

Fig. 23. © Lot-Ek

Fig. 24-25. Author's own

Fig. 26. Internet source: bc-salome.jugem.jp/?eid=86

Fig. 27. © Loft Cube

Fig. 28. The Archigram Archival Project; Internet source: archigram.westminster.ac.uk/project.php?id=82

Fig. 29. Author's own

Fig.30 (left). © Warner Bros, Metro-Goldwyn-Mayer.

Fig.30 (right). © Schemata Architects / Jo Nagasaka

Fig. 31-44 Author's own

Fig. 45. © Frac Centre-Val de Loire

Fig. 46. (left) Internet source: archi.ru/russia/44832/v-masshtabe-mikro

Fig. 46. (right) Internet source: designboom.com/architecture/schemata-architecture-office-jo-nagasaka-paco-open-house/

Fig. 47. Author's own

Fig. 48. Internet source: twitter.com/areasvellas/status/1340014794015948805?s=20&t=3LgaPmhn7s9IXzKmiLB4fg

Fig. 49. Author's own

Fig. 50. Internet source: photrip-guide.com/2013/09/15/tubes

Fig. 51. © James Lambiasi ARCHITECT

Fig. 52. © uniqhotels.com

Fig. 53. © Kisho Kurokawa Architects and Associates

Fig. 54-73. Author's own

Fig. 74. © Kisho Kurokawa Architects and Associates

Fig. 75. (left) © Room 810 Design Office

Fig. 75 (right) © Daiichi Progress Inc

Fig. 77-81. Author's own

Acknowledgements:

I would like to express my sincere gratitude to all members of Shiozaki Laboratory who helped me a lot in developing this research. Foremost, I would very much like to thank my supervisor – Prof. Taishin Shiozaki for his firm guidance from the time when I was still in Ukraine and his comprehensive support. Also, I would like to thank my senior – Yushiro Hirose who always helped me in a wide range of topics and always shared my responsibility when I had troubles. Next, I would like to say 'thank you' to IGP students – Ji Yuxin, Che Jin and Xu Xingling (who is not IGP student but graduates together with us) for your kindness and many happy moments. Equally, I would like to thank personally everybody in the laboratory for a warm and friendly company where anyone is treated as a family member, especially Chika Katou, Mayumi Ito and Hitotaka Sugisaki. Thank you.

This work was supported by JST SPRING, Grant Number JPMJSP2106.

本研究は、JST 次世代研究者挑戦的研究プログラム JPMJSP2106 の支援を受けたものです。

(Appendix) List of materials

No.	1
Name	Dymaxion House
Year	1930, 1946
Architect/Bureau	Buckminster Fuller
Country	USA
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Mobile** - In 1991 the family donated the house with all original spare components to the Henry Ford Museum in Dearborn, Michigan, which currently exhibits the totally restored initial version. According to Fuller's principles, the whole house had to be delivered in a manageable steel cylinder, with most parts nesting together as compact as possible. Any single component could be handled by one workman using one hand, leaving the other free to fasten the part in its place. http://sebastiaankaal.nl/architecture/roundhouse-wichita/index.php?fno=1

○Concept of change:

［Not only would the house have been exemplary in its self-sufficiency, but it also could have been mass-produced, flat-packaged and shipped throughout the world. With an average recycling rate for all metals of 22 years, and with comparable design improvements in performance per pound, ephemeralization means that ever more people are being served at ever higher standards with the same old materials. […] You could easily change the floor plan as required - squeezing the bedrooms to make the living room bigger for a party, for instance.］

[D.Capsules' joint or fusion]
[E.Capsules' mobility/movability]
[F.Change of capsules' functions]
[G.Recyclability/Reuse]

https://www.archdaily.com/401528/ad-classics-the-dymaxion-house-buckminster-fuller

●Renovation:

［Yet despite all these things going for it, the little metal house never caught on. In 1991, this sole Dymaxion House prototype was donated to the Henry Ford Museum in Michigan, which also houses such scientific wonders as Edison's Last Breath. It then underwent an eight year restoration before going on display in 2001, and in 2013 another conservation project was started to maintain Fuller's vision of a better designed world.］

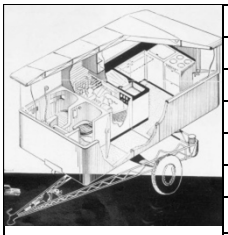
[i.Preservation]

https://www.atlasobscura.com/places/dymaxion-house

Type of capsule: Leisure (Mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



No.	2
Name	Mechanical Wing
Year	1940
Architect/Bureau	Buckminster Fuller
Country	USA
Status	Concept
Way of arrangement	①
No. of capsules	1
Shape	Vehicle
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	3 m^3
Application	**Mobile** - The Mechanical Wing was a trailer-drawn mobile home, described in the October 1940 issue of The Architectural Forum. The Mechanical Wing included Fuller's Dymaxion Bathroom and Fog Gun as well as the usual amenities of a mobile home. https://synchronofile.com/the-lost-inventions-of-buckminster-fuller-part-1-of-3/

○Concept of change:

［The Mechanical Wing included Fuller's Dymaxion Bathroom and Fog Gun as well as the usual amenities of a mobile home. In Dymaxion World Fuller emphasizes that his invention was the cylindrical metal A-frame trailer of the Mechanical Wing, an invention later "popular as a trailer frame for transporting boats."］

[E.Capsules' mobility/movability]

https://synchronofile.com/2009/02/27/the-lost-inventions-of-buckminster-fuller-part-1-of-3/

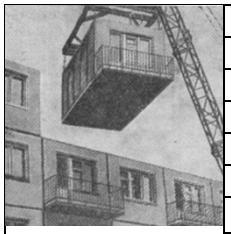
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	3
Name	Structural Blocks Housing
Year	1945-1980
Architect/Bureau	USSR Block Construction Research Institutes
Country	USSR
Status	Concept / Built / Being renovated
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Growing** - <…>With such production at the construction site, only the installation of block-rooms brought on a special platform should be carried out. Usually a "set" of blocks includes: a block room (general), a block bedroom, a block kitchen (together with a bathroom and a toilet). The stairs are assembled from blocks. https://tatlin.ru/articles/stroitelstvo_panelnyx_domov

○Concept of change:

［None］

●Renovation:

［Renovation are done by residents themselves. Moreover, additional DIY extensions have been added over time by residents in order to increase flat's area. Large scale renovation programs with support of local governments are being developed in order to legalize chaotic self-construction.］

[iv.Structural repairs]

[v.Cosmetic repairs]

[vi.Interior renovation]

[vii.Adapt function]

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ▲, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ▲, Easy navigation: ×, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>4</td></tr>
<tr><td>Name</td><td>Rotel</td></tr>
<tr><td>Year</td><td>1945</td></tr>
<tr><td>Architect/Bureau</td><td>Rotel</td></tr>
<tr><td>Country</td><td>Germany</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>②</td></tr>
<tr><td>No. of capsules</td><td>30</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Hotel</td></tr>
<tr><td>Materials</td><td>Plastic</td></tr>
<tr><td>Capsule size fit</td><td>2 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental – That sleeping experience could be a claustrophobic’s nightmare. <…> Single cabins measure three feet high, three feet wide – and six feet long.<…>Their bottom surface is all bed: You probably could prop yourself up to sitting position – unless perhaps you play center in the NBA. <…> People assume the vehicle carries musicians, a traveling theater – "or chickens,"

https://www.news-press.com/story/news/2018/10/16/southwest-florida-attracts-rotel-german-touring-hotel-wheels/1653026002/

Mobile – Rotel Tours is a tour operator that specializes in overlanding via "rolling hotels", custom built buses in which guests also sleep.

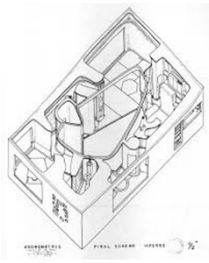
https://en.wikipedia.org/wiki/Rotel_Tours</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ▲, Climate control: ▲, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ×, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.</td></tr>
</table>

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>5</td></tr>
<tr><td>Name</td><td>House of the Future</td></tr>
<tr><td>Year</td><td>1956</td></tr>
<tr><td>Architect/Bureau</td><td>Alison Smithon</td></tr>
<tr><td>Country</td><td>UK</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>1+no limit</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Residential</td></tr>
<tr><td></td><td>Materials</td><td>Plastic</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental - "Unlike other works by the famous architect couple, the House of the Future is not an architectural project, but a scenographic mock-up at full scale of a living unit for a childless couple, set twenty-five years in the future."<…> The house gets rid of windows, and is totally inward looking to a courtyard in the middle. The house is spatially detached from the outside; wired acoustics are the only way it interacts with the outside world. The door elevation shows a speaker and microphone system above a mailbox, all to be installed to the left of the blob-shaped, electronically controlled entry door.

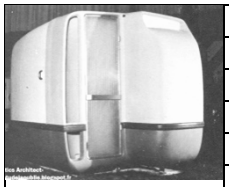
https://www.treehugger.com/look-alison-smithsons-house-future-4858335</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.</td></tr>
</table>



No.	6
Name	Mobile Hotel Cabin
Year	1956
Architect/Bureau	Ionel Schein
Country	France
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Hotel
Materials	Plastic
Capsule size fit	4 m^3
Application	**Growing** – Other cabins can be added as needed or desired, creating clusters of these “plug-in”, modular and adaptable pods. **Mobile** – A design based on the concept of a “monocoque” cabin or pod, made of molded plastic and polyester fiberglass laminate, it is easily transported by truck and can be quickly installed on any type of terrain. https://www.frac-centre.fr/_en/art-and-architecture-collection/schein-ionel/cabine-hoteliere-mobile-317.html?authID=171&ensembleID=558

○Concept of change:

［The cabin forms a unibody assembly, molded in polyester-fiberglass laminated plastic. It is a complete cell, factory finished, with standardized spare parts, maximum comfort and a minimum envelope surface. It is easily transportable: weight 700 kg. about ; a semi-trailer set of normal road gauge carries four cabins.］

[E.Capsules’ mobility/movability]

[F.Change of capsules’ functions]

https://www.frac-centre.fr/_en/art-and-architecture-collection/schein-ionel/cabine-hoteliere-mobile-317.html?authID=171&ensembleID=558

●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ▲, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	7
Name	Plastic House
Year	1956
Architect/Bureau	Ionel Schein
Country	France
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Cylinder
Function	Residential
Materials	Plastic
Capsule size fit	7 m^3
Application	**Growing** - Schein advocated the use of these revolutionary materials for three main reasons: their ease of implementation, lightness and the speed with which they can be reproduced. Thus, by industrializing flexible dwelling modules in new forms, Schein was encouraging occupants to determine the organization of their own interior spaces. For Ionel Schein, plastic architecture was the architecture of life. Inspired directly from nature, the snail-like plan of this house is a major departure from the orthogonal plans commonly used. Plastic materials allow for complete control of forms and enable the dwelling to develop according to an organic pace of growth: “Plastic materials can now enable the expression of a biological style” (Ionel Schein) https://www.frac-centre.fr/_en/art-and-architecture-collection/schein-ionel/maison-tout-plastiques-salon-des-arts-menagers-paris-317.html?authID=171&ensembleID=554

○Concept of change:

［By industrializing flexible dwelling modules in new forms, Schein was encouraging occupants to determine the organization of their own interior spaces.］

[B.Capsules’ addition/ structural extension]

[F.Change of capsules’ functions]

https://www.frac-centre.fr/_en/art-and-architecture-collection/schein-ionel/maison-tout-plastiques-salon-des-arts-menagers-paris-317.html?authID=171&ensembleID=554

●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	8
Name	Futuro House
Year	1960
Architect/Bureau	Matti Suuronen
Country	Finland
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental** - From the beginning, it had been met with public hostility. Its avant-garde appearance and unfamiliar material influenced the public's reluctance to accept the Futuro House.<…> The first Futuro House that was erected near Lake Puulavesi in Finland elicited public protest because it looked too unnatural for the rustic environment. **Mobile** - It was designed by Suuronen as a ski cabin that would be "quick to heat and easy to construct in rough terrain". The end result was a universally transportable home that had the ability to be mass replicated and situated in almost any environment. https://en.wikipedia.org/wiki/Futuro **Growing** – (Two Futruro Houses are combined into restaurant by a bridge; there are other sources depicting Futuro houses joined together or combined with other structures) https://thefuturohouse.com/Futuro-Kvistgard-Denmark.html

○Concept of change:

［The project could be constructed on site, or dismantled and reassembled on site in two days, or even airlifted in one piece by helicopter to the site. […] Shaped like the Hollywood idea of a flying saucer, the Futuro is a plastic, prefabricated, portable vacation home built to easily adapt to any climate or terrain, from mountain slopes to the seaside.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[F.Change of capsules' functions]

[G.Recyclability/Reuse]

https://architectuul.com/architecture/futuro-house-13

https://www.atlasobscura.com/articles/a-map-of-

●Renovation:

［Fewer than 100 were made and it is estimated that today around 60 of the original Futuro homes survive, owned mostly by private individuals. The prototype (serial number 000) is in the collection of Museum Boijmans Van Beuningen in Rotterdam, The Netherlands. The Futuro no. 001, the only other Futuro currently in a public collection, is in the possession of the WeeGee Exhibition Centre in Espoo, Finland.］

[i.Preservation]

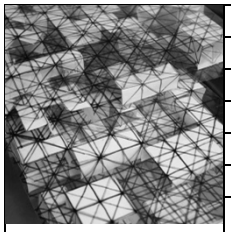
[iii.Change of location]

[iv.Structural repairs]

[v.Cosmetic repairs]

[vi.Interior renovation]

the-last-remaining-flying-saucer-homes	[vii.Adapt function] https://www.wikihero.net/en/Futuro
◆Type of capsule: Nomadic (mental) LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.	



No.	9
Name	Spatial City
Year	1960
Architect/Bureau	Yona Friedman
Country	Worldwide
Status	Concept
Way of arrangement	④
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Unspecified
Capsule size fit	4 m^3
Application	**Mental** – Individual dwellings are grafted onto the open grid, which leave it only half occupied, the “fillers” having to alternate with “voids”; thereby giving a variable rhythm to the whole, depending on the choices of the inhabitants. “The power of individual expression will thus become a random composition (...) and the city will again become what it always was: a theater of daily life” (Friedman). **Growing** – Spatial City constitutes what Yona Friedman called an “artificial topography”: a framework suspended in space that outlines a new mapping of the territory by means of a homogeneous, continuous and indeterminate network. Within this megastructure, this modular fabric offers a city the perspective of unlimited growth. https://www.frac-centre.fr/_en/art-and-architecture-collection/friedman-yona/ville-spatiale-317.html?authID=72&ensembleID=164

○Concept of change:

［The idea of the Ville Spatiale was to assure for its inhabitant the freedom to shape both their individual habitat and the city layout, freely after their preferences. The second element of that idea was the Architecture mobile, the possibility to periodically remodel the individual habitat and urban layout, without imposing demolition. […] All elements which come into direct contact with the users (i.e. those they see, touch etc.) are mobile, in contrast to the infrastructure, which is used collectively and remains fixed.］

[A.Capsules’ replacement/removal]

[B.Capsules’ addition/ structural extension]

[C.Capsules’ rearrangement]

[D.Capsules’ joint or fusion]

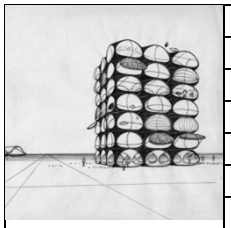
[F.Change of capsules’ functions]

https://archeyes.com/yona-friedman/

●Renovation:

［None］

https://dprbcn.wordpress.com/2010/03/03/yona-friedman-ville-spatiale-in-binckhorst/	
◆Type of capsule: Leisure (mental)	



No.	10
Name	Stackable Multipurpose Cells
Year	1960
Architect/Bureau	Jean Louis Rey (Chaneac)
Country	France
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Custom
Function	Multipurpose
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental** – Chanéac plays on the diversity of openings to create a varied and attractive visual universe. The habitat now becomes a living organism: living space cells proliferate and evolve freely around those intended for traditional functions (kitchen, sanitary facilities). **Growing** – Chanéac offers an arrangement of multi-purpose cells with a plastic shell, assembled to each other without connecting pieces. All identical, symmetrical, the cells are open on their four faces then obstructed by elements presenting openings of different shapes, so as to create windows and doors. https://www.frac-centre.fr/projets-64.html?authID=37&ensembleID=94&oeuvreID=429

○Concept of change:

［Clinging to large arches that transform the urban landscape into artificial hills, the industrialized plastic cell is the basic unit of a flexible and mobile habitat that now opens up to a relational and organic space.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

https://www.frac-centre.fr/projets-64.html?authID=37&ensembleID=94&oeuvreID=429

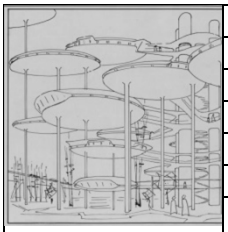
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	11
Name	Residential Area
Year	1960
Architect/Bureau	Pascal Hausermann
Country	Switzerland
Status	Concept
Way of arrangement	①
No. of capsules	51~100
Shape	Custom
Function	Residential
Materials	RC
Capsule size fit	10 m^3
Application	**Mental** – (Forest-like structure creates different type of environment) http://archidrop.blogspot.com/2011/12/ **Growing** – (Structure is composed from independent cells, supported by several beams each) https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/projet-beton-64.html?authID=87&ensembleID=267

○Concept of change:

［Since the beginning of the 1960s, Häusermann's ovoid architectures also rely on the assembly of prefabricated plastic shells and cells (Domobiles) that open to a flexible design of the habitat through an extremely successful architectural research.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

http://www.bubblemania.fr/en/museumotel-1967-pascal-hausermann-1936-2011/

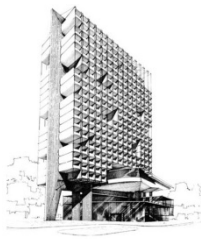
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

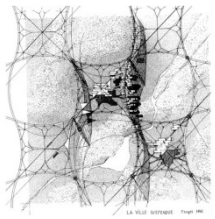
Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>12</td></tr>
<tr><td>Name</td><td>Hanging Hotel</td></tr>
<tr><td>Year</td><td>1960</td></tr>
<tr><td>Architect/Bureau</td><td>Takiz Zenetos</td></tr>
<tr><td>Country</td><td>Greece</td></tr>
<tr><td>Status</td><td>Concept</td></tr>
<tr><td>Way of arrangement</td><td>③</td></tr>
<tr><td>No. of capsules</td><td>380</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Hotel</td></tr>
<tr><td></td><td>Materials</td><td>RC</td></tr>
<tr><td></td><td>Capsule size fit</td><td>5 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental - <…>The above project – visible in the next image – is for a hanging hotel, a combination of Tibetan palace, Anasazi cliff dwelling, and artificial geological formation.

https://bldgblog.com/2009/01/cable-city-and-the-hanging-hotel/</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Leisure (mental)</td></tr>
</table>



No.	13
Name	Cable City
Year	1960
Architect/Bureau	Takiz Zenetos
Country	Greece
Status	Concept
Way of arrangement	④
No. of capsules	1+no limit
Shape	Dome
Function	Multipurpose
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental**, **Growing** – <…> a city that would not only span, but even temporarily replace, the earth's surface, forming a cobweb of urban settlement. An extremely local architectural offworld made of capsules, wired Archigramian hammocks, and other high-tech micro-environments. <…> Zenetos with its " electronic urbanism " offered a dematerializing vision of architecture as a promise of universal communication. https://bldgblog.com/2009/01/cable-city-and-the-hanging-hotel/

○Concept:

［Architect invented his overhanging cities as mega-constructions in tension that gradually would cover the Earth's surface, though without stirring it up. The only interference with the ground is the nodal connections in combination with the foundations of the pylons.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

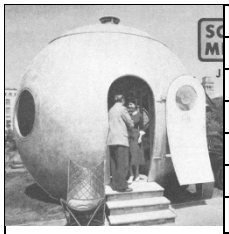
[F.Change of capsules' functions]

https://www.mascontext.com/issues/18-improbable-summer-13/takis-zenetos-unbuilt-tropes/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)



No.	14
Name	Ball House
Year	1961
Architect/Bureau	Johann Wilhelm Ludowici
Country	Germany
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	1+no limit
Shape	Sphere
Function	Residential
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mobile** – (the house can be easily transported by a helicopter, or, alternatively, be rolled) http://www.bubblemania.fr/en/juni-ludowici-1896-1983-kugelhaus-1959/

○Concept of change:

［The house meant to be fully customizable and movable, even able to submerge in water.］

[F.Change of capsules' functions]

http://www.bubblemania.fr/en/juni-ludowici-1896-1983-kugelhaus-1959/

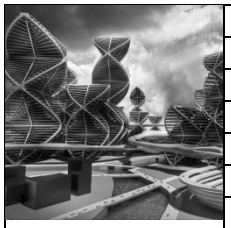
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	15
Name	Helix city
Year	1961
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Rectangular
Function	Multipurpose
Materials	Steel/Metal frame
Capsule size fit	5 m^3
Application	**Growing** - Here, urban structures are being developed both vertically and horizontally, and the points of contact are not conscious. The helix structure is a spiral structure which has been proposed as a third or alternate spatial system for such urban space. Just as in the case of the chromosomes (DNA) in the life system, the helix structure acts as a space frame for data transmission. This structure is in the form of a three-dimensional cluster system. https://www.kisho.co.jp/page/200.html

○Concept of change:

［The helix structure is a spiral structure which has been proposed as a third or alternate spatial system for such urban space.Just as in the case of the chromosomes (DNA) in the life system, the helix structure acts as a space frame for data transmission. This structure is in the form of a three-dimensional cluster system.］

[B.Capsules' addition/ structural extension]

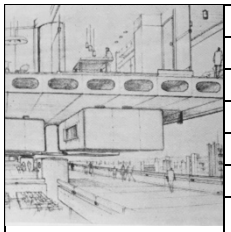
[G.Recyclability/Reuse]

https://www.kisho.co.jp/page/200.html

●Renovation:

［None］

◆Type of capsule: Leisure



No.	16
Name	Urban Area Reconstruction Plan
Year	1961
Architect/Bureau	Yukio Otani
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Unspecified
Capsule size fit	5 m^3
Application	**Growing** – (megastructural project with capsules attached to a bearing frame)

○Concept of change:

［None］

●Renovation:

［None］

◆Type of capsule: Urban

No.	17
Name	Plastic Sky Lodge
Year	1962
Architect/Bureau	Kenji Ekuan
Country	Japan
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	1
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mobile** – (mobile lodge on four legs) See Koolhaas (Project Japan, Metabolism Talks), Senk (Capsules. Typology of Other Architecture)

○Concept of change:

［Designed to be carried on the back of a truck, the Plastic Ski Lodge encapsulates four beds and washing facilities.］

[E.Capsules' mobility/movability]

See Koolhaas (Project Japan, Metabolism Talks), Senk (Capsules. Typology of Other Architecture)

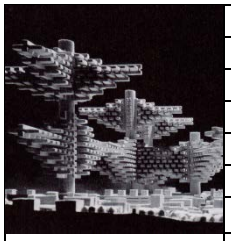
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: _, Interim space: _, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: _, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



	No.	18
	Name	Clusters in the Air
	Year	1962
	Architect/Bureau	Arata Isozaki
	Country	Japan
	Status	Concept
	Way of arrangement	③
	No. of capsules	800
	Shape	Rectangular
	Function	Residential
	Materials	Steel/Metal frame
	Capsule size fit	7 m^3
	Application	**Growing**, **Mobile** – City in the Air is a project of capsules suspended in the air over cylindrical and modular megastructures. These structures permit the expansion and the reorganization of the urban space, incorporating or removing units of capsules in order to satisfy in real time the necessities of the residents. https://www.archdaily.com/912738/the-city-in-the-air-by-arata-isozaki

○Concept of change:

［Each main module can then be surmounted or connected to others to form more complex structures so as to generate a set of expanding elements in space.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

https://www.archdaily.com/912738/the-city-in-the-air-by-arata-isozaki

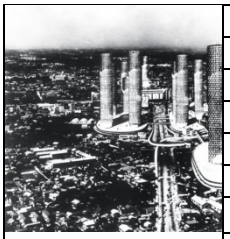
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	19
Name	Ikebukuro Plan
Year	1963
Architect/Bureau	Kiyonori Kikutake
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	1250
Shape	Tube
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Growing**, **Mobile** – Here, the towers rest on massive podiums or artificial floors, and, in response to Tokyo's growing population, the towers preemptively break with a 31-meter height rule that existed at the time in the city, having been abolished in 1963. The towers rise towards the sky, with a cylindrical concrete structure, allowing housing in its outline the housing capsules to accommodate 5,000 people. These capsules are thought of as elements that can be removed and placed in the tower, allowing the number of occupants to vary. https://projectarciutattokyo.wixsite.com/tokyo/ikebukuro-plan-1962

○Concept of change:

［The towers rise towards the sky, with a cylindrical concrete structure, allowing the housing capsules to be housed around it to accommodate 5,000 people. These capsules are thought of as elements that can be removed and placed in the tower, allowing the number of containers to vary.］

[A.Capsules' replacement/removal]

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

[F.Change of capsules' functions]

[G.Recyclability/Reuse]

Kurokawa K., Metabolism in Architecture, 1977

https://archeyes.com/marine-city-megastructure-kiyonori-kikutake/

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate

control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: _, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>20</td></tr>
<tr><td>Name</td><td>Prefabricated Box-type Apartments</td></tr>
<tr><td>Year</td><td>1962</td></tr>
<tr><td>Architect/Bureau</td><td>Kisho Kurokawa</td></tr>
<tr><td>Country</td><td>Japan</td></tr>
<tr><td>Status</td><td>Concept</td></tr>
<tr><td>Way of arrangement</td><td>③</td></tr>
<tr><td>No. of capsules</td><td>1+no limit</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Residential</td></tr>
<tr><td>Materials</td><td>Steel/Metal frame</td></tr>
<tr><td></td><td>Capsule size fit</td><td>4 m^3</td></tr>
<tr><td></td><td>Application</td><td>Growing - The open frame structure was designed to receive the functional capsule units akin to bottles on a rack. Although repetitive, the megastructure and capsules' clustering was suggested in an asymmetrical pattern. This sensibility toward an overall dynamic plan arranged on standardized components showcased Kurokawa's sensitivity for achieving quality spatial relationships as well as an efficient industrialized building system.

http://prefabricate.blogspot.com/2016/02/prefabrication-experiments-90-kisho.html</td></tr>
<tr><td colspan="2">○Concept of change:

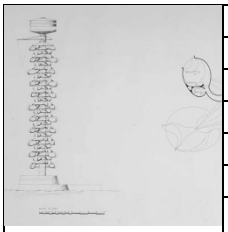
［Kurokawa like Kikutake before him, endeavored to realize metabolic life of a building where the life span of various elements or functional sets varies.］

[B.Capsules’ addition/ structural extension]

[G.Recyclability/Reuse]

http://prefabricate.blogspot.com/2016/02/prefabrication-experiments-90-kisho.html</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Urban</td></tr>
</table>



No.	21
Name	Tree Housing Tower
Year	1962
Architect/Bureau	Arthur Quarmby
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	101~200
Shape	Egg-shaped
Function	Residential
Materials	Unspecified
Capsule size fit	5 m^3
Application	**Growing**, **Mobile** – The architect develops in this project a principle of hooking and unhooking habitable cells on a central pillar 160 meters high: "The carrier mast is made up of rings fitted with massive cantilevered arms from which are suspended space cells. A pivoting crane, placed at the top of the mast, allows the assembly and dismantling of the cells. The design shows diamonds clinging to radiating arms. This operation allows absolute mobility of the habitat from a primary reception structure. https://www.frac-centre.fr/collection-art-architecture/quarmby-arthur/corn-the-cob-64.html?authID=156&ensembleID=494

○Concept of change:

［In Corn on the Cob, Quarmby adopts the plug-in principle, used by Ionel Schein since 1956 in its mobile hotel cabins and by Archigram in several of their projects. The architect develops in this project a principle of hanging and unhooking of habitable cells on a central pillar of 160 meters height: "The mast is made up of rings equipped with cantilevered massive arms to which are suspended space cells. A swiveling crane, placed at the top of the mast, allows the assembly and disassembly of the cells.］

[A.Capsules' replacement/removal]

[C.Capsules' rearrangement]

https://www.frac-centre.fr/collection-art-architecture/quarmby-arthur/corn-the-cob-64.html?authID=156&ensembleID=494

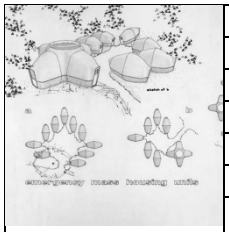
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: _, Climate control: _, Interim space: ●, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



No.	22
Name	Emergency Mass Housing Units
Year	1962
Architect/Bureau	Arthur Quarmby
Country	UK
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	3 m^3
Application	**Growing**, **Mobile** – After an initial order for English railways (Relay Room System, 1959-61), it applies its principles to certain extreme situations requiring temporary housing, as scientific expeditions or emergency shelter (Emergency Mass Housing Units, 1962) but also to everyday life. (as seen in the picture, modules can be combined) http://www.bubblemania.fr/en/maison-enterree-1964-arthur-quarmby-1934-huddersfield-angleterre/

○Concept of change:

［After a first order for the British Railways (Relay Room System , 1959-61), he applied his principles to certain extreme situations requiring a temporary habitat, such as scientific expeditions or the emergency shelter (Emergency Mass Housing Units , 1962) but also to everyday life. His interest in the mobility of architecture then develops in experimental projects that upset the typologies of buildings and their programs.］

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

http://www.bubblemania.fr/en/maison-enterree-1964-arthur-quarmby-1934-huddersfield-angleterre/

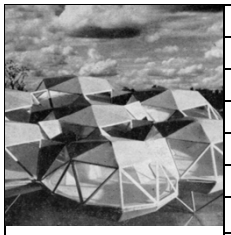
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ▲, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	23
Name	Prefabricated Plastic Cells
Year	1963
Architect/Bureau	Paul Maymont
Country	France
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Polygonal
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Growing**, **Mobile** – Manufacturing by industrialized panels facilitates transport and assembly. Organic growth is free; orientation and sunshine are no longer a problem. http://astudejaoublie.blogspot.com/2013/06/maison-plastique-futuriste-1963-c.html

○Concept of change:

［Individual housing: the facades of this building can be modified at will by replacing the industrialized elements. Residence on stilts installed in rough terrain. This industrialized construction system type "Meccan" shows the assembly of several elements. It is a family dwelling that can grow freely by adding other cells.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

http://astudejaoublie.blogspot.com/2013/06/maison-plastique-futuriste-1963-c.html

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

No.	24
Name	Marine City
Year	1963
Architect/Bureau	Kiyonori Kikutake
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	1250
Shape	Tube
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Growing**, **Mobile** – This is made up of a "mother city" and other smaller cities, where all are connected by large bridges. The island presents a scheme with the interior occupied by the residential area, with large exterior islands that serve as wave absorbers and for easy access to the industrial service. It is a mobile type city, autonomous and climatically controlled. The towers are predisposed at different stages of growth, and when an island is too old and unfit for life it is drawn to the bottom of the sea and sunk. https://projectarciutattokyo.wixsite.com/tokyo/marinecity

○Concept of change:

［The project is based around steel rings, measuring over two miles in diameter, on which towers would sit holding 1250 magnetized living units that could be easily replaced without causing any damage to the structure.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

https://theunravel.com.au/nakagin-capsule-tower-tokyo

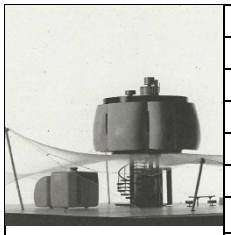
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: _, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



	No.	25
	Name	Pumpkin House
	Year	1964
	Architect/Bureau	Kenji Ekuan
	Country	Japan
	Status	Concept
	Way of arrangement	①
	No. of capsules	1+no limit
	Shape	Custom
	Function	Residential
	Materials	Plastic
	Capsule size fit	20 m^3
	Application	**Mental** – I thought of the concept of "tools" which had been in my mind.I reviewed the concept of traditional architecture that had a fixed understanding about a target object, and looked for mechanisms to structure new spaces and temporary buildings with independent functions while considering their inter-relations with different tools. Beginning with "tools," tried to draw new forms in order to find new styles in living spaces from the perspective of industrial design. In other words, I wanted to create ideal houses or urban environments combining different tools. I intended to explore ways to settle various points of confusion in cities and architectural works through the means of tools, and to find ways to better contribute to the environment. GK Report_25 **Growing** – Ekuan designed the "Pumpkin House" as an expandable structure for a couple, able to feature outdoor space and even expandable to include a mini-capsule for a child. https://archeyes.com/furniture-designs-that-turn-into-cities-kenji-ekuan/

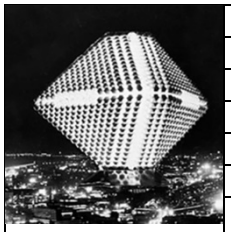
○Concept of change: ［Ekuan designed the "Pumpkin House" as an expandable structure for a couple, able to feature outdoor space and even expandable to include a mini-capsule for a child.］ [B.Capsules' addition/ structural extension] [F.Change of capsules' functions] https://socks-studio.com/2015/10/18/from-the-furniture-to-the-city-1964-scale-escalating-projects-by-metabolist-kenji-ekuan/	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate

control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ▲, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	26
Name	Dwelling City
Year	1964
Architect/Bureau	Kenji Ekuan
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	10001~1 million
Shape	Polygonal
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Growing**, **Mobile** – Ekuan designed the "Dwelling City", a double stacked tetrahedrons structure with capsules attached on the surface and the interior designated as public space. Cue Metabolism, a collective of architects, designers and a critic that sought to recreate the very definition of 'city', transferring it's appendage from noun to verb. Cities would exist as living, moving and evolving creatures – constantly changing and adapting within a social consciousness. A primitive concept of "Cities within Cities" is obtained by the definition and mutliplications of clusters. https://archeyes.com/furniture-designs-that-turn-into-cities-kenji-ekuan/

○Concept of change:

［Ekuan designed the "Dwelling City", a double stacked tetrahedrons structure with capsules attached on the surface and the interior designated as public space. Cue Metabolism, a collective of architects, designers and a critic that sought to recreate the very definition of 'city', transferring it's apendage from noun to verb. Cities would exist as living, moving and evolving creatures – constantly changing and adapting within a social consciousness. A primitive concept of "Cities within Cities" is obtained by the definition and mutliplications of clusters.］

[B.Capsules' addition/ structural extension]

https://archeyes.com/furniture-designs-that-turn-into-cities-kenji-ekuan/

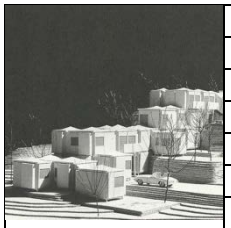
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ▲, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: _, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	27
Name	Village Housing
Year	1964
Architect/Bureau	Kenji Ekuan
Country	Japan
Status	Concept
Way of arrangement	①
No. of capsules	23
Shape	Rectangular
Function	Residential
Materials	Plastic
Capsule size fit	4 m^3
Application	**Growing**, **Mobile** – A system able to deal with alteration by adding and replacing standardized housing structural elements. The system can be adapted to wide range from a single house to congregated housing development. https://www.gk-design.co.jp/en/works/934/

○Concept of change:

［Adaptable agglomeration of prefab units/capsules］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

https://www.gk-design.co.jp/en/works/934/

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: ●.

No.	28
Name	Tortoise House
Year	1964
Architect/Bureau	Kenji Ekuan
Country	Japan
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Polygonal
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	5 m^3
Application	**Growing** - A multipliable house: the space of living is structured by connecting a component space such as the bed room, den, kitchen, bath room alike. <…>Tortoise House" is a family dwelling integrated into an inhabitable space frame formed by separated room-units and facilitating growth https://www.gk-design.co.jp/en/works/940/ https://socks-studio.com/2015/10/18/from-the-furniture-to-the-city-1964-scale-escalating-projects-by-metabolist-kenji-ekuan/

○Concept of change:

［Tortoise House is a family dwelling integrated into an inhabitable space frame formed by separated room-units and facilitating growth.］

[B.Capsules' addition/ structural extension]

https://www.gk-design.co.jp/en/works/940/

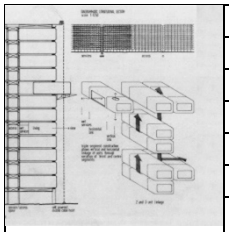
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ▲, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	29
Name	Potteries Thinkbelt
Year	1964
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Unspecified
Capsule size fit	7 m^3
Application	**Growing**, **Mobile** – It was a decentralized campus, around this English region; taking advantage of and providing solutions to what were ancient potteries that worked for more than 250 years; arranged throughout the territory, and connected by an intact and winding railway network that connected cities and factories in ruins. http://hacedordetrampas.blogspot.com/2010/10/potteries-thinkbelt-de-cedric-price.html

○Concept of change:

［Expiration, recycling, technology, teaching, temporality, calculated uncertainty ... All these are aspects that Cedric Price (1934-2003) talks about in his project Potteries Thinkbelt (PTb), started in 1964. Potteries Thinkbelt (PTb) is about a "circular university". It had to be a higher education facility; a teaching that responded to the educational needs of England in the sixties, a teaching based on science and technology. PTb would generate a campus of 2,800 hectares with more than 20,000 students that would translate into 40,000 inhabitants for the deteriorated North Staffordshire region; becoming a great technological and research center.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

http://hacedordetrampas.blogspot.com/2010/10/potteries-thinkbelt-de-cedric-price.html

●Renovation:

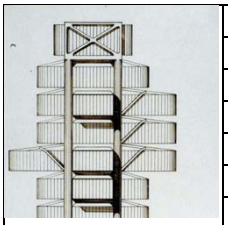
［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity:

●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	30
Name	Office Towers in Plug-in City
Year	1964
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	11~20
Shape	Rectangular
Function	Office
Materials	Unspecified
Capsule size fit	5 m^3
Application	**Growing**, **Mobile** – (as a part of the all-encompassing circulation of capsules, the office units could be plugged in the frames in business centers) See Plug-in City description

○Concept of change:

［We then turned towards a specific application of 'Plug-in' thinking: the rentable office floor. The axonometric shows a pylon that contains lifts and services with a 'tray' hanging off each side. One tray is the 'front' office, the other the 'backroom' office. Each part would be exchangeable. Various ideas about automated shopping and diagonalized movement combine with the Plug-in Office tower in [Europa] - a hypothetical 'businesstown' along an international route.］

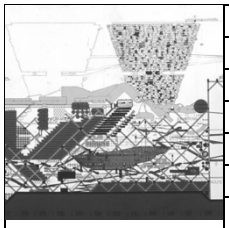
[A.Capsules' replacement/removal]

https://pdfcoffee.com/modern-architecture-vi-module-4chapter-10pdf-pdf-free.html

●Renovation:

［None］

◆Type of capsule: Urban



No.	31
Name	Plug-in City
Year	1964
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Custom
Function	Multipurpose
Materials	Unspecified
Capsule size fit	5 m^3
Application	**Mental** – Dissatisfaction with this status quo pushed the experimental architectural collective to dream of alternative urban scenarios that flied in the face of the superficial formalism and dull suburban tendencies common to British modernism of the time. The Plug-In City, along with other projects such as The Walking City or The Instant City, suggested a nomadic way of life and, more importantly, a liberation from the modernist answer of suburbia. **Growing, Mobile** – This provocative project suggests a hypothetical fantasy city, containing modular residential units that "plug in" to a central infrastructural mega machine. The Plug-in City is in fact not a city, but a constantly evolving megastructure that incorporates residences, transportation and other essential services--all movable by giant cranes. "Plug-In City was a method of allowing people to grow their dwelling with themselves," said Cook. "[The capsules] vary in size, but also can be replaced, so you're getting a lot of variety and change." https://www.dezeen.com/2020/05/12/archigram-plug-in-city-peter-cook-dennis-crompton-video-interview-vdf/ https://www.archdaily.com/399329/ad-classics-the-plug-in-city-peter-cook-archigram

○Concept of change:

［The Plug-in City as a total project was the combination of a series of ideas that were worked upon between 1962 and 1964. The Metal Cabin Housing was a prototype in the sense that it placed removable house elements into a 'megastructure' of concrete. The discussions of Archigram 2 and 3 built up a pressure of argument in favour of expendable buildings: and it was then inevitable that we should investigate what happens if the whole urban environment can be programmed and structured for change.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

●Renovation:

［None］

[E.Capsules' mobility/movability] https://www.scribd.com/document/44963127/archigram-s-plug-in-city-02	
◆Type of capsule: Leisure (mental) LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.	

No.	32
Name	Capsule Homes
Year	1964
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	520
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mental**, **Growing, Mobile** (see description of Plug-in City)

○Concept of change:

［The capsule dwelling was a set of components: whilst snugly and efficiently locked together they were capable of total inter-changeability. The whole tower would be organised to allow the larger elements to be replaced by crane and the smaller elements manoeuvred from within: as a result all parts could be capable of being opened-out or clipped-in.］

[A.Capsules' replacement/removal]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

(see description of Plug-in City)

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

No.	33
Name	Multi-purpose Cell Prototype
Year	1964
Architect/Bureau	Jean Louis Rey (Chaneac)
Country	France
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Multipurpose
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mobile** (*realized in prototype) (See No.10, Stackable Multipurpose Cells)

○Concept of change:

［The polyvalent cells open a new reflection on modularity in architecture. Leaving the user the opportunity to remodel his interior, Chanéac is convinced of the need for total industrialization, to reduce costs while increasing productivity. All identical, symmetrical, the cells are open on all four faces and then obstructed by elements having openings of different shapes, so as to create windows and doors. Chanéac plays on the diversity of openings to create a varied and seductive visual universe. The habitat is now a living organism: cells living space proliferate and evolve freely around those for traditional functions (kitchen, sanitary).］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

(See No.10, Stackable Multipurpose Cells)

●Renovation:

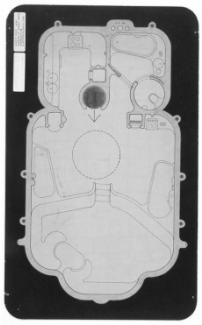
［One cell is preserved by local institution as an exhibit］

[i.Preservation]

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



No.	34
Name	Gasket House
Year	1965
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	5 m^3
Application	**Growing, Mobile** – Instead of thinking about homes as fixed objects on the ground, Archigram imagined gasket homes being suspended from a megastructure. This project was stimulated by the capsule tower project that archigram did a year before. Each capsule remained to be independent from each other, but without stacking up the capsules into a tower this project gave each unit more freedom. Each capsule can be easily removed or replaced while keeping the whole system still same. https://studioarewethereyet.wordpress.com/2016/04/20/gasket-house-archigram-1965/

○Concept of change:

［Each capsule can be easily removed or replaced while keeping the whole system still same. In this way Archigram regarded houses not as something fixed but as something that might need to be renewed from time to time, and by making every element mobile the whole system is possible to be stable.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

https://studioarewethereyet.wordpress.com/2016/04/20/gasket-house-archigram-1965/

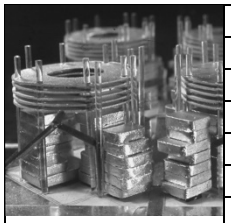
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ●, Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	35
Name	Plug-in University Node
Year	1965
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	51~100
Shape	Rectangular
Function	Auditorium
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Growing, Mobile** (see description of Plug-in City)

○Concept of change:

［The main enclosures are simply tensioned skins slung on trays which collectively create the ‘node’. Each student can have a standard metal box and can choose to have it located anywhere on the decking. In a sense, this anticipates the nomad’ nature of subsequent projects.］

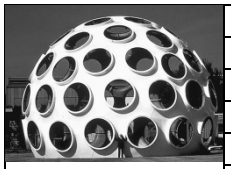
[E.Capsules’ mobility/movability]

(see description of Plug-in City)

●Renovation:

［None］

◆Type of capsule: Urban



No.	36
Name	Fly’s Eye
Year	1965
Architect/Bureau	Buckminster Fuller
Country	USA
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	1
Shape	Dome
Function	Residential
Materials	Plastic
Capsule size fit	20 m^3
Application	**Growing, Mobile** - Richard Buckminster Fuller designed and patented the Fly's Eye Dome in 1965, which he saw as a prototype for low-cost portable housing of the future. (alike other domes created by Fuller, their structures could be combined) https://crystalbridges.org/architecture/flys-eye-dome/

○Concept of change:

［One of the last of Fuller's visionary projects, the "Fly's Eye" dome was designed to be an autonomous dwelling.］

[E.Capsules’ mobility/movability]

https://www.archdaily.com/343036/buckminster-fullers-50-foot-flys-eye-dome-to-be-restored

●Renovation:

［Noted architectural historian and preservationist Robert Rubin has purchased the largest of Buckmister Fuller's "Fly's Eye" domes and plans to reopen it to the public this summer for the first time in 30 years. Rubin intends to restore it and put it on display at the Toulouse Contemporary Art Festival in France , between May 24 and June 23 this year (2013). Having already begun in California, the restoration of the dome is being undertaken by Daniel Reiser of DR Design and consultant John Warren - both having worked on the original dome, as well as the restoration of Craig Robins' version.］

https://www.archdaily.com/343036/buckminster-fullers-50-foot-flys-eye-dome-to-be-restored

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

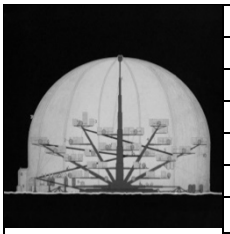
No.	37
Name	The Environment Bubble
Year	1965
Architect/Bureau	Francois Dallegret
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Dome
Function	Attraction
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental** – <…>transparent plastic membrane inflated by air-conditioning output from a technological ‘’totem’’ showing architecture as a fit environment for human activities. "A Home Is Not a House", Reyner Banham, Art in America (April 1965)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	38
Name	Blow-out Village
Year	1966
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	51~100
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental, Growing, Mobile** - In 1966, Peter Cook presented a proposal for a mobile town using hovercraft, hydraulic and inflatable technologies. In this work, Cook explores a technological version of the concept of "village". Blow-out Village combines three aspects of technology: the bubble, the hydraulic system and the air displacement. It turns the community space into an object with its own dynamics and mobility. https://tecnne.com/biblioteca/archigram-blow-out-village/

○Concept of change:

［Mobile villages can be used everywhere to rehouse people hit by disaster, for workmen in remote areas, and as fun resorts sited permanently or seasonally at the seaside and near festivals. When not in use the village is quarter size. This is done by drawing off the hydraulic fluid from the main mast and the arms: the village then contracts. It is moved on to a site by a hovercraft motor and anchored by the two feet seen in the diagram. The main mast is raised hydraulically to the chosen height. Air-inflated ribs fall from the top of the main mast supporting a weatherproof transparent plastic cover over the whole village.］

[B.Capsules' addition/ structural extension]

[F.Change of capsules' functions]

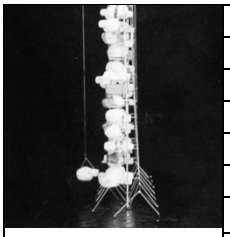
[G.Recyclability/Reuse]

Cook P., Archigram, 1972

●Renovation:

［None］

◆Type of capsule: Nomadic



No.	39
Name	Living Pod
Year	1966
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental, Growing, Mobile** - The house is designed as an appliance to be transported around with the owner, the city becomes a machine people plug into," wrote David Greene. The Living Pod reduces the dwelling to a compartment equipped with minimum but sufficient comforts<…> In the wake of Reyner Banham's theorizing on the "a-house" (1965), Greene explored the idea of the probable abandoning of the house altogether in its static and permanent form in favor of alternative systems based on new technologies.

○Concept of change:

［Although this capsule can be hung within a plug-in urban structure or can sit in the open landscape it is still a 'house'. Really one is left with a zoomland trailer home. Probably a dead end. A basic assumption that must be reassessed in terms of the possibility of increasing personal mobility and technological advance. Anything is probable.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

https://thefunambulist.net/editorials/great-speculations-living-pod-by-david-greene

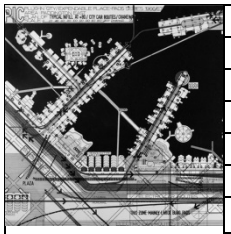
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	40
Name	Paddington East
Year	1966
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	10001~1 million
Shape	Custom
Function	Multipurpose
Materials	Unspecified
Capsule size fit	5 m^3
Application	**Growing, Mobile** – (as an urban planning approach the project adopts principles of growth from Plug-in City)

○Concept of change:

［The megastructure extends east-west and related inter-city car routes, exchange passengers and luggage onto electric city car routes, by way of the interchange, mixed use infill is basic to the megastructured area, by tributaries are sent off from it mainly infilled with housing. Electric cars are able to reach all family dwellings; they can be the furniture that is able to travel.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

See description Plug-in City

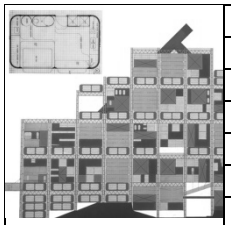
●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	41
Name	Hornsey Housing Study
Year	1966
Architect/Bureau	Archigram
Country	UK
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mental, Growing, Mobile** – (see Plug-in City)

○Concept of change:

［Hornsey Capsule is more simplified as a form than the earlier capsule. It is basically made from three standard elements which combine to give a one or a two-person unit. It was planned to integrate with larger 'Family Cage' dwellings and the capsule concept seems even now to be a logical approach for pre-family dwellings.］

[A.Capsules' replacement/removal]

[E.Capsules' mobility/movability]

Cook P., Archigram, 1972

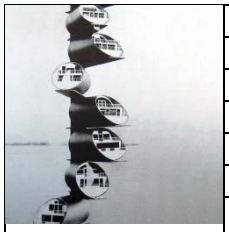
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	42
Name	Cylindrical Building
Year	1966
Architect/Bureau	Guy Dessauges
Country	Switzerland
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Tube
Function	Residential
Materials	Plastic
Capsule size fit	10 m^3
Application	**Growing, Mobile** – (cylinders can be arranged in different structures and are used as independent living units)

○Concept of change:

［Cylindrical homes can form different structures with additional bearing elements.］

[B.Capsules' addition/ structural extension]

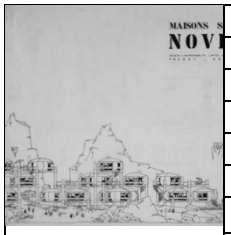
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: _, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	43
Name	Novery Space Houses
Year	1966
Architect/Bureau	Pascal Hausermann
Country	Switzerland
Status	Concept
Way of arrangement	①
No. of capsules	51~100
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mental, Growing, Mobile** – (in his designs Pascal Hausermann utilizes the principle of relationship between egg-shaped plastic units and supporting jungle-like structure to create unique environment which can be modified by users) https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/maisons-spatiales-novery-64.html?authID=87&ensembleID=205

○Concept of change:

［Modules in disassembled form can be added to or removed from the ensemble upon request.］

[A.Capsules' replacement/removal]

https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/maisons-spatiales-novery-64.html?authID=87&ensembleID=205

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>44</td></tr>
<tr><td>Name</td><td>Hotel in Menorca</td></tr>
<tr><td>Year</td><td>1967</td></tr>
<tr><td>Architect/Bureau</td><td>Pascal Hausermann</td></tr>
<tr><td>Country</td><td>Switzerland</td></tr>
<tr><td>Status</td><td>Concept</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>21~50</td></tr>
<tr><td>Shape</td><td>Egg-shaped</td></tr>
<tr><td>Function</td><td>Hotel</td></tr>
<tr><td>Materials</td><td>Plastic</td></tr>
<tr><td>Capsule size fit</td><td>4 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental, Growing – (same as Novery Space Houses, but the whole structure is, in principle, immovable but capsules can form structures of any shapes)

https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/hotel-minorque-64.html?authID=87&ensembleID=223</td></tr>
</table>

○Concept of change:

［Since the beginning of the 1960s, Häusermann's ovoid architectures also rely on the assembly of prefabricated plastic shells and cells (Domobiles) that open to a flexible design of the habitat through an extremely successful architectural research.］

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/hotel-minorque-64.html?authID=87&ensembleID=223

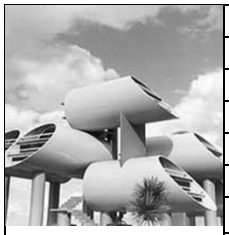
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	45
Name	Cylindrical Houses
Year	1967
Architect/Bureau	Guy Dessauges
Country	Switzerland
Status	Concept
Way of arrangement	②
No. of capsules	7
Shape	Tube
Function	Residential
Materials	Plastic
Capsule size fit	10 m^3
Application	**Growing, Mobile –** (cylinders can be arranged in different structures and are used as independent living units)

○Concept of change:

［Cylindrical homes can form different structures with additional bearing elements.］

[B.Capsules' addition/ structural extension]

●Renovation:

［None］

◆Type of capsule: Leisure

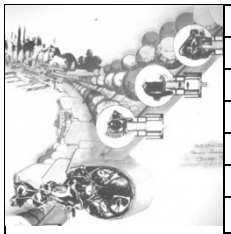
LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ●, Natural light: ●, Climate control: _, Interim space: ●, Public space: _, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

	No.	46
	Name	Bubble House
	Year	1967
	Architect/Bureau	Jean Maneval
	Country	France
	Status	Concept / Built / Renovated
	Way of arrangement	①
	No. of capsules	30
	Shape	Custom
	Function	Multipurpose
	Materials	Plastic
	Capsule size fit	5 m^3
	Application	**Mental –** The 32-square-metre home was intended for four people, with six small, room-like spaces connected to a central living area. As the dwelling was made to be prefabricated using fibreglass, it could be mass produced, allowing for Bubble House communities. The aim was to create small "democratic" buildings, made in various types of synthetic material, which had to be cheap, modular, movable, compact, industrially manufactured, durable, and integrated into the landscape. The influence of the "space-age aesthetic", the introduction of new plastic materials, and new utopian forms of collective living deeply influenced those designers and their vision of modernity. **Growing -** Encompassing an internal floor area of 390 square feet forming a single, largely undivided, space; the house comprises an entrance area, two bedrooms, a living room, a kitchen, and a bathroom. Only the bathroom is enclosed by thin internal walls. Two or more houses can be connected to create theoretically infinite clusters. **Mobile** – Overall, the house weighs 3,300 pounds, can be transported by a truck, and assembled on-site in a few days; the structure is supported by a small concrete base. https://www.inexhibit.com/case-studies/the-bubble-house-by-jean-benjamin-maneval-1963/ https://medium.com/pagesdigital-archive/this-1960s-bubble-house-in-france-still-look-futuristic-today-b39820e744f4

○Concept of change: ［The aim was to create small "democratic" buildings, made in various types of synthetic material, which had to be cheap, modular, movable, compact, industrially manufactured, durable, and integrated into the landscape. Two or more houses can be connected to one another to create theoretically infinite clusters.］ [B.Capsules' addition/ structural extension] [C.Capsules' rearrangement]	●Renovation: ［Recently, at an exhibition in Milan, I had the rare occasion to see a restored version of the famous Maison Bulle (The Bubble House) designed by French architect Jean-Benjamin Maneval in the early Sixties. About 300 units of it were produced, some of which still exists today.］ [i.Preservation] [iii.Change of location]

[D.Capsules' joint or fusion] https://www.inexhibit.com/case-studies/the-bubble-house-by-jean-benjamin-maneval-1963/	[v.Cosmetic repairs] https://www.inexhibit.com/case-studies/the-bubble-house-by-jean-benjamin-maneval-1963/
◆Type of capsule: Leisure (mental) LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.	



No.	47
Name	Pneumacosm
Year	1967
Architect/Bureau	Haus-Rucker-Co
Country	Austria
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Sphere
Function	Residential
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental, Growing, Mobile** – "Pneumacosm is your very own living planet, made of plastic and functioning like an electric light bulb. Plug it into the sockets of existing urban frameworks and appreciate life in three dimensions, immersed in the surrounding environment. Thousands and thousands of Pneumacosms are shaping a new urban landscape." (Haus-Rucker-Co) https://www.frac-centre.fr/_en/art-and-architecture-collection/haus-rucker/pneumacosm-317.html?authID=86&ensembleID=193

○Concept of change:

［Imagined by Günter Zamp Kelp and Manfred Ortner as the Haus-Rucker-Co group's manifesto and founding project, Pneumacosm, "the respiration of the cosmos," is a housing unit made of inflatable plastic that functions like a light bulb within a vertical urban structure. When this unit is "plugged" into the building's façade, it is ready to be turned on. The unit is accessed via corridors added to the building while the interior of the sphere is divided into a common area and several smaller spaces designed to house various functions. These small functional units can be chosen individually prior to installation on the vertical structure. The internal organization of the sphere allows each occupant the possibility of a private space in a smaller pod, or shared social life in the larger common area.］

[B.Capsules' addition/ structural extension]

https://www.frac-centre.fr/_en/art-and-architecture-collection/rub/rub-317.html?authID=86&ensembleID=193

●Renovation:

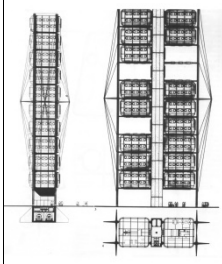
［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: _, Visual comfort/Quality of interior:_; Safety: Firm

structure: _, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: _.



No.	48
Name	House of Stacked Units
Year	1967
Architect/Bureau	Wolfgang Doring
Country	Worldwide
Status	Concept
Way of arrangement	③
No. of capsules	11~20
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Growing, Mobile** – (growing structures allowing adding or removing capsules)

○Concept of change:

［Units could be added or removed from the structure］

[A.Capsules' replacement/removal]

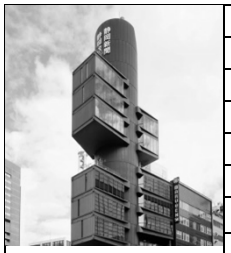
●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



	No.	49
	Name	Shizuoka Press and Broadcasting Center
	Year	1967
	Architect/Bureau	Kenzo Tange
	Country	Japan
	Status	Concept / Built / Renovated
	Way of arrangement	③
	No. of capsules	14
	Shape	Rectangular
	Function	Office
	Materials	Steel/Metal frame
	Capsule size fit	10 m^3
	Application	**Growing** - Tange shown in this project his vision Metabolist giving the building a core of facilities that can be plugged roughly capsules according to the need of building users. Proof of this are the terraces or voids that are on or between any of the modules. While the space is not needed it is left as a terrace. At the time that the expansion of offices needed, a new capsule would occupy this space. https://en.wikiarquitectura.com/building/shizuoka-press-and-broadcasting-center/

○Concept of change:

［Tange shown in this project his vision Metabolist giving the building a core of facilities that can be plugged roughly capsules according to the need of building users. Proof of this are the terraces or voids that are on or between any of the modules. While the space is not needed it is left as a terrace. At the time that the expansion of offices needed, a new capsule would occupy this space.］

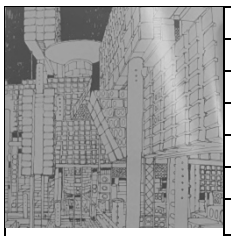
[B.Capsules' addition/ structural extension]

https://en.wikiarquitectura.com/building/shizuoka-press-and-broadcasting-center/

●Renovation:

［None］

◆Type of capsule: Urban



No.	50
Name	Japan Architect: 1967 Housing Design Competition 1st Place
Year	1967
Architect/Bureau	Kunihiko Harakawa et al
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	10001~1 million
Shape	Rectangular
Function	Multipurpose
Materials	Plastic
Capsule size fit	4 m^3
Application	**Growing, Mobile** – (the project describes an active urban matter where new capsules can be exchanged with old, as well equipment of a living unit over time) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change:

［Living units can be added together with city growth, expanding this urban closed network.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

The Japan Architect: Urban Residences for a High-Density, 1967

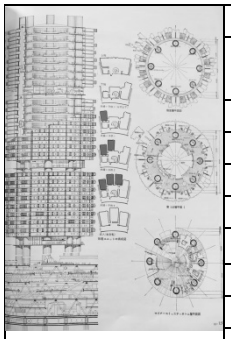
●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	51
Name	Japan Architect: 1967 Housing Design Competition Honorable Mention
Year	1967
Architect/Bureau	Takamizawa Shingo et al
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Growing, Mobile** – (drawings show attachment and detachment of capsules of different configurations while the whole project is presented as a megastructure) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change:

［Units are freely detachable and attachable to the minor community what the towers are.］

[A.Capsules' replacement/removal]

The Japan Architect: Urban Residences for a High-Density, 1967

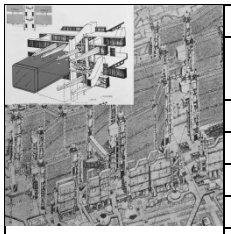
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



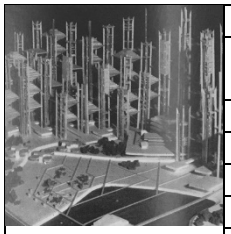
	No.	52
	Name	Japan Architect: 1967 Housing Design Competition Honorable Mention 2
	Year	1968
	Architect/Bureau	Sadao Tanaka
	Country	Japan
	Status	Concept
	Way of arrangement	③
	No. of capsules	10001~1 million
	Shape	Rectangular
	Function	Multipurpose
	Materials	Steel/Metal frame
	Capsule size fit	5 m^3
	Application	**Growing, Mobile** – (each resident is given around 400 sq m of space in a city which is in shape of a capsular house. Although it is not written if capsules can be exchangeable, new capsules can be added to a structure) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change: ［Capsules are provided after receiving property rights and are installed to the main structure of living units' section of the city.］ [E.Capsules' mobility/movability] The Japan Architect: Urban Residences for a High-Density, 1967	●Renovation: ［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:_; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



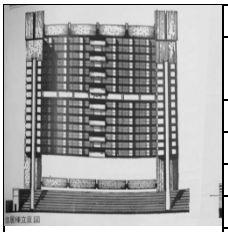
	No.	53
	Name	Japan Architect: 1967 Housing Design Competition Honorable Mention 3
	Year	1967
	Architect/Bureau	Hiroshi Inagaki et al
	Country	Japan
	Status	Concept
	Way of arrangement	③
	No. of capsules	10001~1 million
	Shape	Rectangular
	Function	Multipurpose
	Materials	Unspecified
	Capsule size fit	5 m^3
	Application	**Growing, Mobile** – (capsules are customizable depending on a family structure and new blocks of flats can be added to the existing expandable shafts) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change: ［Units are expandable corresponding to family growth. Mechanic arms control capsules installation or detachment processes.］ [A.Capsules' replacement/removal] [B.Capsules' addition/ structural extension] The Japan Architect: Urban Residences for a High-Density, 1967	●Renovation: ［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	54
Name	Japan Architect: 1967 Housing Design Competition Honorable Mention 4
Year	1967
Architect/Bureau	Nobuyoshi Fujimoto et al
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	Unspecified
Capsule size fit	7 m^3
Application	**Growing, Mobile** – (capsular units can grow around a structural core while the structure itself can expand over time) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change:

［New parts can be added to living units gradually.］

[D.Capsules' joint or fusion]

The Japan Architect: Urban Residences for a High-Density, 1967

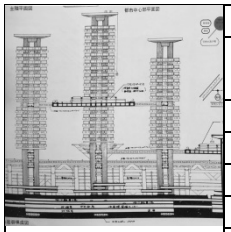
●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	55
Name	Japan Architect: 1967 Housing Design Competition Honorable Mention 5
Year	1967
Architect/Bureau	Kuniaki Suda et al
Country	Japan
Status	Concept
Way of arrangement	③
No. of capsules	101~200
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Growing, Mobile** – (capsules are moved by the cranes on top of the residential towers) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change:

［Structures can expand and contract due to the number of capsules which can be easily manipulated by cranes installed at tops of the buildings.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

The Japan Architect: Urban Residences for a High-Density, 1967

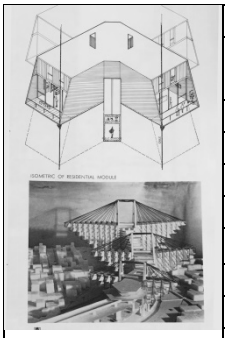
●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



No.	56
Name	Japan Architect: 1967 Housing Design Competition Honorable Mention 6
Year	1961
Architect/Bureau	Robert Esnard, Robert Markisz
Country	USA
Status	Concept
Way of arrangement	②
No. of capsules	51~100
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	10 m^3
Application	**Growing, Mobile** – (capsule homes are adjustable depending on a family's growth while structures prone to grow over the existing urban landscape) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change:

［Based on number of family members living units may be arranged correspondingly over time. ］

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

The Japan Architect: Urban Residences for a High-Density, 1967

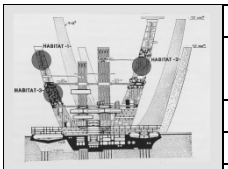
●Renovation:

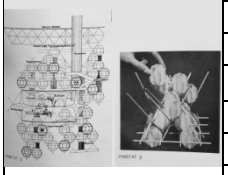
［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.





	No.	57
	Name	Japan Architect: 1967 Housing Design Competition Honorable Mention 7
	Year	1967
	Architect/Bureau	Kazuo Tamama et al
	Country	Japan
	Status	Concept
	Way of arrangement	④
	No. of capsules	1001~10000
	Shape	Polygonal
	Function	Residential
	Materials	RC
	Capsule size fit	5 m^3
	Application	**Mental, Growing, Mobile** – (in the superstructure living units are added in a shape of polygonal Easter eggs what is contrasted to an ordinary non-capsular "habitats" also presenting in the superstructure; the 3-dimantional structure allows manipulation with the capsules) The Japan Architect: Urban Residences for a High-Density, 1967

○Concept of change:

［Prefabricated residential units are nested inside space-frame and can be arranged, added, piled or removed freely.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

The Japan Architect: Urban Residences for a High-Density, 1967

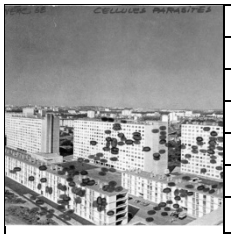
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: _, Climate control: _, Interim space: _, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ×; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.



No.	58
Name	Cellules Prasites
Year	1968
Architect/Bureau	Jean Louis Rey (Chaneac)
Country	Switzerland
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Custom
Function	Extension
Materials	Unspecified
Capsule size fit	4 m^3
Application	**Mental, Mobile** – Developed as a temporary extra space, “parasite cells are habitable volumetric elements mass-produced by industry or built spontaneously by individuals. They can be established in a few hours on the terraces of dwellings to create additional habitable volumes. <…> https://www.frac-centre.fr/collection-art-architecture/chaneac/cellules-parasites-64.html?authID=37&ensembleID=724

○Concept of change:

［Developed as temporary booster space, "parasitic cells are volumetric living elements mass produced by industry or spontaneously constructed by individuals. They can set up in a few hours on the terraces of houses to create additional living volumes. Manufactured "clandestinely", it materializes the dream of the inhabitants who can modulate their apartments by fixing these "cupping cells" directly on the facades.］

[B.Capsules’ addition/ structural extension]

https://www.frac-centre.fr/collection-art-architecture/chaneac/cellules-parasites-64.html?authID=37&ensembleID=724

●Renovation:

［None］

◆Type of capsule: Leisure

No.	59
Name	Hexacube
Year	1968
Architect/Bureau	Georges Candilis, Anja Blamsfeld
Country	France
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	1+no limit
Shape	Polygonal
Function	Residential
Materials	Plastic
Capsule size fit	3 m^3
Application	**Growing, Mobile** – Total design object since its interior fittings are a perfect echo to its exterior, the hexacube contains all the qualities of the utopias of the time: perfectly mobile, dismountable by two people, modular, grouping together in a tablecloth, it is made of two modules of different sizes allowing endless combinations. https://renamimoa.jimdofree.com/l-hexacube/

○Concept of change:

［Each element is seven square meters, but a system of hooks allows them to juxtapose and form multiple combinations. Everyone can choose the dimensions of their home.］

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

https://renamimoa.jimdofree.com/l-hexacube/

●Renovation:

［Many Hexacubes were installed at a holiday village in the Mediterranean tourist resort of Port Leucate, though nowadays you're more likely to see one going for five figure sums over on popular online antiques marketplace.］

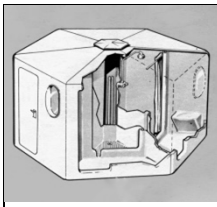
[i.Preservation]

https://edition.cnn.com/style/article/utopie-plastic/index.html

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



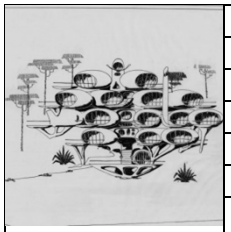
	No.	60
	Name	Plastic Modular Home
	Year	1968-1971
	Architect/Bureau	Wigth Plastics Limited
	Country	UK
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	1+no limit
	Shape	Hexagon
	Function	Residential
	Materials	Plastic
	Capsule size fit	4 m^3
	Application	**Mobile** – The basic module consists of 6 wall panels and 6 roof elements. The covered area is 14 m2. The interior height in the center is 2.60 m. The set reaches a weight of 295 kg. In order to allow easy transport, the module is delivered in the form of 2 packages of 2 m X 3 m X 0.45 m. Assembly is quick: 2 inexperienced men can assemble a module in 2 hours. It can be set up on any flat surface without special foundations. In the event of permanent use, it is necessary to provide for the bolting of the module to a concrete surface. http://astudejaoublie.blogspot.com/search/label/*Wight%20Plastics%20Limited

○Concept of change: ［None.］	●Renovation: ［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ▲, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: ●.



No.	61
Name	Residence of M. Ginet
Year	1968
Architect/Bureau	Pascal Hausermann
Country	Switzerland
Status	Concept
Way of arrangement	③
No. of capsules	21~50
Shape	Egg-shaped
Function	Residential
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mental** – (capsules scattered on the terrace with a distinct organic appearance) https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/residence-m-ginet-64.html?authID=87&ensembleID=233

○Concept of change:

［Since the beginning of the 1960s, Häusermann's ovoid architectures also rely on the assembly of prefabricated plastic shells and cells (Domobiles) that open to a flexible design of the habitat through an extremely successful architectural research.］

[F.Change of capsules' functions]

https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/residence-m-ginet-64.html?authID=87&ensembleID=233

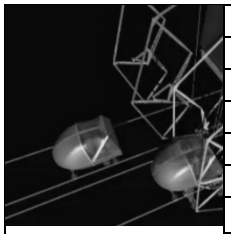
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



	No.	62
	Name	Drive-in House
	Year	1968
	Architect/Bureau	Michael Webb
	Country	UK
	Status	Concept
	Way of arrangement	③
	No. of capsules	1+no limit
	Shape	Vehicle
	Function	Residential
	Materials	Steel/Metal frame
	Capsule size fit	3 m^3
	Application	**Mental** – The ability to dream of next year's architectural modes does not depend only on knowing what next year's materials will do for you (plastic skins that dissolve in sunlight to reform again when it's cold, (which can take to the place in a test tube and let it sprout), but also in being able to see the meaning and importance behind such sanctuaries of our mechanized society as drive-ins, mobile homes, gadgets, cars that can be turned into caravans or boats, supermarket doors that open on approach, U-shaped transport trailers, etc. If you take the car, it can be a status symbol, an object of masculine virility, and a means of getting around that is fun to own and ride,but it can also be a mobile room that can be connected to a drive-in theater and become an extra surface of that bank. **Growing** – So the structure has been designed to be larger or smaller, depending on the size of the container population present. When a driver enters the perimeter of the block, he marks the part he wants to reach, and the hydraulic device – structure opens a parking space as shown in the three-phase diagram **Mobile** – Since most people will be using their mobile containers to travel around the block, when someone is throwing a party - like the people in number D - they are going to need a lot of space to accommodate all the containers. So when these same people are on vacation, there's going to be a lot of free and expensive space around their service/affiliate box. https://tecnne.com/biblioteca/archigram-drive-in-housing/

○Concept of change:

［In the 1960s Michael Webb, a young British architect of Archigram envisioned the integration of habitation and transportation. His Drive-in House consists of specially designed vehicles running on tracks and high-rise structures with mechanical cranes. As a vehicle approaches a building, a crane picks up the vehicle, elevates it along the side of the building, and finally plugs it into an apartment.］

[E.Capsules' mobility/movability]

https://tecnne.com/biblioteca/archigram-drive-in-

●Renovation:

［None］

housing/	
◆Type of capsule: Leisure (mental) LIVING STANDARDS: Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.	

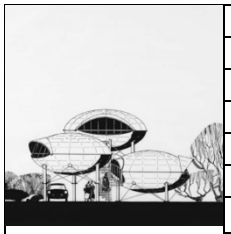
	No.	63
	Name	Habitat Puerto Rico
	Year	1968
	Architect/Bureau	Moshe Safdie
	Country	Puerto Rico
	Status	Concept / Built / Demolished
	Way of arrangement	②
	No. of capsules	101~200
	Shape	Custom
	Function	Hotel
	Materials	RC
	Capsule size fit	5 m^3
	Application	**Mental** – Habitat Puerto Rico was begun just a year after the success of the Expo '67 World Fair to provide 800 low-cost homes on a sloping, 20-acre site in the Hato Rey neighbourhood of San Juan. These stacked volumes were each to have a private garden and views of the city – a new vision for low-income community living. <…> Each unit was designed to have complete visual and acoustical privacy and a private terrace shaded by cantilevered units overhead. The upper portions of the windows were louvered and shaded; the lower halves had clear glass. **Growing** – (project had a big scale to utilize a mounting slope converting it into artificial terrain) https://cac.mcgill.ca/moshesafdie/fullrecord.php?ID=10820&d=1

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: _, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



	No.	64
	Name	Plastic Cells
	Year	1969
	Architect/Bureau	Pascal Hausermann
	Country	Switzerland
	Status	Concept
	Way of arrangement	①
	No. of capsules	3
	Shape	Custom
	Function	Residential
	Materials	Plastic
	Capsule size fit	7 m^3
	Application	**Mental** – A pioneer in the renewal of forms of architecture and town planning in the 1960s, Pascal Häusermann defended for more than fifty years modularity in architecture and the free expression of the individual. **Growing** – (flexibility of habitats were achieved by combining cells together as if fusing them) https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal-58.html?authID=87

○Concept of change:

［A pioneer in the renewal of forms of architecture and urban planning in the 1960s, Pascal Häusermann defended the modularity of architecture and the free expression of the individual for over fifty years. In 1958, Häusermann was the first to develop for the design of a house the technique of shotcrete on steel reinforcement. This very flexible application technique frees the concrete from its banches and favors the creation of various shapes, with single or double cylindrical, spherical, hyperbolic curvature - a process that will become the best way of expressing architecture-sculpture. Since the beginning of the 1960s, Häusermann's ovoid architectures also rely on the assembly of prefabricated plastic shells and cells (Domobiles) that open to a flexible design of the habitat through an extremely successful architectural research.］

[C.Capsules' rearrangement]

[F.Change of capsules' functions]

http://www.bubblemania.fr/en/museumotel-1967-pascal-hausermann-1936-2011/

https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal-58.html?authID=87

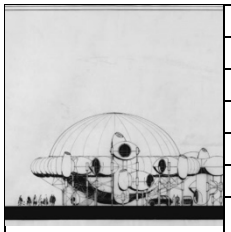
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



	No.	65
	Name	Mobile Theatre
	Year	1969
	Architect/Bureau	Pascal Hausermann
	Country	Switzerland
	Status	Concept / Built / Demolished
	Way of arrangement	①
	No. of capsules	11~20
	Shape	Egg-shaped
	Function	Attraction
	Materials	Plastic
	Capsule size fit	4 m^3
	Application	**Mental** – The architect Pascal Häusermann then designed a strange structure: a main sphere houses the auditorium, and the second contains the stage. The public settled in the center of the performance hall, in a configuration that was ultimately fairly close to the traditional theatre. But the stage itself could adopt 19 different configurations, depending on the needs of the show. To this moving organization are added 12 cardboard cells, sort of satellites capable of acting as dressing rooms, for another point of view on the show. **Mobile** – Built in Thonon, the Mobile Theaterwas transported and staged in Saint-Herblain, then in Courbevoie for the performances. https://actualitte.com/article/39500/distribution/le-theatre-mobile-de-pascal-hausermann-1-scene-19-configurations

○Concept of change:

［The audience could sit in the center, in circular and removable bathtubs, and attend performances on a stage that could take nineteen different configurations. Built in Thonon, the Mobile Theaterwas transported and mounted at Saint-Herblain, then at Courbevoie for the performances.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

https://actualitte.com/article/39500/distribution/le-theatre-mobile-de-pascal-hausermann-1-scene-19-configurations

●Renovation:

［None］

◆Type of capsule: Urban (mental)

<table>
<tr><td rowspan="11">  </td><td>No.</td><td>66</td></tr>
<tr><td>Name</td><td>Inflatable Mobile Unit</td></tr>
<tr><td>Year</td><td>1969</td></tr>
<tr><td>Architect/Bureau</td><td>Hans Hollein</td></tr>
<tr><td>Country</td><td>Austria</td></tr>
<tr><td>Status</td><td>Concept / Built / Removed</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>1</td></tr>
<tr><td>Shape</td><td>Custom</td></tr>
<tr><td>Function</td><td>Office</td></tr>
<tr><td>Materials</td><td>Plastic</td></tr>
<tr><td>Capsule size fit</td><td>2 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental, Mobile – Hans Hollein’s ‘Mobile Office’ (1969) has been catalogued as an installation consisting of PVC-foil, a vacuum cleaner, a typewriter (Hermes Baby), a telephone, a drawing board, a pencil, rubber, and thumbtacks. In fact, Mobile Office is a two-minutes-and-twenty-seconds-long performance exclusively produced for television. It paradigmatically shows the contours of an emerging shift in architectural practice that must be read in parallel to the radical transformations in the organization of labour in the postwar years.

https://archinect.com/features/article/150057955/screen-print-66-hans-hollein-s-mobile-office-and-the-new-workers-reality</td></tr>
<tr><td colspan="2">○Concept of change:

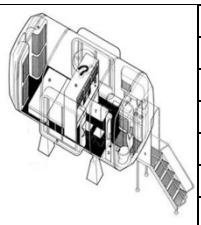
［In 1969, years before mobile-communication had developed ist possibilities, Hollein proposed the inflatable mobile office, that provided take-along-workspace to blow up. […] In 1969, decades before winning the Pritzker Prize, Austrian architect Hans Hollein built an inflatable mobile office that could be carried around and set up practically anywhere. Prophesying what would later become a laptop, the project—part pneumatic architecture, part performance, part video art—involved Hollein landing a small airplane on a runway and setting up the portable, plastic space, in which he could be seen talking on the telephone and typing.］

[B.Capsules’ addition/ structural extension]

[E.Capsules’ mobility/movability]

https://archinect.com/features/article/150057955/screen-print-66-hans-hollein-s-mobile-office-and-the-new-workers-reality</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Nomadic (mental)</td></tr>
</table>



No.	67
Name	Yadokari Hermit Crab Capsule Lodge
Year	1969
Architect/Bureau	Kenji Ekuan
Country	Japan
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	2
Shape	Rectangular
Function	Residential
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mobile** – (mobile capsule on legs) https://socks-studio.com/2015/10/18/from-the-furniture-to-the-city-1964-scale-escalating-projects-by-metabolist-kenji-ekuan/

○Concept of change:

［After the 1953's "Phone Booth" (a pre-capsule design that became ubiquitous in Japan) and the 1962-63's "Plastic Ski Lodge" (a well equipped mobile home transportable on a truck), Ekuan began designing systems operating on every scale.］

[E.Capsules' mobility/movability]

https://socks-studio.com/2015/10/18/from-the-furniture-to-the-city-1964-scale-escalating-projects-by-metabolist-kenji-ekuan/

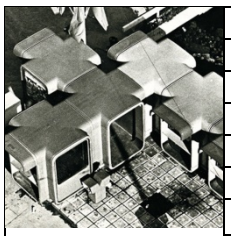
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	68
Name	K67
Year	1969
Architect/Bureau	Sasa J. Machtig
Country	Slovenia
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Multipurpose
Materials	Plastic
Capsule size fit	2 m^3
Application	**Growing**, **Mobile** – <…>the existing structures (used as tobacco shops and newsstands) were treated too much like small houses in their conceptualization and construction. Presenting the K67 project for the first time, Mächtig offered a revised set of precedents: “In its modern interpretation the kiosk allows the possibility of growth and change, in purpose perhaps similar to Scandinavian cupboard systems and in terms of design to automotive bodywork.” https://www.archdaily.com/806346/the-story-of-the-1960s-mass-produced-modular-design-that-actually-went-into-production

○Concept of change:

［In theory, the system permitted unlimited configurations and variations. […] Occasionally, Mächtig even developed special customizations for particular functions, such as fast-food preparation.］

[B.Capsules’ addition/ structural extension]

[C.Capsules’ rearrangement]

[D.Capsules’ joint or fusion]

[E.Capsules’ mobility/movability]

[F.Change of capsules’ functions]

http://davidhuber.info/sasa-machtig-k67-modular-kiosk/

●Renovation:

［Around the world, they were adapted to uses ranging from border patrol stations and ski lift ticket booths to retail and fast-food stands. […] The K67, a recent retrospective of Mächtig’s work at the Museum of Architecture and Design in Ljubljana managed to restore its original brilliance.］

[i.Preservation]

[vii.Adapt function]

https://www.archdaily.com/806346/the-story-of-the-1960s-mass-produced-modular-design-that-actually-went-into-production

◆Type of capsule: Urban

No.	69
Name	Capsule Houses
Year	1969
Architect/Bureau	Wolfgang Doring
Country	Germany
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Cube
Function	Residential
Materials	Plastic
Capsule size fit	3 m^3
Applicability	**Growing**, **Mobile** – With the capsule houses, he consistently developed the principle of prefabrication further, since these no longer require any further supporting structures. Similar to the construction system of the Mero knot, they can be connected to each other on all sides. Design drawings show that a serial housing estate in Solingen-Caspersbroich was planned with the capsule system. Each module should have an edge length of three meters. Since the cubes should be easy to transport, use in developing countries was also planned. http://archiv.dam-online.de/handle/11153/061-002-002

○Concept of change:

［Expandable plastic capsules could arrange different flexible structures. […] The structures, which are able to be constantly converted and dismantled like a pin game, are comparable to the visions of the Japanese metabolists like Isozaki, the group Archigram, and the Metastadt by Richard J. Dietrich.］

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

http://archiv.dam-online.de/handle/11153/061-002-002

●Renovation:

［None］

◆Type of capsule: Urban

No.	70
Name	Modular and Floating Leisure Habitat
Year	1970
Architect/Bureau	Jacques Beufe
Country	France
Status	Concept / Built
Way of arrangement	①
No. of capsules	2
Shape	Custom
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Growing** - This habitat, made up of high-strength shells, mechanically assembled, constitutes rigid assemblies. The land version has an adjustable tripod base; the low weight of the assembly allows the removal of foundations, the use of steeply sloping land or normally insufficient work rates. The floating version allows: continuous mobility of orientation in relation to the sun, views, winds; displacement by barge or autonomous by the addition of a motor and derivatives; establishment in lake groupings on existing bodies of water or created in suitable sites, artificial bodies of water should be linked by canals to natural bodies of water, safeguarded in their integrity to allow navigation and activities tourist. **Mobile** – <…>sold furnished, it is immediately usable; light weight and transportable, it can be installed in all sites or even in sites unsuitable for traditional construction: aquatic sites, land with an insufficient work rate, etc. http://astudejaoublie.blogspot.com/2013/04/habitat-de-loisirs-modulable-j-beufe.html

○Concept of change:

［Industrialized, transformable, combinatorial and extensible (and floating) leisure home］

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

http://astudejaoublie.blogspot.com/2013/04/habitat-de-loisirs-modulable-j-beufe.html

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	71
Name	The Pirate Bubble
Year	1970
Architect/Bureau	Jean Louis Rey (Chaneac)
Country	Switzerland
Status	Concept / Built / Demolished
Way of arrangement	③
No. of capsules	1
Shape	Egg-shaped
Function	Extension
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental -** Avignon-born Chanéac was one of the first to experiment with spontaneous, temporary and adaptable architectural solutions. Developed as temporary and supplementary spaces, “parasitic cells are volumetric inhabitable elements which are mass-produced by industry or spontaneously built by individuals. They can be erected in a matter of hours onto the façades of buildings as a way of creating complementary inhabitable spaces” **Mobile** – Chanéac applied for a patent for these multifunctional plastic cells, which could be produced in the factory, transported by road and assembled in two hours. https://popupcity.net/observations/the-pirate-bubble-parasite-architecture-from-the-seventies/

○Concept of change:

［Developed as temporary and supplementary spaces, “parasitic cells are volumetric inhabitable elements which are mass-produced by industry or spontaneously built by individuals. They can be erected in a matter of hours onto the façades of buildings as a way of creating complementary inhabitable spaces.］

[B.Capsules’ addition/ structural extension]

https://popupcity.net/observations/the-pirate-bubble-parasite-architecture-from-the-seventies/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ×.

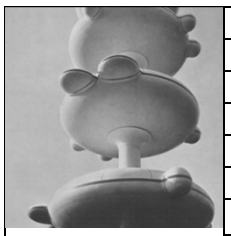
<table>
<tr><td rowspan="10">  </td><td>No.</td><td>72</td></tr>
<tr><td>Name</td><td>Experiment 70</td></tr>
<tr><td>Year</td><td>1969</td></tr>
<tr><td>Architect/Bureau</td><td>Luigi Colani</td></tr>
<tr><td>Country</td><td>Germany</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>1</td></tr>
<tr><td>Shape</td><td>Sphere</td></tr>
<tr><td>Function</td><td>Utilities</td></tr>
<tr><td></td><td>Materials</td><td>Plastic</td></tr>
<tr><td></td><td>Capsule size fit</td><td>2 m^3</td></tr>
<tr><td></td><td>Application</td><td colspan="2">Mental – “The earth is round, all the heavenly bodies are round; they all move on round or elliptical orbits. This same image of circular globe-shaped mini worlds orbiting around each other follows us right down to the microcosmos. We are even aroused by round forms in species propagation related eroticism. Why should I join the straying mass who want to make everything angular? I am going to pursue Galileo Galilei’s philosophy: my world is also round.” — Luigi Colani

Growing – The kitchen pod would connect to the main house. His “kitchen satellite” from 1969 is a prominent example of his ergonomic “biodynamic” school of thought and his love affair with rounded forms.

https://retroobsessions.wordpress.com/2012/08/04/luigi-colani-satellite-kitchen-1969/</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Leisure (mental)</td></tr>
</table>



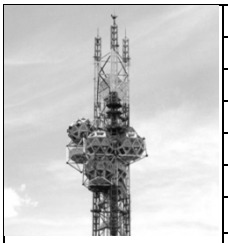
	No.	73
	Name	Total Housing Unit
	Year	1970
	Architect/Bureau	Luigi Colani
	Country	Germany
	Status	Concept
	Way of arrangement	③
	No. of capsules	21~50
	Shape	Custom
	Function	Residential
	Materials	Plastic
	Capsule size fit	2 m^3
	Application	**Growing, Mobile** – (Towers can vary in modules which, again, have their subordinate modules which can be added to the main capsule) http://www.bubblemania.fr/en/luigi-colani-ei-tour-luntec/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ▲, Climate control: _, Interim space: ×, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: _.



No.	74
Name	Expo Tower
Year	1970
Architect/Bureau	Kiyonori Kikutake
Country	Japan
Status	Concept / Built / Demolished
Way of arrangement	③
No. of capsules	7
Shape	Polygonal
Function	Attraction
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Mental** – It wasn't just a tower, it was thought of as a model for a future residential city (being the landmark tower, the architecture was a symbol of a city of the future) **Mobile**, **Growing** – (additional capsules could be added anywhere to the metal structure) http://expotower.fan.coocan.jp/1970/what/index.html

○Concept of change:

［As realization of the concept of Tower Shaped Community the main structure bears capsules able to be easily removed or added.］

[A.Capsules' replacement/removal]

http://expotower.fan.coocan.jp/1970/what/index.html

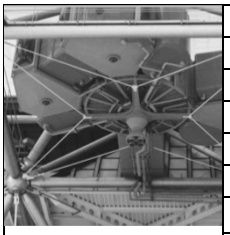
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

	No.	75
	Name	Takara Beautilion
	Year	1970
	Architect/Bureau	Kisho Kurokawa
	Country	Japan
	Status	Concept / Built / Demolished
	Way of arrangement	④
	No. of capsules	20
	Shape	Cube
	Function	Attraction
	Materials	Steel/Metal frame
	Capsule size fit	4 m^3
	Application	**Mental** – Beauty knows no limits or generational differences. The pursuit of beauty, which the companies of the Takara Group presented, was related to the themes of the Expo. Thus, the theme of their pavilion was 'The Joy of Being Beautiful'...which was called the Beautilion. Apart from that, the pavilion presented a new type of modern beauty in an architectural style using steel pipe elements. The elements, manufactured in factories, were assembled on site and the pavilion was built in only one week. It was a symbolic tower made of plastic capsules. It conveyed the symbols of man's past and progress. Visitors entered the pavilion by first walking through a hanging garden filled with flowers. **Mobile** – (capsules were independent and could be detached or attached to the structure) **Growing** – This structure is characterized with its potential to extend, or replicate horizontally and vertically depending on necessity. https://en.worldfairs.info/expopavillondetails.php?expo_id=18&pavillon_id=1551 https://www.kisho.co.jp/page/211.html

○Concept of change: ［This structure is characterized with its potential to extend, or replicate horizontally and vertically depending on necessity. An investigation of structure, whether a structure can expand, shrink, or reduce depending on necessity, in other words, a search for architecture of Metabolism is suggested.］ [A.Capsules' replacement/removal] [B.Capsules' addition/ structural extension] https://www.kisho.co.jp/page/211.html	●Renovation: ［None］
◆Type of capsule: Leisure (mental)	



	No.	76
	Name	Capsule for Living
	Year	1970
	Architect/Bureau	Kisho Kurokawa
	Country	Japan
	Status	Concept / Built / Demolished
	Way of arrangement	④
	No. of capsules	1
	Shape	Custom
	Function	Residential
	Materials	Plastic
	Capsule size fit	7 m^3
	Application	**Mental** – The Capsule House was suspended from the space frame in the pavilion, built with a window in the living room floor to view the ground below. The installation of the substructure (architecture) into the mega-structure (city infrastructure) shows one possibility of what cities in the future will be like. The suspension of the architecture from the also shows that we are one step closer to achieving a weightless base in outer space. **Mobile** – (capsules for family members or with equipment could be added separately) https://www.kisho.co.jp/page/211.html

○Concept of change:

［The Capsule House was suspended from the space frame in the pavilion, built with a window in the living room floor to view the ground below. The installation of the substructure (architecture) into the mega-structure (city infrastructure) shows one possibility of what cities in the future will be like.

The suspension of the architecture from the also shows that we are one step closer to achieving a weightless base in outer space.］

[D.Capsules' joint or fusion]

https://www.kisho.co.jp/page/211.html

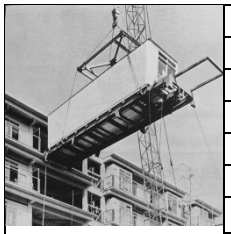
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



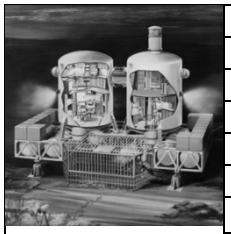
No.	77
Name	Steinhaym
Year	1970
Architect/Bureau	New Metal Production Japan
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Growing** – (modules used in a prefabrication construction method)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



	No.	78
	Name	Tektite II Habitat
	Year	1970
	Architect/Bureau	Alaska Fisheries Science Center
	Country	USA
	Status	Concept / Built
	Way of arrangement	③
	No. of capsules	2
	Shape	Cylinder
	Function	Residential
	Materials	Steel/Metal frame
	Capsule size fit	7 m^3
	Application	**Mental** – Tektite was among the largest, most ambitious undersea habitats ever built. The internal volume, as a single structure (i.e. excluding Conshelf 2) was second only to Conshelf 3. The dual drum-shaped capsules were linked by a water tight corridor, a first for any standalone underwater structure, and several dome shaped windows afforded a magnificent view of the surrounding undersea environment. **Mobile**, **Growing** – (the habitat was transported to the side and lowered to seabed; it was one of the several missions of underwater habitats) https://www.spaceflightinsider.com/space-flight-news/nasas-tektite-ii-undersea-habitat-an-interview-with-aquanaut-engineer-peggy-lucas-bond/ https://ponytailjournal.com/womens-wear/the-two-weeks-habitability-tektite-program

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: ▲ , Natural light: ×, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	79
Name	Venturo House
Year	1971
Architect/Bureau	Matti Suuronen
Country	Finland
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental** – The Finish architect's futuristic vision was as suited for the Jetsons as for Barbarella or Modesty Blaise, an architecture for the raging rebellious plastic fantastic pop-culture. A "Just bring your orange bikini, and come for the weekend!"-kind of house. Suuronen was along with contemporaries like Verner Panton, Joe Colombo, Gaetano Pesce, and Archigram just one of many exponents for a design and architecture replacing a stale international modernism with blobby, curvy, sleek forms for a casual, easy-going lifestyle. **Mobile** – The likewise maintenance free, modularly assembled Venturo house was made out of fiberglass reinforced plastic, metal, and glass. Transport was easy, just lift the 7 parts onto a truck with a trailer, and go look for a piece of land. **Growing** – (additional configurations of combined capsules are possible) https://thefuturohouse.com/pdf/venturo-brochure.pdf http://www.venturohouse.com/eng

○Concept of change:

［Suuronen's first venture in creating the house of the future was the flying saucer-like Futuro, something of a sci-fi prop that could land in whatever kind of terrain thanks to its four sturdy adjustable legs.］

[E.Capsules' mobility/movability]

http://www.venturohouse.com/eng

●Renovation:

［Today only 9 Venturos are known to remain in the world. In Sweden one is used as a café at Kivik Art Center, another is possibly lost, while the number 17 is being restored to its original pristine condition and up for sale.］

[i.Preservation]

[iii.Change of location]

[iv.Structural repairs]

[v.Cosmetic repairs]

[vii.Adapt function]

http://www.venturohouse.com/eng

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	80
Name	Do-Bausystem-Plastic House
Year	1970-1971
Architect/Bureau	Jean-Claude Ventalon, Ana Sklenar
Country	Germany
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	1+no limit
Shape	Polygonal
Function	Residential
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental** – (plastic holiday modular home) **Mobile** – The polyhedral structures of the system are based on the Euclidean division of a modified dodecahedral cell. This basic cell envelops a cube whose edges (230, 230, 230) divide the dodecahedral envelope into 6 identical self-supporting shells, which for transport can be stacked in order to reduce the size. **Growing** – The basic cell of this building system is dodecahedral and encloses an inscribed cube with a side of 230 cm, thus offering — despite the small external dimensions — a relatively large usable surface. http://astudejaoublie.blogspot.com/2013/09/do-bausystem-plastic-house-jc-ventalon.html

○Concept of change:

［The interest of this system of construction resides in the multiple combinations of cell assemblies that it presents. A basic cell provides a base area, 7 m2. This surface can be increased by the addition (at 60 or 90 °) of other cells of the same surface or of special cells for sanitary and kitchen. The cells can also be superimposed on two vertical rows.］

[D.Capsules' joint or fusion]

http://astudejaoublie.blogspot.com/2013/09/do-bausystem-plastic-house-jc-ventalon.html

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	81
Name	Domobiles
Year	1971
Architect/Bureau	Pascal Hausermann
Country	Switzerland
Status	Concept / Built
Way of arrangement	①
No. of capsules	8
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mental** – An emblematic project of all Häusermann's research on evolving housing, the Domobiles were the subject of multiple developments during the 1970s by the architect, who notably imagined applications in the broader field of the city. **Growing** – Pascal Häusermann also develops an architecture of bubbles and shells: the cell becomes the basic element of a modular architecture proceeding by aggregates, connections or free juxtaposition of elements, to constitute a constantly evolving habitable whole. https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/domobiles-64.html?authID=87&ensembleID=245

○Concept of change:

［Pascal Häusermann also develops an architecture of bubbles and shells: the cell becomes the basic element of a modular architecture proceeding by aggregates, connections or free juxtaposition of elements, to constitute an ever evolving living ensemble. Organic forms of Domobilesresult from extremely successful technical and architectural research. Combinations of polyurethane foam shells covered with reinforced polyester, the housing modules are factory-built and then transported on site, offering a cost-effective and at the same time flexibility in the design of the habitat by the user.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

https://www.frac-centre.fr/collection-art-architecture/hausermann-pascal/domobiles-64.html?authID=87&ensembleID=245

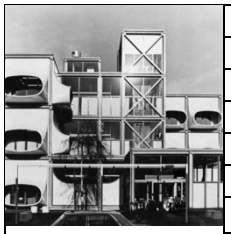
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

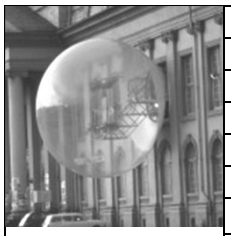
Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	82
Name	AZM Offices
Year	1972
Architect/Bureau	Laurens Bisscheroux
Country	Netherlands
Status	Concept / Built / Demolished
Way of arrangement	②
No. of capsules	21~50
Shape	Cube
Function	Office
Materials	RC
Capsule size fit	5 m^3
Application	**Mental** - This futuristic structure turns out to be a basic, flexible, largely prefabricated office building.<…> Bisscheroux was commissioned to design a new, functional building that could be easily extended, could be flexibly arranged and had an open and inviting character. He was free in choice of materials and construction. The abundant use of glass, the light through the bells, the generous dimensions and the use of colors and materials ultimately give the building an open atmosphere. The light horns are designed in such a way that the desired amount of light enters at every position of the sun. These replaced the usual blinds. At the same time, contact with the outside world continued. Also, all installations, such as the elevator and the boiler, are visible from the outside of the building, even all wiring and pipes. Inside there are no solid walls, but partitions that can be moved. By using color he accentuates the functionality of elements. https://www.archieven.nl/nl/zoeken?mivast=0&mizig=210&miadt=62&miaet=1&micode=507&minr=1226828&miview=inv2

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban



No.	83
Name	Oase N7
Year	1972
Architect/Bureau	Haus-Rucker-Co
Country	Austria
Status	Concept / Built / Removed
Way of arrangement	③
No. of capsules	1
Shape	Sphere
Function	Attraction
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental**, **Growing** – Taking their cue from the Situationist's ideas of play as a means of engaging citizens, Haus-Rucker-Co created performances where viewers became participants and could influence their own environments, becoming more than just passive onlookers. These installations were usually made from pneumatic structures such as Oase No. 7 (1972), which was created for Documenta 5 in Kassel, Germany. An inflatable structure emerged from the façade of an existing building creating a space for relaxation and play... https://www.fourwall.com/blog/2017/1/18/haus-rucker-co-oase-no-7-1972

○Concept of change:

［Oase No. 7 was designed as part of the Documenta 5 exhibition in Kassel, 1972. The Cloud by Coop Himmelb(l)au was also designed to be featured in Documenta 5, however it remained unbuilt.］

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

https://www.fourwall.com/blog/2017/1/18/haus-rucker-co-oase-no-7-1972

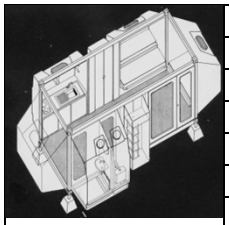
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ×, Easy navigation: ×, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	84
Name	Tetrodon
Year	1972
Architect/Bureau	AUA
Country	France
Status	Concept / Built / Renovated
Way of arrangement	②
No. of capsules	1+no limit
Shape	Custom
Function	Multipurpose
Materials	Plastic
Capsule size fit	5 m^3
Application	**Growing, Mobile** - They created this. Inspired by the Tetrodon fish (apparently), it is a modular habitat, designed to be transportable on the road network. Indeed, the it based on the frame of a shipping container, with additional areas able to be added with the addition of polyester 'bubbles'.<…> (also the modules can create clusters) https://www.recoursexploration.com/portfolio/aua-tetrodon-architecture/ http://astudejaoublie.blogspot.com/2015/01/lege-cap-ferret-tetrodon-habitat.html

○Concept of change:

［Invented by the AUA (Urbanism and Architecture Workshop) the tetrodon has the peculiarity of being dimensioned as a container and to be able, unit by unit, to travel to transport standards on trucks, for example. We can juxtapose them, superimpose them on any terrain because they are based on small adjustable studs. What is interesting about the tetrodon, in addition to its mobility, is this alliance between a metal structure and polyester elements that are disassembled and stored in the said structure for easy transport. […] Mobile and placed in places of high visibility, Tetrodon will be a mediating architecture creating links and interactions in partnership with local communities and cultural institutions.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

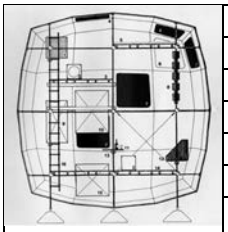
https://www.recoursexploration.com/portfolio/aua-tetrodon-architecture/

http://astudejaoublie.blogspot.com/2015/01/lege-cap-ferret-tetrodon-habitat.html

●Renovation:

［Separate examples are received by several institutions over France with collaboration of activists and construction companies for conservation as architectural heritage. […] The City of Architecture and Heritage organizes an exhibition "AAU years" in 2015. The course and projects of the Workshop of urban planning and architecture will be traced. The city of architecture and heritage wishes to exhibit on this occasion the Tetrodon de Fos-sur-Mer outside the Palais de Chaillot from June to September 2015.[…] After several prototypes from 1970 onwards, the tetrodons switched to mass production but in 1973, the first oil shock and its impact on petrochemical-based products put an end to the tetrodons, whose total production reached a little over a thousand copies. Among the installed projects, there is a center of Sonacotra in Fos-sur-Mer or a holiday center in Lège-Cap-Ferret, both of which have been the subject of safeguarding projects. One of the copies of Fos-sur-Mer has been awarded the "Heritage of the 20th century" label 1. As for the Lège-Cap-Ferret tetrodons, when the VVF Villages center where they were chosen to replace them, the municipality of Lège-Cap-Ferret bought 40 to offer seasonal habitat and 42 others were taken over. by the Darwin Endowment Fund. […] Of the 80 Tetrodons installed in 1979 at VVF Claouey, 40 were recovered by the town hall of

	Lège-Cap-Ferret and installed at Camping des Pastourelles and Camping des Embruns in Claouey.〕 [i.Preservation] [iii.Change of location] [v.Cosmetic repairs] [vi.Interior renovation] https://www.recoursexploration.com/portfolio/aua-tetrodon-architecture/ http://astudejaoublie.blogspot.com/2015/01/lege-cap-ferret-tetrodon-habitat.html
◆Type of capsule: Leisure LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.	



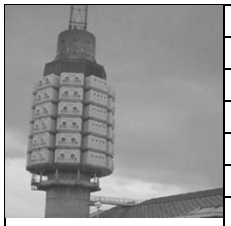
No.	85
Name	Microhouse
Year	1972
Architect/Bureau	Ken Isaak
Country	USA
Status	Concept / Built / Demolished
Way of arrangement	①
No. of capsules	1+no limit
Shape	Polygonal
Function	Residential
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental**, **Mobile** – In 1974 Ken Isaacs published a book called How to build your own Living Structures.Â The book is a guide on how to make unique interiors, storage units, and… a microhouse.Â Isaacs created and designed this modular shelter which is flexible in a way where you can separate and divide it into tiny sections inside.Â His book provides step by step instructions with plans for different versions of the micro house. https://tinyhousetalk.com/8-foot-micro-house/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ▲, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ×.



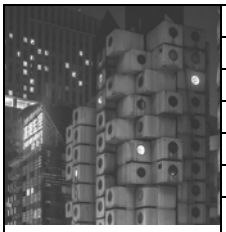
No.	86
Name	Tower of Youth
Year	1972
Architect/Bureau	Suga Yoshitomi
Country	Japan
Status	Concept / Built / Demolished
Way of arrangement	③
No. of capsules	48
Shape	Rectangular
Function	Attraction
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental** – (capsules are put around the main core and serve as hotel room; the building itself is a landmark and has a techno-futuristic image)

○Concept of change:	●Renovation:
［None］	［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: _, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: _.



No.	87
Name	Nakagin Capsule Tower
Year	1972
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept / Built / Being renovated
Way of arrangement	③
No. of capsules	140
Shape	Rectangular
Function	Multipurpose
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental** - <...> Its design embodies the Metabolists' urban and social ideals: a city of mobility and flexibility, and a system adapted to the needs of a fast-paced, constantly changing society. The building celebrates the idea of interchangeability and flexibility through the capsule<...>. iconichouses.org, fastcompany **Growing** – Kurokawa developed the technology to install the capsule units into a concrete core with only 4 high-tension bolts, as well as making the units detachable and replaceable. kisho.co.jp **Mobile** – Capsules were manufactured offsite and delivered by a truck being 90% complete Hidaka J. Nakagin Capsule Tower Building," UIA. 2011

○Concept of change:

Kurokawa developed the technology to install the capsule units into a concrete core with only 4 high-tension bolts, as well as making the units detachable and replaceable.

［A. Capsules' replacement/removal］

<⋯> connecting units can also accommodate a family.

［D. Capsules' joint/fusion］

Kisho Kurokawa architect & associates

<⋯> therefore, capsule can be detached from it and circulate outside in metabolism way and, eventually, creating the new city.

［B. Capsules' addition/expansion］

［E. Capsules' mobility/movability］

［G. Recyclability/Reuse］

●Renovation:

［(i). Preservation］

nakagincapsuletower.com

［(vi). Interior renovations］

［(vii). Adapt function］

Cases of renovated capsules. Shigetoshi I. et al., Nakagin Capsule Tower Building

Hidaka J.: Nakagin Capsule Tower	

◆Type of capsule: Leisure (Mental)

LIVING STANDARDS:

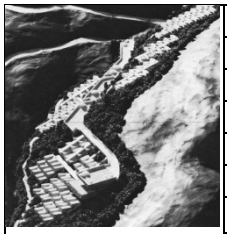
Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

COMMUNITY:

Inside activity: Local chat, parties, meetings;

Building's management: Renovation works, sell-buy of capsules, resident's building management association with right to vote, engagements with business sector and authorities

Outreach: Media engagement, tours, exhibitions; SNS, public page, personal blogs, books' print, merchandise, crowdfunding, social projects, petitions



No.	88
Name	Capsule Village
Year	1972
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept
Way of arrangement	②
No. of capsules	101~200
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental** – (same as in Nakagin Capsule Tower) **Growing**, **Mobile** – The Capsule Village designed to receive leisure dwellings in a plug and play pod format was perhaps the purest expression of the metabolist vision. A large-scale three-dimensional truss spanned intermediately placed concrete supports charting a steep topography outlining a field of potential dwelling outlets. The dancing megastructure touching the landscape sporadically presented the idea of minimal site disturbance further informing its potential to be constructed or deconstructed as needed. The «homo movens» (the mobile man) zeitgeist was central to the development of this type of evolving structure. https://misfitsarchitecture.com/2015/02/23/the-persistence-of-visionaries/capsule-village/ http://prefabricate.blogspot.com/2018/08/prefabrication-experiments-171.html

○Concept of change:

［View of configuration of the whole facility may be randomly equipped.］

[C.Capsules' rearrangement]

https://misfitsarchitecture.com/2015/02/23/the-persistence-of-visionaries/capsule-village/

http://prefabricate.blogspot.com/2018/08/prefabrication-experiments-171.html

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

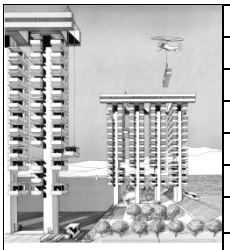
No.	89
Name	Capsule House-K
Year	1973
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept / Built
Way of arrangement	③
No. of capsules	4
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental** – (capsules have different interiors depending on function; one of the capsules is finished as a traditional Japanese tea-room **Mobile** – (capsules are delivered complete on site and be potentially movable to other structures) https://capsule-architecture.com/1973k.html

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	90
Name	Interpod Tower I
Year	1973
Architect/Bureau	William Morgan
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	80
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Growing**, **Mobile** – (living units are replaceable and can be moved by rail or helicopter according to the concept)

○Concept of change:

［The towers are attached to railway able to transport pods from one location to another. The towers may bear as many pods as their capacity allows.］

[A.Capsules' replacement/removal]

[E.Capsules' mobility/movability]

●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

No.	91
Name	Residence Gamma
Year	1973
Architect/Bureau	Jacques Mermet, Agence Parisot
Country	France
Status	Concept / Built / Demolished
Way of arrangement	②
No. of capsules	101~200
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Mental** - It is a question, in an ideological context marked by criticism of large housing estates, of fighting against the hegemony of heavy prefabrication by encouraging alternative construction systems.<…> designer, Jacques Mermet, is working with an architectural firm from Nancy on the development of a metallic system. “At the origin of the Gamma system, recalls Jacques Mermet, there is the research of Parisot, who already had some experience of metal. He had tried to develop with an industrialist from Verdun, Mr. Gervez, a system intended for the market of individual houses and it was only after several experiments that they sought to market the process in the field of collective . https://books.openedition.org/pupvd/6951

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ●; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

No.	92
Name	SIHR – Option 75. 144 sq.m prototype
Year	1974
Architect/Bureau	Claude Prouve
Country	France
Status	Concept / Built
Way of arrangement	②
No. of capsules	12
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental, Mobile** – The conclusions of these different analyzes have shown that only light construction made it possible to achieve true industrialization — through the production in very large series of the constituent elements and habitable volumes completely finished in the factory.<…> The habitable volumes should in particular be as large as possible, allow all the desirable types of housing, be extremely quickly connected to each other and eliminate any finishing work after assembly, allow the greatest diversification and malleability. http://astudejaoublie.blogspot.com/2015/01/ludres-option-75-constructions.html

○Concept of change:

［In particular, the living space should be as large as possible, allow all types of housing desirable, be of extremely fast connection between them and remove any intervention of second work after assembly, allow greater diversification and malleability. The horizontal or vertical juxtaposition of these absolutely standardized volumes, whatever their situation or their use, allows the realization of all forms of habitat: individual, semi-collective or collective; principal or secondary; urban or rural.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

http://astudejaoublie.blogspot.com/2015/01/ludres-option-75-constructions.html

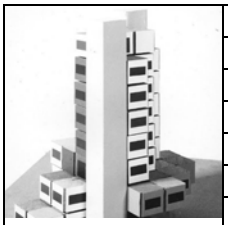
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: ●.



No.	93
Name	SIHR – Experimental building
Year	1974
Architect/Bureau	Claude Prouve
Country	France
Status	Concept / Built / Demolished
Way of arrangement	③
No. of capsules	51~100
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3

Application	**Mental** – Known as the "experimental building of SIRH", the eight storey abandoned structure was created by sixty prefabricated modules that served as a prototype for the SIRH Process – a construction process that experimented with the idea of prefabricating flexible standard living cells that could be easily assembled on site in a unlimited amount of configurations to provide for affordable individual or collective dwellings. **Growing, Mobile** – The post and panel component system could evolve over time, be repurposed, replaced and even disassembled once no longer needed. The main differentiating point between this open system and the plethora of component systems designed during this period was its vertical mechanical shaft used to distribute mechanical and electrical services. https://www.archdaily.com/219115/claude-prouves-recently-demolished-experimental-building-of-sirh http://prefabricate.blogspot.com/2015/08/prefabrication-experiments-70-sirh.html

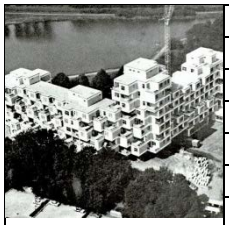
○Concept of change: ［(Refer to No 92)］ [B.Capsules' addition/ structural extension] [D.Capsules' joint or fusion]	●Renovation: ［Thankfully, the industrial site owner who led the demolition surrendered to activists' demands and kindly donated one of the building modules to the "Musée de l'Histoire du Fer", which is run by the Communauté Urbaine du Grand Nancy.］ [i.Preservation] [vi.Interior renovation] https://www.archdaily.com/219115/claude-prouves-recently-demolished-experimental-building-of-sirh

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: _, Electricity:

_; Flexibility: Movable furniture: _, Functional diversity: _.



No.	94
Name	Metastadt Building System
Year	1974
Architect/Bureau	Richard J. Dietrich
Country	Germany
Status	Concept / Built / Demolished
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	3 m^3
Application	**Mental** – Metastadt was designed by architects Richard J. Dietrich and Bernd Steigerwald in the 1960s, as a response to the urban sprawl of cities which appeared to be growing at an alarming rate. It was a modernist utopia, designed to be built over existing urban spaces, by incorporating highways, parking, and could bridge over existing highways. **Growing** – Each module could be open and connected, or separated using moveable and interchangeable walls, ceilings, and façade systems, all of which could be altered to allow for maximum flexibility and future growth. http://tparchitecture.blogspot.com/2009/11/metastadt-bausystem-by-richard-dietrich.html

○Concept of change:

［The building was completed in 1974 by Metastadt-Planungsgesellschaft mbH architects in Wulfen, Germany. Metastadt worked a little like tinker toys in that the steel, load-bearing frame was bolted together in small, uniform sections allowing virtually limitless vertical and horizontal expansion.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

http://tparchitecture.blogspot.com/2009/11/metastadt-bausystem-by-richard-dietrich.html

●Renovation:

［None］

◆Type of capsule: Urban (mental)

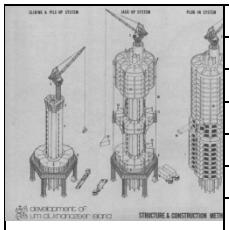
LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	95
Name	Koito Building
Year	1974
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept / Built
Way of arrangement	③
No. of capsules	18
Shape	Rectangular
Function	Utilities
Materials	Steel/Metal frame
Capsule size fit	2 m^3
Application	**Mental** – (utilitarian capsules attached to the ordinary structure used to highlight the contrast between two types of spatial organization)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban



No.	96
Name	Um Al Khanazeer Island and Tourist Development
Year	1975
Architect/Bureau	Kisho Kurokawa
Country	Iraq
Status	Concept
Way of arrangement	③
No. of capsules	250
Shape	Custom
Function	Utilities
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** – (same as in Koito building (No.95)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

<table>
<tr><td rowspan="9">  </td><td>No.</td><td>97</td></tr>
<tr><td>Name</td><td>Sony Tower</td></tr>
<tr><td>Year</td><td>1976</td></tr>
<tr><td>Architect/Bureau</td><td>Kisho Kurokawa</td></tr>
<tr><td>Country</td><td>Japan</td></tr>
<tr><td>Status</td><td>Concept / Built / Demolished</td></tr>
<tr><td>Way of arrangement</td><td>③</td></tr>
<tr><td>No. of capsules</td><td>8</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Utilities</td></tr>
<tr><td>Materials</td><td>Steel/Metal frame</td></tr>
<tr><td>Capsule size fit</td><td>3 m^3</td></tr>
<tr><td colspan="2">Application</td><td>Mental, Mobile – Along the outside of the central display space, the stairs, elevator, escalator, and toilet are capsulized. The capsules are the same size as those of the Nakagin Capsule Tower, but the exterior is made of stainless steel. To connect the basement to the public parking lot, the utility rooms are all placed on the roof. The utility pipes are exposed, also like those of the Nakagin Tower, to facilitate the maintenance and recycling of the pipes. The Sony Tower is another prototypical example of sustainable architecture.

https://www.kisho.co.jp/page/205.html</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Urban (mental)</td></tr>
</table>

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>98</td></tr>
<tr><td>Name</td><td>Conservatorie De Montreuil</td></tr>
<tr><td>Year</td><td>1976</td></tr>
<tr><td>Architect/Bureau</td><td>Claude le Goas</td></tr>
<tr><td>Country</td><td>France</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>④</td></tr>
<tr><td>No. of capsules</td><td>14</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Auditorium</td></tr>
<tr><td>Materials</td><td>RC</td></tr>
<tr><td></td><td>Capsule size fit</td><td>10 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental - Indeed its architecture, which resembles a beehive with its honeycomb cells, is an application of the theses of the Modern Movement: it is its function that generates its form. <…>A metal structure receives light shells with rounded shapes, in light sheet metal protected by a resin coating. The independence of the shells from each other ensures the quality of sound insulation, so that each music lesson can take place in good conditions. Finally, the building is part of an urbanism on slab, where the forecourt reserved for pedestrians is protected from traffic by raising.

https://www.est-ensemble.fr/le-conservatoire-montreuil-fete-ses-50-ans</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Urban (mental)</td></tr>
</table>

No.	99
Name	Capsule Inn Osaka
Year	1979
Architect/Bureau	Kisho Kurokawa
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	431
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** - There are two types of sleep capsules: the world's first sleep capsule designed by architect Kisho Kurokawa, and the wide type sleep capsule with increased size and comfort. (the capsules are opposed to the ordinary rooms and capsules with increased comfort) http://newjapan.co.jp/umeda/capsule_inn_osaka

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ×, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ▲.

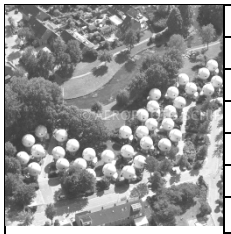
No.	100
Name	Capsule Inn in Sapporo
Year	1980
Architect/Bureau	Ask Gate Group
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	184
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** – (capsules for sleep for Japanese urban nomads and employees on business trips)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ×, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	101
Name	Globe House
Year	1984
Architect/Bureau	Experimental Housing Development Program
Country	Netherlands
Status	Concept / Built / Renovated
Way of arrangement	①
No. of capsules	50
Shape	Sphere
Function	Residential
Materials	RC
Capsule size fit	10 m^3
Application	**Mental** - Construction of the houses was funded by the Experimental Building Grants, introduced in 1968. In other experiments, new layouts or a new social environment are tried out, this mainly concerns the shape of the houses, as is the case with the cubic houses in Helmond and Rotterdam. The almost alien shapes are all the more accentuated as they border an ordinary new neighborhood stand. http://www.bubblemania.fr/dries-kreijkamp-the-globe-houses-1984-1990-netherlands/

○Concept of change:

［None］

●Renovation:

［In the 90s, following various construction disorders, cabins were joined at the base, reinforcing the structure and increasing the possibilities of storage.］

[iv.Structural repairs]

http://www.bubblemania.fr/dries-kreijkamp-the-globe-houses-1984-1990-netherlands/

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

COMMUNITY:

Inside activity: Local chat, art-projects

Building's management: Company owns houses and land, company act as an initiator; rules include no painting inside, no drilling and trees should not be higher than 2-3 meters

Outreach: Tours, occasional engagement with media, blogging

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>102</td></tr>
<tr><td>Name</td><td>7th km</td></tr>
<tr><td>Year</td><td>1989</td></tr>
<tr><td>Architect/Bureau</td><td>7th km Ltd</td></tr>
<tr><td>Country</td><td>Ukraine</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>②</td></tr>
<tr><td>No. of capsules</td><td>20000</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Commercial</td></tr>
<tr><td>Materials</td><td>Containers</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m3</td></tr>
<tr><td></td><td>Application</td><td>Growing – (the city in a city – a big market with its own spatial organization and management)

Mobile – (containers can be added or removed due to general planning; some containers are added as a second level)

https://dumskaya.net/news/tridtcat-let-sedmomu-uzhe-ne-tort-chem-zhivet-kr-108252/</td></tr>
<tr><td colspan="2">○Concept of change:

［Market planned to constantly expand by adding new containers］

[B.Capsules’ addition/ structural extension]

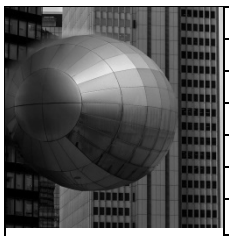
https://dumskaya.net/news/tridtcat-let-sedmomu-uzhe-ne-tort-chem-zhivet-kr-108252/</td><td>●Renovation:

［Old containers are recycled and replaced by new ones; their interiors and cintents prone to constantly change.］

[v.Cosmetic repairs]

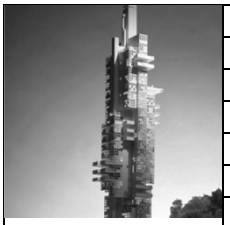
[vi.Interior renovation]

[vii.Adapt function]</td></tr>
<tr><td colspan="3">◆Type of capsule: Nomadic</td></tr>
</table>



	No.	103
	Name	The Egg of The Winds
	Year	1991
	Architect/Bureau	Toyo Ito
	Country	Japan
	Status	Concept / Built
	Way of arrangement	③
	No. of capsules	1
	Shape	Egg-shaped
	Function	Attraction
	Materials	Steel/Metal frame
	Capsule size fit	10 m^3
	Application	**Mental, Mobile** – Ito proposed a kind of "Building of Tomorrow", an "video gallery oudoors." There are two versions of this, one in Brussels and the other in the Japanese suburb of River City 21 in Tokyo. It is a structure of a oval geometry -a recurring form in their designs at the time, contrasting with right-angled parallelepiped volumes of its surrounding. http://architecturalmoleskine.blogspot.com/2010/06/toyo-ito-tribute-to-winds.html

○Concept of change: ［None］	●Renovation: ［None］
◆Type of capsule: Urban	



No.	104
Name	Industrialized Housing
Year	1992
Architect/Bureau	Richard Rogers, Laurie Abbott
Country	Korea
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Cube
Function	Residential
Materials	RC
Capsule size fit	10 m^3
Application	**Growing, Mobile** - The units were designed to be used in a flexible way, providing for the needs of a wide range of potential inhabitants. They can form towers or low-rise schemes, depending on the local terrain which in South Korea is often very hilly. <…>combined with RSHP's interest in affordable housing, drove this design for modular prefabricated housing in south korea. inside features compact steel units that are fitted out in a factory, craned into place and plugged in a core. https://rshp.com/projects/residential/industrialised-housing/ https://www.designboom.com/architecture/rshp-venice-biennale-richard-rogers-saving-the-city-06-03-2016/

○Concept of change:

［The units were designed to be used in a flexible way, providing for the needs of a wide range of potential inhabitants. They can form towers or low-rise schemes, depending on the local terrain which in South Korea is often very hilly.］

[B.Capsules' addition/ structural extension]

https://rshp.com/projects/residential/industrialised-housing/

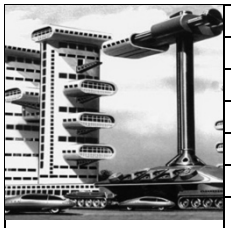
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.



No.	105
Name	Residential Buildings in Project Venus
Year	1995
Architect/Bureau	Jacque Fresco
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	1+ no limit
Shape	Custom shape
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	20 m^3
Application	**Growing, Mobile** - The prefabricated, modular homes, embodying a high degree of flexibility, could be built anyplace one might imagine, amidst forests, atop mountains, or on remote islands.<…> Maintaining a balance between the population and the earth's carrying capacity, we may have to move our cities not only skyward and seaward but subterranean as well. https://www.thevenusproject.com/resource-based-economy/environment/circular-city/

○Concept of change:

［The prefabricated, modular homes, embodying a high degree of flexibility, could be built anyplace one might imagine, amidst forests, atop mountains, or on remote islands. ］

[B.Capsules' addition/ structural extension]

https://www.thevenusproject.com/resource-based-economy/environment/circular-city/

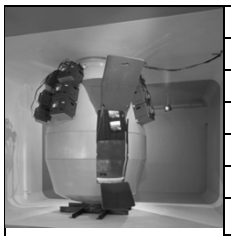
●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: _, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: _.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>106</td></tr>
<tr><td>Name</td><td>Mixer</td></tr>
<tr><td>Year</td><td>2000</td></tr>
<tr><td>Architect/Bureau</td><td>Lot-Ek</td></tr>
<tr><td>Country</td><td>USA</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>1</td></tr>
<tr><td>Shape</td><td>Custom</td></tr>
<tr><td>Function</td><td>Attraction</td></tr>
<tr><td>Materials</td><td>Other objects</td></tr>
<tr><td>Capsule size fit</td><td>3 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental - Mixer transforms a steel cement mixer into a 21st century media cocoon suitable for lounging, viewing, and dreaming. Fitted with 12” monitors connected to a variety of audio/video inputs (surveillance cameras, satellite TV/DVD player, PlayStation 2), Mixer provides a plush, intimate environment animated by multiple channels of information and media. Pivoting on its central axis, Mixer offers, in the spirit of a DJ mixing booth, a space for one or few people to select, sample, and mix sound and imagery to suit individual fantasies.

https://lot-ek.com/MIXER</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Nomadic (mental)</td></tr>
</table>

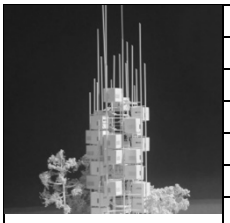
No.	107
Name	Morton Loft
Year	2000
Architect/Bureau	Lot-Ek
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	2
Shape	Custom
Function	Residential / Utilities
Materials	Other objects
Capsule size fit	3 m^3
Application	**Mental** - A petroleum trailer tank is devised to encapsulate private areas within the apartment. It is imported into a loft space on the fourth floor of a former parking garage. The tank is cut in two sections that enclose intimate functions, leaving the surrounding space undivided and unobstructed. One section is placed horizontally over the living room and contains two sleeping pods. https://lot-ek.com/MORTON-LOFT

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ▲, Climate control: ▲, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:_; Safety: Firm structure: ▲, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ▲, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



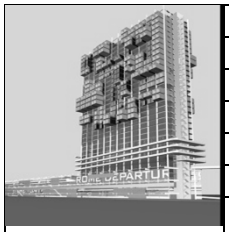
	No.	108
	Name	Tree Village
	Year	2001
	Architect/Bureau	Micro Compact Home Ltd
	Country	Europe region
	Status	Concept / Built
	Way of arrangement	④
	No. of capsules	21~50
	Shape	Cube
	Function	Residential
	Materials	Steel/Metal frame
	Capsule size fit	3 m^3
	Application	**Mental** - The Microcompacthome is a charming piece of equipment with intelligent logistics. The micro-particles of the residential area interlock synchronously and, despite their small size, have a certain spaciousness. The individual boxes appear neither provisional nor over-instrumented and convey an unexpected practicality. https://de.wikipedia.org/wiki/Micro_compact_home **Growing** – Its structure is made up of a cluster of small steel vertical columns or 'reeds' that echo the surrounding natural vertical architecture whilst reducing foundation disturbance to tree roots and vegetation. An open core space contains the central lift shaft and stairway surrounded by thirty micro compact homes. These are supplied with power and water from an internal ring of vertical services 'reeds'. The micro compact homes are arranged around the core in a way to provide maximum transparency and openness for nature to penetrate the space. http://www.microcompacthome.at/projects/?con=tree&l=e **Mobile** – Compact dimensions allow the micro home to nest amidst small trees and shrubs and integrate into any landscape. The m-ch is delivered by trailer or light crane and may be arranged as a single unit raised above the ground on a light aluminium frame and placed in a garden for private use, as a 'guest home' or 'teen home' or in the countryside for weekend leisure activities. http://www.microcompacthome.at/index.php?con=projects&l=e

○Concept of change: ［Micro compact homes may be grouped in horizontal or vertical arrangements as 'family clusters', or form larger villages connected by personal outside spaces related to each unit.］ [B.Capsules' addition/ structural extension] [D.Capsules' joint or fusion] http://www.microcompacthome.at/index.php?con=projects&l=e	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



	No.	109
	Name	Torino Porta SusaStation
	Year	2001
	Architect/Bureau	Lot-Ek
	Country	Italy
	Status	Concept
	Way of arrangement	③
	No. of capsules	201~500
	Shape	Rectangular
	Function	Hotel
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Growing**, **Mobile** – (containers are inserted into a frame and their configuration can vary depending on conditions) https://lot-ek.com/TORINO-PORTA-SUSA-STATION

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

No.	110
Name	Container City
Year	2001-2002
Architect/Bureau	Urban Space Management Ltd
Country	UK
Status	Concept / Built / Renovated
Way of arrangement	②
No. of capsules	36
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – Probably the most recognisable container building in the world, Container City II is easily recognisable by its bright colours designed to reflect the creative nature of those who occupy its 22 studios. **Growing** – (is continuation of Container city I and prone to expand to other structures) http://www.containercity.com/container-city-2 https://www.atlasobscura.com/places/container-city

○Concept of change:

［It is principally a means of utilizing standard forty-foot equivalent unit shipping containers, at the end of their life, to produce flexible accommodation and offices at low cost. […] The modular apartments of Container City will be recyclable for decades to come. If the development is ever closed down, the containers will be easy to transport and reuse elsewhere.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

https://www.wikiwand.com/en/Container_City

https://www.atlasobscura.com/places/container-city

●Renovation:

［The first (Container City I) was installed in 2001, in four days, and fitted out over five months, at Trinity Buoy Wharf, in the London Borough of Tower Hamlets. This was expanded with a second phase (Container City II) in 2002 and offices were constructed on the same site in the Riverside Building in 2005. […] A fourth floor to Container City I was added in 2003 to accommodate three more live/work apartments.］

[vi.Interior renovation]

https://travel.sygic.com/en/poi/container-city-poi:38886246

http://www.containercity.com/container-city-1

◆Type of capsule: Urban

LIVING STANDARDS:

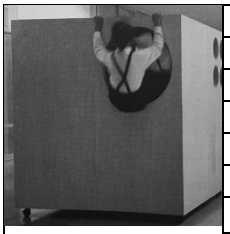
Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

COMMUNITY:

Inside activity: official page, outer decorations

Building's management: Company initiated construction and mantain the building

Outreach: tours, interaction with media



No.	111
Name	Cave
Year	2001
Architect/Bureau	Toru Murakami Architectural Design Office
Country	Japan
Status	Concept / Built
Way of arrangement	①
No. of capsules	4
Shape	Cube
Function	Attraction
Materials	Wood
Capsule size fit	2 m^3
Application	**Mental**, **Mobile** – (movable closed space acting as a playground and secret base for children)

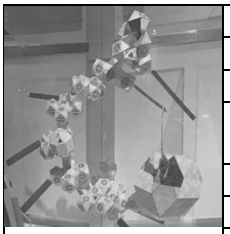
○Concept of change:

［None］

●Renovation:

［None］

◆Type of capsule: Leisure (mental)



No.	112
Name	Research to Challenge Space Architecture
Year	2001-2002
Architect/Bureau	Shuichi Matsumura, University of Tokyo + KeishiUniversity Ikeda Satoshi Laboratory
Country	Japan
Status	Concept
Way of arrangement	②
No. of capsules	21~50
Shape	Polygonal
Function	Utilities
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Mental, Growing** – (developments of expandable cosmic base)

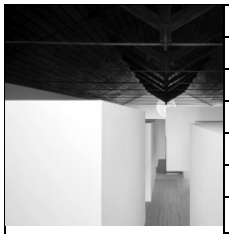
○Concept of change:

［None］

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)



No.	113
Name	House in Azeitao
Year	2003
Architect/Bureau	Aires Mateus
Country	Portugal
Status	Concept / Built
Way of arrangement	①
No. of capsules	11~20
Shape	Rectangular
Function	Residential
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental** - Stairs within the thick wall and day lit from above make the light transition from social to private space. The more private areas – bedrooms, bathrooms and a studio– are conceived as habitable volumes in an "impossible" balance, structuring the space. The volumes, articulated by light, modulate the main space of the lower living room, emphasizing its breadth. https://www.archdaily.com/794436/house-in-azeitao-aires-mateus

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ▲, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ▲.

No.	114
Name	DST Pod
Year	2003
Architect/Bureau	Cannata & Fernandes
Country	Portugal
Status	Concept / Built
Way of arrangement	①
No. of capsules	3
Shape	Rectangular
Function	Hotel
Materials	Wood
Capsule size fit	10 m^3
Application	**Mental** - The development of a modular typology that could respond to specific ends such as of temporary housing, environmental observatory, fire outpost, bar, Kiosk, "virtual square" or to a minimum element that could gather the necessary conditions to communicate through IT systems was a priority. Being a prefabricated module capable to address the needed comfort it also provides resources to processes and energetic recovery systems of high end technology such as photovoltaic panels. The module was designed to be installed in places where no major environmental changes can take place e.g. natural parks, beaches, city squares and zones where it is not possible for various reasons to access infrastructures. https://www.archdaily.com/435435/nautic-cleb-of-aldeia-do-mato-cannata-and-fernandes

○Concept of change:

［The main intention was to manufacture modules that could be grouped freely, and that were self-sufficient. This implies that they should have the capacity to work unplugged from urban infrastructures.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

https://www.archdaily.com/435435/nautic-cleb-of-aldeia-do-mato-cannata-and-fernandes

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

	No.	115
	Name	Mobile Dwelling Unit
	Year	2003
	Architect/Bureau	Lot-Ek
	Country	USA
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	1+no limit
	Shape	Rectangular
	Function	Residential
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Growing** – (containers can be added or removed from the accordingly adjusted rack-like structures worldwide) **Mobile** - One shipping container is transformed into a Mobile Dwelling Unit. Cuts in the metal walls of the container generate extruded sub-volumes, each encapsulating one living, working or storage function. When traveling, these sub-volumes are pushed in, filling the entire container. They then interlock with each other, leaving the outer skin of the container flush to allow worldwide standard shipping. https://lot-ek.com/MDU-Mobile-Dwelling-Unit

○Concept of change:

［Designed for the modern-day nomad, the MDU can easily be transported from one spot to the next, fully-loaded with all the live/work amenities you could ask for. […]Another inherent feature of such a modular construction approach is its multiplicity and potential to be stored and/or combined with other modules to create a larger-scale dwelling. Multiple MDU's can be stored tiered steel racks that integrate elevators, stairs, power, data, water, and sewage systems to create a sort of plug-in-house infrastructure for the individual modules. We love LOT-EK's description of the multiple MDU system:

"The vertical harbor is in constant transformation as MDUs are loaded and unloaded from the permanent rack. Like pixels in a digital image, temporary patterns are generated by the presence or absence of MDUs in different locations along the rack, reflecting the ever-changing composition of these colonies scattered around the globe."］

[A.Capsules' replacement/removal]

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

●Renovation:

［None］

[E.Capsules' mobility/movability] https://inhabitat.com/lot-ek-shipping-container-house/ https://kidisite.wordpress.com/2016/01/06/mdumobile-dwelling-unit-lot-ek/	
◆Type of capsule: Leisure LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.	

No.	116
Name	Loft Cube
Year	2004
Architect/Bureau	Werner Aisslinger
Country	Germany
Status	Concept / Built / Renovation via company support
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	5 m^3
Application	**Growing**, **Mobile** – (the home is mobile and can form joined structures) https://loftcube.net/#locations

○Concept of change:

［Units may be combined together to make larger structures.］

[D.Capsules' joint or fusion]

https://loftcube.net/#locations

●Renovation:

［Company provides warranty and support］

[ii.Maintenance]

[iv.Structural repairs]

[v.Cosmetic repairs]

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

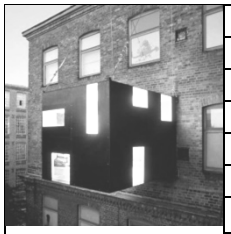
No.	117
Name	Rotor House
Year	2004
Architect/Bureau	Luigi Colani
Country	Germany
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental** – 36 m2 of actual floor space features a cylinder with rotor technology which allows you to change the same rotor cylinder from kitchen to bath to sleeping area when turned. Place saving, functional and economical.<…> with a space requirement of only 6 x 6 m the HANSE-COLANI rotor house is ideal for the growing number of big city nomads and small families http://www.moderndesign.org/2006/04/luigi-colani-rotorhaus.html https://www.designboom.com/architecture/luigi-colani-rotor-house/ **Mobile** – (the house to be planned mass-produced and transportable)

○Concept of change:	●Renovation:
［None］	［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



No.	118
Name	Rucksack-House
Year	2005
Architect/Bureau	Stefan Eberstadt
Country	Germany
Status	Concept / Built
Way of arrangement	③
No. of capsules	1
Shape	Rectangular
Function	Extension
Materials	Steel/Metal frame
Capsule size fit	3 m^3
Application	**Mental, Mobile** – <…>his Rucksack House project, the artist Stefan Eberstadt incorporates current architectural issues such as mobility and flexibility, thereby reacting to the changing conditions of modern life. It is precisely because of its uniqueness - hanging an extra room on steel cables in front of the facade of a house - that Rucksack House has received a great deal of publicity and publicity in recent years. http://www.stefaneberstadt.de/rucksack.html

○Concept of change:

［Designed by Stefan Eberstadt, the Rucksack House (backpack house) is a an additional room that can be suspended from the façade of any residential building. Mobile and lightweight, the extra room is both minimalist and spacious, providing nine whole square meters of additional space. In 2004, the Rucksack House was in Leipzig, then in Cologne in 2005 and then moved to Bamberg in 2011.］

[E.Capsules' mobility/movability]

https://architectuul.com/architecture/backpack-house

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: _, Functional diversity: ×.

No.	119
Name	Riverside Building
Year	2005
Architect/Bureau	Container City tm
Country	UK
Status	Concept / Built
Way of arrangement	②
No. of capsules	51~100
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – (made from recycled containers)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban

No.	120
Name	3:1 Expandable 20-foot ISO Shelter
Year	2005
Architect/Bureau	AAR
Country	USA
Status	Concept / Built / Renovated
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Multipurpose
Materials	Steel/Metal frame
Capsule size fit	5 m^3
Application	**Mental, Mobile** – (the containers are abandoned in a desert somewhere in US by army and is converted to a nomadic hotel) https://www.youtube.com/watch?v=3Oft19WSXA8

○Concept of change:

［AAR's 3-In-1 Expandable 20-Foot ISO Shelter with a built-in Mechanical Room is a highly configurable, lightweight shelter designed to be readily air-transportable in the C-130 without the need for pallets and chains. Ideal for C4ISR, CBRNE, TOC, and expeditionary applications.］

[F.Change of capsules' functions]

https://www.aarcorp.com/3-1-expandable-20-foot-iso-shelter/

●Renovation:

［Some abandoned shelters were converted into nomad hotel in American desert.］

[vii.Adapt function]

https://www.youtube.com/watch?v=3Oft19WSXA8

◆Type of capsule: Nomadic (mental)

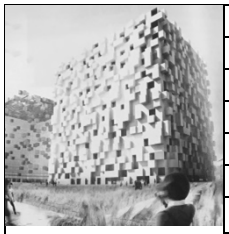
LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ×, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

	No.	121
	Name	Halley VI British Antarctic Research Station
	Year	2005-2013
	Architect/Bureau	Hugh Broughton Architects
	Country	Antarctica
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	11~20
	Shape	Custom
	Function	Utilities
	Materials	Steel/Metal frame
	Capsule size fit	7 m^3
	Application	**Mental** – Bedrooms, laboratories, office areas and energy centres are housed in standardised blue modules. A larger two-storey light-filled red module provides the social heart of the station and is used for living, dining and recreation. Inspiring interior design provides an uplifting environment to sustain the crew through the long dark winters, helping to combat the debilitating influence of Seasonal Affected Disorder. **Growing** – (the modules can be added and station is a continuation of previous missions) https://en.wikipedia.org/wiki/Halley_Research_Station **Mobile** – The station is arranged in a straight line perpendicular to the prevailing wind so that snow drifts form on the leeward side. This leaves the windward side free from drifts, reducing snow management requirements and creating a hard icy surface across which vehicles can easily move. The base is split in two for life safety. Each half has its own energy centre and is self sustaining in case of emergency. https://hbarchitects.co.uk/halley-vi-british-antarctic-research-station/

○Concept of change: ［[…] To allow for the replacement of individual facilities without significant interference to the whole station. […] To provide flexibility to support a 5-yearly science programme in a building with a minimum life of 20 years. […] To be fully relocateable inland when there is risk of the site calving off as an iceberg.］ [B.Capsules' addition/ structural extension] [C.Capsules' rearrangement] [D.Capsules' joint or fusion] [E.Capsules' mobility/movability] [G.Recyclability/Reuse]	●Renovation: ［None］

https://spacearchitect.org/portfolio-item/halley-vi-antarctic-research-station/ https://hbarchitects.co.uk/halley-vi-british-antarctic-research-station/	
◆Type of capsule: Nomadic (mental) LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.	

	No.	122
	Name	Symbolic Living Machine
	Year	2005
	Architect/Bureau	Gentaro Shimada, Philipp Kuhne
	Country	Japan
	Status	Concept
	Way of arrangement	②
	No. of capsules	10001~1 million
	Shape	Cube
	Function	Multipurpose
	Materials	Unspecified
	Capsule size fit	4 m^3
	Application	**Mental, Growing, Mobile** – (the project consists from interchangeable capsular buildings divided by living and producing units what facilitates circulation of people and resources for the sake of sustainability) https://sk-jutaku.shinkenchiku.net/c/results/#gallery-53

○Concept of change: ［The symbolic living machine is presented here in its purest and abstract form. To integrate it into different urban scenarios it can be declined into several types: “stacking, hybrid, silo, and parasite”.］ [F.Change of capsules’ functions] https://sk-jutaku.shinkenchiku.net/c/results/#gallery-53	●Renovation: ［None］
◆Type of capsule: Nomadic (mental)	

	No.	123
	Name	Huik Own Home and Office
	Year	2006
	Architect/Bureau	Sculp Architecten
	Country	Netherlands
	Status	Concept / Built
	Way of arrangement	②
	No. of capsules	4
	Shape	Rectangular
	Function	Multipurpose
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Growing** – (building is a recycled containers inserted into an empty plot between buildings) https://www.sculp.it/site/projects/huik

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

<table>
<tr><td rowspan="9">  </td><td>No.</td><td>124</td></tr>
<tr><td>Name</td><td>Freitag Individual Recycled Freeway Shop</td></tr>
<tr><td>Year</td><td>2006</td></tr>
<tr><td>Architect/Bureau</td><td>Yves Netzhammer</td></tr>
<tr><td>Country</td><td>Germany</td></tr>
<tr><td>Status</td><td>Concept / Built / Demolished</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>17</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Commercial</td></tr>
<tr><td>Materials</td><td>Containers</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental, Growing - The Freitag tower has stood just a few meters from the Hardbrücke bridge since 2006. The tower is - just like the products that can be bought there – made from used materials. It comprises 19 rusty freight containers stacked on top of each other to form a unique skyscraper.

Mobile – The shop is planned to stay for 5 up to 10 years

https://we-make-money-not-art.com/who_and_how_did/

https://www.zuerich.com/en/visit/shopping/freitag</td></tr>
<tr><td colspan="2">○Concept of change:

［The shop is planed to stay for 5 up to 10 years – it was a great challenge, but also great fun to realise this project. It is to early to say if we will open similar shops elsewhere in the world. But I would not say “no”…］

[E.Capsules’ mobility/movability]

[G.Recyclability/Reuse]

https://we-make-money-not-art.com/who_and_how_did/</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Urban (mental)</td></tr>
</table>

No.	125
Name	Papertainer Museum
Year	2006
Architect/Bureau	Shigeru Ban Architects
Country	Korea
Status	Concept / Built
Way of arrangement	②
No. of capsules	166
Shape	Rectangular
Function	Attraction
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – The first row container wall is used as exhibition booths and the second row container wall is used as office and storage spaces.<…> The alternation of containers with empty spaces on the main façade gives dynamism and animates the entrance to the museum. **Mobile** – This is a temporary exhibition pavilion created for the celebration of the 30th year anniversary of the Korean publisher Design House. http://arquitecturacomprometida.blogspot.com/2012/12/papertainer-museum-papel-y-contenedores.html http://www.shigerubanarchitects.com/works/2006_papertainer-museum/index.html

○Concept of change:

［This is a temporary exhibition pavilion created for the celebration of the 30th year anniversary of the Korean publisher Design House. […] The building's designer, Shigeru Ban, explained that the museum can be disassembled, transported and rebuilt in a different place.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

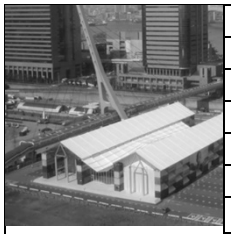
[G.Recyclability/Reuse]

http://www.shigerubanarchitects.com/works/2006_papertainer-museum/index.html

●Renovation:

［None］

◆Type of capsule: Urban (mental)



No.	126
Name	Nomadic Museum Tokyo
Year	2007
Architect/Bureau	Shigeru Ban Architects
Country	Japan
Status	Concept / Built / Renovated
Way of arrangement	②
No. of capsules	144
Shape	Rectangular
Function	Attraction
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – The bulk of the shipping containers used in the structure were rented at each location, while the remainder were used to ship the building components from location to location. Following the New York installation, Ban and Colbert reworked the arrangement of the building to improve circulation. **Mobile** – The voyage of the Nomadic Museum began in New York in 2005, and later traveled to Santa Monica near Los Angeles in 2006. The site in Santa Monica was unlike that of New York's long pier structure but was shorter and much wider. The original 200m long gallery was divided into two 100m lengths and arranged parallel to each other with a spacing of the same width as the gallery. A membrane roof was put over the void and the requested museum shop and cinema was added. It was possible to avoid increasing the number of containers while adding further functionality. In the Spring of 2007 the museum was transported to Tokyo where it took the same shape as in Santa Monica. http://www.shigerubanarchitects.com/works/2007_nomadic-museum-tokyo/index.html https://www.archdaily.com/777307/ad-classics-nomadic-museum-shigeru-ban-architects

○Concept of change:

［Reuse of shipping containers in different areas as museum travels.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

http://www.shigerubanarchitects.com/works/2007_nomadic-museum-tokyo/index.html

●Renovation:

［In the spring of 2007, the Nomadic Museum was transported to Tokyo where it took the same shape as in Santa Monica. The voyage of the Nomadic Museum began in New York in 2005, and later traveled to Santa Monica near Los Angeles in 2006. The site in Santa Monica was unlike that of New York's long pier structure but was shorter and much wider. The original 200m long gallery was divided into two 100m lengths and arranged parallel to each other with a spacing of the same width as the gallery. A membrane roof was put over the void and the requested museum shop and cinema was added. It was possible to avoid increasing the number of containers while adding further functionality. In the Spring of 2007 the museum was transported to Tokyo where it took the same shape as in Santa Monica. […] The bulk of the shipping containers used in the

	structure were rented at each location, while the remainder were used to ship the building components from location to location.〕 [iii.Change of location] [vii.Adapt function] http://www.shigerubanarchitects.com/works/2007_nomadic-museum-tokyo/index.html
◆Type of capsule: Urban (mental)	

No.	127
Name	DH1 Disaster House
Year	2007
Architect/Bureau	Gregg Fleishman
Country	USA
Status	Concep
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Wood
Capsule size fit	4 m^3
Application	**Growing, Mobile** – (house can be constructed without additional equipment and form growing structures) https://makeasmartcity.com/2016/07/14/designing-for-disaster/

○Concept of change:

［The use of quality materials is intended to allow for the integration of the DH1 modules into the permanent solution for the neighborhoods in which they are deployed.］

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

https://makeasmartcity.com/2016/07/14/designing-for-disaster/

●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: _, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: _.

No.	128
Name	Barier
Year	2007
Architect/Bureau	G-Wood
Country	Japan
Status	Concept / Built / Renovation via maintenance
Way of arrangement	①
No. of capsules	1+no limit
Shape	Polygonal
Function	Residence
Materials	Wood
Capsule size fit	3 m^3
Application	**Mobile** – Twelve pentagonal iron panels and 20 hexagonal panels are combined to form the same "truncated icosahedron" as a soccer ball, and the force is distributed, so it is strong against impact. If you paint the pentagonal part black, it becomes a huge soccer ball. Heavy members are placed at the bottom to maintain balance even when floating on water. It is said that the water resistance has been confirmed by repeating the experiment of floating on water. http://reynotch.blog.fc2.com/blog-entry-231.html?sp

○Concept of change:

［None ］

●Renovation:

［Maintenance is provided by manufacturer.］

[ii.Maintenance]

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ▲, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

No.	129
Name	Yotel Air London Gatwick Hotel
Year	2007
Architect/Bureau	Yo! Company
Country	UK
Status	Concept / Built
Way of arrangement	①
No. of capsules	47
Shape	Rectangular
Function	Hotel
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental** – The queen-sized beds are retractable, and some rooms even have a small bunk that emanates from the wall above the bed. Behind sliding doors, you will find your toilet and monsoon shower. Your room will have a workstation equipped with furiously fast wi-fi and a techno-wall with flatscreen TV and iPod dock. https://www.uniqhotels.com/yotel#video

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	130
Name	Lafayette Tower
Year	2007
Architect/Bureau	Lot-Ek
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	21~50
Shape	Rectangular
Function	Utilities
Materials	Containers
Capsule size fit	5 m^3
Application	**Mental** - The tower is a perfect representation of hybrid construction, combining a simple concrete slab construction clad in glazing, a second skin constructed from a metal mesh, and container segments plugged-into the facade. The metal mesh skin performs as an acoustical buffer, filters direct sunlight, and provides visual privacy from the exterior. The interstitial spaces between the mesh and glazing, created by scaffolding-like steel skeleton, function as semi-private balconies. The shipping container segments, which protrude from the façade in varying degrees, activate the façade in the third dimension. These container elements house specific programs including leisure spaces, bathrooms, and kitchens. The containers, glazed from ground to ceiling, frame unobstructed, transparent views to the exterior, contrasting with the translucent views of the mesh-clad surfaces. https://lot-ek.com/LAFAYETTE-TOWER

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

No.	131
Name	Hotel Everland
Year	2002
Architect/Bureau	Sabina Lang and Daniel Baumann
Country	Switzerland
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Custom
Function	Hotel
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental, Mobile** – Hotel Everland is not a hotel. It is the subjective dream of a hotel. It is a project by artist duo, Sabina Lang and Daniel Baumann, better known as L/B. Part of the 'Life Art' movement, the duo creates works that involve the viewer in the moment of art itself. They have created a hotel; the only hotel ever to tour Europe. Everland took bookings online and ran for just over 1000 nights between 2006-2009 in locations in Yverdon, Leipzig, and Paris. Guests could book for one night only. Everland often found its home on the roof of a contemporary art gallery. The hotel is an integral unit designed down to the last stitch. L/B deliberately set out to undermine the boundaries between art and interior design<…> https://www.uniqhotels.com/hotel-everland

○Concept of change:

［They have created a hotel; the only hotel ever to tour Europe. Everland took bookings online and ran for just over 1000 nights between 2006-2009 in locations in Yverdon, Leipzig and Paris. Guests could book for one night only. Everland often found its home on the roof of a contemporary art gallery. The hotel is an integral unit designed down to the last stitch. L/B deliberately set out to undermine the boundaries between art and interior design, utilizing 1970s style functionality and modern aesthetics. You could enjoy any number of spectacular views (depending on where the hotel unit was placed at the time), from the Paris skyline to a calm lake in Switzerland. The artists gleefully subverted traditional hotel conventions: the room included signs encouraging you to steal the gold-embroidered towels – would you do it? Breakfast was delivered to your door the following morning and when you have checked out, the hotel was re-opened to the public as an art attraction.］

[E.Capsules' mobility/movability]

https://www.uniqhotels.com/hotel-everland

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	132
Name	Single Hauz
Year	2007
Architect/Bureau	Front Architects
Country	Poland
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Mental -** A peculiar little manifesto is an experimental proposal of a home / shelter for a young / old man of today's Western World. The basic social cell which is called the marriage union ceases to be the only model of life today, at least at some stage. Single Hauz as a free-standing residential unit for 1 person fills a vacuum in this field: no such proposals for the so-called "Singles". A large number in this group are young, well-educated, ambitious, energetic and very open to the world. **Mobile** – Single Hauz, inspired directly by a roadside advertising totem, is designed as an object that can "fit" into almost any place on earth. It is especially predisposed to all locations related to interesting landscape conditions. Forest, sea, lake, mountains, meadows, but also the side of the main artery of the city - all these places are an energy source for the residents of the facility. The object can be placed individually, like a lonely tree in a meadow, but it also works well in a group of several / a dozen or so units. https://www.frontarchitects.pl/single-hauz

○Concept of change:	●Renovation:
［None］	［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	133
Name	Puma City
Year	2008
Architect/Bureau	Lot-Ek
Country	USA
Status	Concept / Built / Renovated
Way of arrangement	②
No. of capsules	24
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental -** With a painted logo on the outside and complete renovation on the inside, the shipping containers' past life is well-disguised. While the structure of the shipping containers is evident in the multiple frames created by the knocking down of the shipping containers' walls, the open and well-lit environment makes the industrial aesthetic seem almost intentional. Additionally, built-in details, such as the two decks located on the upper floors and recessed lighting, gives the store a greater sense a permanence and less like a prefabricated structure that can simply be folded up and moved. https://inhabitat.com/prefab-friday-puma-city-container-architecture/ **Mobile** – Puma City was built for the 2008 Volvo Ocean Race. Overall, 24 shipping containers were used for this portable store that traveled around the world for a year. The light-filled, airy interior is a whopping 11,000 square feet and features plug-in HVAC and electrical systems, allowing it to be simply plugged in at each location. Between locations, the store was taken apart and loaded onto a cargo ship to be transported. https://weburbanist.com/2009/12/14/working-it-30-cargo-container-offices-stores-and-businesses/1-puma-shipping-container-store/

○Concept of change: ［Shipping containers are retrofitted and transformed into PUMA City, a transportable retail and event building. The building was assembled and disassembled a number of times at several different international ports..］ [E.Capsules' mobility/movability] [G.Recyclability/Reuse] https://lot-ek.com/puma-city	●Renovation: ［Overall, 24 shipping containers were used for this portable store that traveled around the world for a year. The store is currently at the Volvo Ocean Race 2008-2009, and it´s transported to each location (Alicante, Boston, Stockholm) and assembled quickly.］ [iii.Change of location] [vii.Adapt function] https://weburbanist.com/2009/12/14/working-it-30-cargo-container-offices-stores-and-businesses/1-puma-shipping-container-store/

◆Type of capsule: Urban (mental)

	No.	134
	Name	Sky-Village
	Year	2008
	Architect/Bureau	Adept
	Country	Denmark
	Status	Concept
	Way of arrangement	②
	No. of capsules	201~500
	Shape	Rectangular
	Function	Residential
	Materials	Wood
	Capsule size fit	4 m^3
	Application	**Mental –** The design for Sky Village combines the character of the surrounding low-rise housing complex with the strong appearance of the building blocks next to the main street. The shape of the tower volume minimizes the impact of shadows in the surroundig areas without blocking the views at ground level. A vertical village thus comes to life. **Growing -** The designing of the tower is basically a grid structure with a minimal pixel size, that allow any configuration imaginable. **Mobile** – The pixelated design with a small base makes space for public activity at the base, mulitiple gardens in the sky and panoramic views of Copenhagen skyline. The design of the tower also creates great programmatic flexibility as well as adapting to the changing ecomomic market. https://adept.dk/project/sky-village

○Concept of change:

［By designing a tower that is basically a grid structure with a minimal pixel size, any configuration can be imagined and filled in. The pixel-units can be joined together to form larger spaces that accommodate larger apartments etc.］

[D.Capsules' joint or fusion]

https://adept.dk/project/sky-village

●Renovation:

［None］

◆Type of capsule: Urban (mental)

No.	135
Name	Bayside Marina Hotel
Year	2009
Architect/Bureau	Yasutaka Yoshimura Architects
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	31
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – (project transforms two containers into luxury resort housing)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

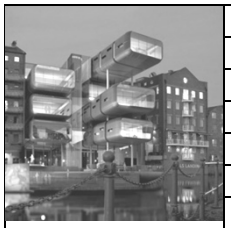
LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ×.

No.	136
Name	Platoon Kunsthalle
Year	2009
Architect/Bureau	Graft Architects
Country	Korea
Status	Concept / Built
Way of arrangement	②
No. of capsules	21~50
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – PLATOON KUNSTHALLE is not about entertainment. The program will provide a communication platform for anybody interested in subcultural creative fields like street art, graphic design, fashion, video art, programming, music, club culture, political activism etc. https://www.archdaily.com/27386/platoon-kunsthalle-graft-architects

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban (mental)



No.	137
Name	Contained Calls
Year	2009
Architect/Bureau	Aedas
Country	UK
Status	Concept
Way of arrangement	①
No. of capsules	7
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	10 m^3
Application	**Mental**, **Growing** – the building is designed as a 'family' of elements that creates a new business community along the river aire. the individual prefabricated modules provide 136m2 of open plan work space, and whilst they all share a 'family resemblance' they can be modified to respond to their occupants needs. the stacking of these elements allows for change and flexibility through the addition and subtraction of modules, these can be added both horizontally and vertically to allow for future expansion. **Mobile** – a robust and flexible monocoque structure will allow the building to change and evolve over time with minimal disruption. as the construction is flexible it is possible that the site could return to its current state once the lifetime of the building is complete. https://www.designboom.com/architecture/aedas-the-contained-calls/

○Concept of change:

［The stacking of these elements allows for change and flexibility through the addition and subtraction of modules, these can be added both horizontally and vertically to allow for future expansion. […] It is proposed that the pods are constructed using monocoque construction techniques. the main principle of the technique is that it supports structural load by using an objects external skin as opposed to using an internal frame or truss that is then covered with a non-load-bearing skin. a robust and flexible monocoque structure will allow the building to change and evolve over time with minimal disruption. as the construction is flexible it is possible that the site could return to its current state once the lifetime of the building is complete.］

[A.Capsules' replacement/removal]

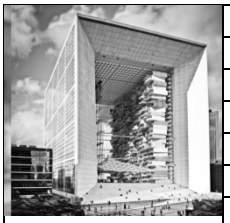
[B.Capsules' addition/ structural extension]

https://bustler.net/news/1614/36-the-calls-shortlisted-entry-8220-contained-calls-8221-by-

●Renovation:

［None］

aedas	
◆Type of capsule: Leisure (mental)	



No.	138
Name	Pocket of Active Resistance
Year	2009
Architect/Bureau	Stephane Malka
Country	France
Status	Concept
Way of arrangement	③
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	Unspecified
Capsule size fit	7 m^3
Application	**Mental**, **Growing** – Determined to create a new social scenario, the Pocket of Active Resistance (PAR) system is a modular complex providing alternative habitation for lifestyles of defiance, positioning itself in a permanent state of insurrection. Its growth is articulated by the vitality of its spontaneous community.<…> And to create a state within a state, a pocket insurgency that establishes a schism and provides for the reception and development of an autonomous zone. https://stephanemalka.com/portfolio/self-defense-pocket-of-active-resistance-la-defense-2009/

○Concept of change:

［Determined to create a new social scenario, the Pocket of Active Resistance (PAR) system is a modular complex providing alternative habitation for lifestyles of defiance, positioning itself in a permanent state of insurrection. Its growth is articulated by the vitality of its spontaneous community.］

[F.Change of capsules' functions]

https://stephanemalka.com/portfolio/self-defense-pocket-of-active-resistance-la-defense-2009/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ▲, Climate control: _, Interim space: _, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

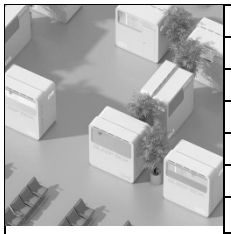
No.	139
Name	9h Kyoto
Year	2009
Architect/Bureau	Design Studio S
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	125
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** – (capsules for sleeping and having a futuristic appearance)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	140
Name	Sleepbox
Year	2009
Architect/Bureau	Arch Group
Country	Russia
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Hotel
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental**, **Mobile** – If you want to sleep, while waiting your plane or train, it may cause many security and hygiene problems. We believe that urban infrastructure should be more comfortable for people. For this purpose we have developed a device SLEEPBOX. It provides moments of quiet sleep and rest from the city without wasting time searching for a hotel. https://www.dezeen.com/2009/11/10/sleepbox-by-arch-group/

○Concept of change:

［Equipped with ventilation, outlets for laptops and cell phones, luggage storage and interior lighting, the units can be upgraded to include built-in audio visual elements, Wi-Fi, security systems, and integrated payment stations. Arch Group shared their innovative SLEEPBOX design with us. Intended to provide a comfortable night sleep, the mobile 3.75 m2 unit can be located anywhere people need a place to rest or relax such as airports, train stations, shopping centers, or even in the middle of the streets.］

[E.Capsules' mobility/movability]

https://www.archdaily.com/173095/update-sleepbox-arch-group

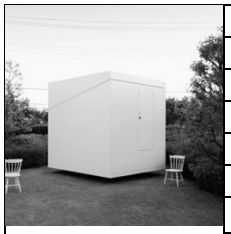
●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	141
Name	Paco
Year	2009
Architect/Bureau	Schemata Architects
Country	Japan
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Cube
Function	Residential
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental**, **Mobile** – It is something between architecture and furniture; too small for architecture, but too big for furniture. It is just big enough for a person to get in and use as a secret hideout. http://schemata.jp/paco/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ▲, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

	No.	142
	Name	The Box Office
	Year	2009
	Architect/Bureau	Joe Haskett
	Country	USA
	Status	Concept / Built
	Way of arrangement	②
	No. of capsules	32
	Shape	Rectangular
	Function	Office
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Growing** - Besides using cost-effective recycled shipping containers, energy efficiency was a high priority. This included the use of high performance, non-petroleum insulation, doors and windows to minimize heat loss in and out of the office spaces. Numerous cut windows pull daylighting into the space, and a large canopy in the center of the building protects the inner courtyard and shades the space in the summer. Like strawbales homes, each container features a “truth window”, which is where the container’s label was left unpainted so everyone could see its serial number. https://inhabitat.com/the-box-office-recycles-32-shipping-containers-into-12-colorful-offices-in-providence/

○Concept of change: ［None］	●Renovation: ［None］
◆Type of capsule: Urban	

No.	143
Name	Treehouse
Year	2009
Architect/Bureau	Terri Chiao
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Custom
Function	Residential
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental** – (hideout inside interior) https://www.youtube.com/watch?v=6kpG3ZqHXro

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ▲, Climate control: ▲, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

No.	144
Name	Diogene
Year	2009
Architect/Bureau	Renzo Piano
Country	Germany
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Custom
Function	Residential
Materials	Wood
Capsule size fit	2 m^3
Application	**Mental** – And we use the word “house” deliberately because for both Renzo Piano and Rolf Fehlbaum it is and was important that the object is a house: not a container and not a caravan. But a house. **Mobile** – And although not mobile per se Diogene has been designed so that it can be transported in its constructed form. https://www.smow.com/blog/2013/06/diogene-by-renzo-piano-building-workshop-and-vitra/

○Concept of change:

［Diogene is both self-sustaining and mobile and comes tricked out with a more complex system than its monochromatic outside would suggest.］

[E.Capsules’ mobility/movability]

https://www.smow.com/blog/2013/06/diogene-by-renzo-piano-building-workshop-and-vitra/

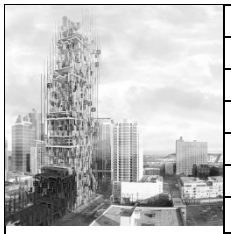
●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ×, Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>145</td></tr>
<tr><td>Name</td><td>Urban Transducer Skyscraper</td></tr>
<tr><td>Year</td><td>2009</td></tr>
<tr><td>Architect/Bureau</td><td>Daniel Nelson</td></tr>
<tr><td>Country</td><td>USA</td></tr>
<tr><td>Status</td><td>Concept</td></tr>
<tr><td>Way of arrangement</td><td>④</td></tr>
<tr><td>No. of capsules</td><td>1+no limit</td></tr>
<tr><td>Shape</td><td>Cube</td></tr>
<tr><td>Function</td><td>Multipurpose</td></tr>
<tr><td>Materials</td><td>Unspecified</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental – Noise also influenced the tower’s form and appearance. Sound is pure when created, but human perception is distorted by contextual influences. Reflecting this condition, the habitable spaces (public hubs and private pods) are pure, simple forms that are perceptually altered and distorted by the screen systems (sound + wind) that obscure their simple forms.

Growing – (endlessly growing structure)

Mobile – (elements can be freely added or removed)

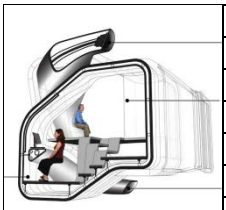
https://www.behance.net/gallery/413244/2010-eVolo-Skyscraper-Competition</td></tr>
<tr><td colspan="2">○Concept of change:

［Two-story cubes function as private residences suspended between the public hubs. Arranged on a grid they abut directly to reach other in some spaces, providing flexibility to expansion.］

[B.Capsules’ addition/ structural extension]

https://www.behance.net/gallery/413244/2010-eVolo-Skyscraper-Competition</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Urban (mental)</td></tr>
</table>



No.	146
Name	Subway Cell
Year	2009
Architect/Bureau	Aaron Berman
Country	USA
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Utilities
Materials	Steel/Metal frame
Capsule size fit	3 m^3
Application	**Mental, Mobile** – The Subway Cell would attach to the back of an existing subway railcar, and travel through the approx. 842 miles of subway tracks taking air-quality measurements at various locations throughout the route. The cell would house one scientist to operate and monitor the equipment for a 12-hour work shift. The cell includes a workspace and personal space, and acts as a beacon, informing all subway passengers of current air quality conditions. https://www.aaron-berman.com/SUBWAY-CELL

○Concept of change:

［The Subway Cell would attach to the back of an existing subway railcar, and travel through the approx. 842 miles of subway tracks taking air-quality measurements at various locations throughout the route. The cell would house one scientist to operate and monitor the equipment for a 12-hour work shift. The cell includes a workspace and personal space, and acts as a beacon, informing all subway passengers of current air quality conditions.］

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

https://www.aaron-berman.com/SUBWAY-CELL

●Renovation:

［None］

◆Type of capsule: Urban (mental)

No.	147
Name	Lookhotels
Year	2010
Architect/Bureau	Lookhotels Ltd
Country	Spain
Status	Concept
Way of arrangement	②
No. of capsules	44
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mental** - Modular rooms would vary in size from 9.7 sq meters for a single up to 12.1 sq meters for a premium room. Each unit would be self-sufficient and include a sofa bed, TV, a desk, a chair, a WIFI connection, a telephone, air conditioning, a bathroom, and automated controls. The entire hotel is automated with self check-in and out kiosks, a built-in safety system, and a 24-hour customer service telephone line will keep guests comfortable. https://inhabitat.com/lookotels-a-prefabricated-capsule-hotel-concept/

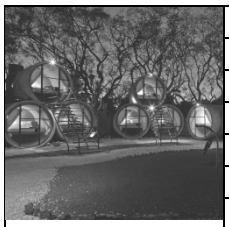
○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

No.	148
Name	Pier 57 – Superpier Market
Year	2010
Architect/Bureau	Lot-Ek
Country	USA
Status	Concept
Way of arrangement	②
No. of capsules	101~200
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – The interior architecture of the retail/urban market is articulated through the reuse of shipping containers, as a sustainable practice, as well as a reference to the shipping history of the river and the pier's previous port function. https://lot-ek.com/PIER-57

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban



No.	149
Name	Tubohotel
Year	2010
Architect/Bureau	T3ARC
Country	Mexico
Status	Concept / Built
Way of arrangement	②
No. of capsules	9
Shape	Tube
Function	Hotel
Materials	Concrete tubes
Capsule size fit	4 m^3
Application	**Mental** - Our client decided to make a hotel with the same characteristics as the Desparkhotel on a ground that is located on the outskirts of Tepoztlan, with excellent panoramic views of the Sierra del Tepozteco. Located in a wooded setting of unusual features, the surrounding environment provides an unique natural environment and for our project. https://www.archdaily.com/147712/tubohotel-t3arc

○Concept of change:

［With a projection of 20 rooms, we began building the first modules. Unlike the hotel of Andreas Strauss, we place the rooms (tubes) in three modules to harness the ground as possible much as possible.］

[B.Capsules' addition/ structural extension]

[G.Recyclability/Reuse]

https://www.archdaily.com/147712/tubohotel-t3arc

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	150
Name	Plug-in Housing Development
Year	2010
Architect/Bureau	Tay Yee Wei
Country	Malaysia
Status	Concept
Way of arrangement	③
No. of capsules	21~50
Shape	Polygonal
Function	Residential
Materials	Wood
Capsule size fit	4 m^3
Application	**Growing, Mobile** – Malaysian architect Tay Yee Wei recently unveiled a towering vertical city populated with hexagonal housing units that offer a solution to urban population growth problems in Asian cities. The tower itself serves as a scaffolding — as the population of urban areas fluctuates, modular units can be “plugged in” to the structure to accommodate an expanding population.<…> Residents will be able to purchase a “lot” and insert a modular housing unit that can be customized to suit each individual family. The pre-fab hexagon units can also be combined to create larger homes for larger families. Wei suggests that many open “lots” could be earmarked for green spaces, recreational areas, and research facilities. https://inhabitat.com/plug-your-hexagonal-house-into-this-vertical-city/

○Concept of change:

［The tower itself serves as a scaffolding — as the population of urban areas fluctuates, modular units can be “plugged in” to the structure to accommodate an expanding population. Residents will be able to purchase a “lot” and insert a modular housing unit that can be customized to suit each individual family. The pre-fab hexagon units can also be combined to create larger homes for larger families. Wei suggests that many open “lots” could be earmarked for green spaces, recreational areas, and research facilities.］

[A.Capsules’ replacement/removal]

[B.Capsules’ addition/ structural extension]

[C.Capsules’ rearrangement]

[D.Capsules’ joint or fusion]

[F.Change of capsules’ functions]

https://inhabitat.com/plug-your-hexagonal-house-into-this-vertical-city/

●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

No.	151
Name	Capsule Hotel in Netherlands
Year	2010
Architect/Bureau	Denis Oudendijk
Country	Netherland
Status	Concept / Built
Way of arrangement	①
No. of capsules	2
Shape	Custom
Function	Hotel
Materials	Other objects
Capsule size fit	4 m^3
Application	**Mental** - F.A.S.T (Free Architecture Surf Terrain) is an alternative surfing community that has a hostel, an all-summer beach party, and a number of 'survival capsules'. These originally came from an off-shore oil rig and are now available to stay in. There are a few pods you can choose from, each with its own emergency chemical toilet<…> https://www.uniqhotels.com/capsule-hotel

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ▲, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	152
Name	Cite a Docks
Year	2010
Architect/Bureau	Cattani Architects
Country	France
Status	Concept / Built
Way of arrangement	②
No. of capsules	100
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – The architect Cattani said the thoughts that accompanied her work. “How do I prevent students, prospective tenants, they feel put in the box? Compelling needs have arisen. Necessary to conceive of a lightweight, transparent, and certainly not solid. Hence the idea of independent living, to avoid the stacking effect.” https://www.contemporist.com/cite-a-docks-student-housing-by-cattani-architects/

○Concept of change:	●Renovation:
［None］	［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

COMMUNITY:

Inside activity: occasional art projects

Building’s management: _Company manages the building, Union of students (UNEF) acts as quality control side; residents can report regarding problems to managing company

Outreach: occasional interaction with media

No.	153
Name	Sergo Marketing Suite
Year	2010
Architect/Bureau	Container City tm
Country	UK
Status	Concept / Built
Way of arrangement	②
No. of capsules	21~50
Shape	Rectangular
Function	Office
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** - The design needed to embody the ethos of the regeneration that inspired it and its location adjacent to the elevate A13 provided the opportunity not only to market the commercial regeneration of the entire Beam Reach business park, but also to provide the client with a building that could be relocated at some point in the future to a similar regeneration development. These aspirations inspired the use of up-cycled shipping containers to create an industrial inspired, flexible and ultimately reusable commercial building. https://www.offsitehub.co.uk/projects/richard-hopkinson-architects-marketing-suite-at-segro-park-rainham/

○Concept of change:

［The building was to provide approx. 200m² of flexible and office and meeting spaces and ultimately should be demountable for reuse on future development sites. The design needed to embody the ethos of the regeneration that inspired it and its location adjacent to the elevate A13 provided the opportunity not only to market the commercial regeneration of the entire Beam Reach business park, but also to provide the client with a building that could be relocated at some point in the future to a similar regeneration development. These aspirations inspired the use of up-cycled shipping containers to create an industrial inspired, flexible and ultimately reusable commercial building.］

[A.Capsules' replacement/removal]

[F.Change of capsules' functions]

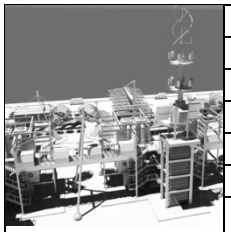
[G.Recyclability/Reuse]

https://www.offsitehub.co.uk/projects/richard-hopkinson-architects-marketing-suite-at-segro-park-rainham/

●Renovation:

［None］

◆Type of capsule: Urban



No.	154
Name	Container Cities for Haiti Housing Relief
Year	2010
Architect/Bureau	Richard Moreta
Country	Dominican Republic
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing, Mobile** - Unlike many of the other container projects, Moreta's utilizes a steel frame system with rubber rollers, which the containers are inserted into, allowing them to be easily stacked on a solid foundation. This system is also easily scalable, can respond quickly to the changing needs of the complex, and is lightweight and structurally sound against earthquakes. https://inhabitat.com/dominican-authorities-approve-of-container-cities-for-haiti-housing-relief/

○Concept of change:

［Richard Moreta is the principal architect for his own firm, Richard's Architecture + Design as well as a principal of GMZ Design, with offices in Berlin, Mexico City, Miami, New York, San Francisco and Santo Domingo. He and his team have devised a modular building system relying on used shipping containers to create "Container Cities," a simple, inexpensive, and easy to implement design and assembly process for temporary housing. This system is also easily scalable, can respond quickly to the changing needs of the complex, and is lightweight and structurally sound against earthquakes. At the end of its life as temporary housing, the container city could either be further modified for more permanent housing or be unbolted and moved to another location.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

[F.Change of capsules' functions]

[G.Recyclability/Reuse]

https://inhabitat.com/dominican-authorities-approve-of-container-cities-for-haiti-housing-relief/

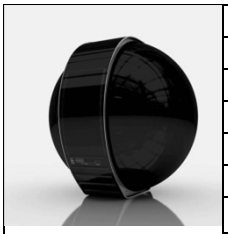
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: _ , Natural light: ▲, Climate control: ●, Interim space: ●, Public space: _, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.



No.	155
Name	Immersive Cocoon
Year	2010
Architect/Bureau	Nau Architects
Country	Germany
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Sphere
Function	Attraction
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** – (a capsule with an integrated virtual reality system) http://nau2.com/portfolios/immersive-cocoon/

○Concept of change:

［Cocoons can be privately leased or used as 21st century telephone booths, with session time booked on the go via smart phone. One can easily start a teleconference with other Cocoon users around the world, making it an ideal option to work remotely or to initiate an intense round of gaming.］

[F.Change of capsules' functions]

http://nau2.com/portfolios/immersive-cocoon/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>156</td></tr>
<tr><td>Name</td><td>Inbox Capsule Hotel</td></tr>
<tr><td>Year</td><td>2016</td></tr>
<tr><td>Architect/Bureau</td><td>Inbox Capsule Hotel Ltd</td></tr>
<tr><td>Country</td><td>Russia</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>②</td></tr>
<tr><td>No. of capsules</td><td>16</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Hotel</td></tr>
<tr><td>Materials</td><td>Wood</td></tr>
<tr><td>Capsule size fit</td><td>2 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental - The capsule hotels, originally introduced in Japan, are finally taking off in Europe to the great satisfaction of those who value good prices and privacy. inBox Capsule Hotel in St. Petersburg skillfully combines modern interiors, comfort, and clever use of space to provide you with your own personal space for very little money.

https://www.uniqhotels.com/inbox-capsule-hotel</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ×, Climate control: ×, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: ; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.</td></tr>
</table>

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>157</td></tr>
<tr><td>Name</td><td>Bubble Suite de Sonolge</td></tr>
<tr><td>Year</td><td>2010</td></tr>
<tr><td>Architect/Bureau</td><td>Gites Insolites de Solonge Camp</td></tr>
<tr><td>Country</td><td>France</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>2</td></tr>
<tr><td>Shape</td><td>Sphere</td></tr>
<tr><td>Function</td><td>Hotel</td></tr>
<tr><td>Materials</td><td>Plastic</td></tr>
<tr><td></td><td>Capsule size fit</td><td>4 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental - The Insolites de Sologne, located in France, is known for its unique, clear “bubble” suites. The Pond’s Bubble is the second largest bubble in France and offers luxury accommodations for up to two guests. The suite is actually made up of two bubbles and is located on the edge of a beautiful private pond. Nearly 13 feet high, these bubbles are spacious and beautifully decorated with crisp white linens and warm throw blankets.

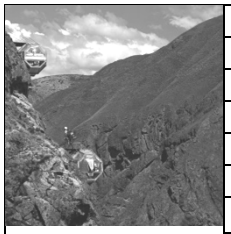
https://www.uniqhotels.com/gites-insolites-de-sologne</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.</td></tr>
</table>



No.	158
Name	Skylodge Adventure Suites
Year	2015
Architect/Bureau	Naturavive
Country	Chile
Status	Concept / Built
Way of arrangement	①
No. of capsules	4
Shape	Polygonal
Function	Hotel
Materials	Glass
Capsule size fit	4 m^3
Application	**Mental** - Accessible only by climbing, hiking, or zip-lining, each transparent capsule suite vertically hangs at the top of a 1200 ft (366 m) mountain (!!!) and offers a 300-degree view of the stunning Sacred Valley landscape. **Mobile** – (the capsules are attached to a mountain by cables and are transportable) https://www.uniqhotels.com/skylodge-adventure-suites

○Concept of change: ［We have maintenance and renovation programs that assures you a safe operation.］ [F.Change of capsules' functions]	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

No.	159
Name	42/5
Year	2011
Architect/Bureau	Lot-Ek
Country	USA
Status	Concept
Way of arrangement	②
No. of capsules	101~200
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental**, **Growing** - Container Mall is conceived as a system to address leftover empty lots throughout the city exploiting the modularity of shipping containers. Nine levels of containers are stacked to form a new typology for a mall on a sliver of street front real-estate. Each container module serves as an indoor booth in the fashion of an urban market. The sidewalk is replicated as catwalks, creating an outdoor arcade. Views and loggias are created by leaving out a selection of containers from the façade. https://lot-ek.com/42nd-5th-MALL

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

No.	160
Name	Spacebox Studios
Year	2003
Architect/Bureau	TU Delft
Country	Netherlands
Status	Concept / Built / Demolished
Way of arrangement	②
No. of capsules	39
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	5 m^3
Application	**Mental** – These colorful, box-like units offer a compact yet practical interior – perfect for on-campus housing, resorts, art studios etc. **Growing, Mobile** - <…>Thus all 450 spaceboxes have been replaced. The second phase of this project is the new tower on Stieltjesweg, comprising of 504 student rooms. The building is expected to be ready in June 2017. https://www.delta.tudelft.nl/article/bye-bye-boxes https://www.busyboo.com/2009/05/10/prefab-home-spacebox/

○Concept of change:

［This year, 132 space boxes will be placed on the TU Delft site, commissioned by the local student housing provider DUWO. This week, the producer based in Lelystad started installing the first 33 homes according to a modular construction system. The houses are completely prefabricated in Lelystad. The (dis) assembly on site is fast. "Such a block of 33 houses can be placed within two days."

The fully recyclable houses are fully furnished in Delft and are intended to accommodate foreign students quickly. The living units have a lifespan of twenty years.］

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

[F.Change of capsules' functions]

[G.Recyclability/Reuse]

https://www.delta.tudelft.nl/article/bye-bye-boxes

https://www.busyboo.com/2009/05/10/prefab-home-spacebox/

●Renovation:

［None］

◆Type of capsule: Urban (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	161
Name	Genussregal Exhibition
Year	2011
Architect/Bureau	BWM Architekten & partner
Country	Austria
Status	Concept / Built
Way of arrangement	④
No. of capsules	16
Shape	Rectangular
Function	Attraction
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – BWM architects and partners have therefore invented the so-called “Genussregal”. A comprehensive overall business concept including architecture (landmark, exhibition hall and exhibition, shop within the logistics storage place) offering the company a new identity and opening up new possibilities in communication with the outside (marketing, logo development, product positioning etc.). **Growing, Mobile** - Every container stands for one product symbolizing at the same time the commercial character of the location. The containers provide information about where the goods are delivered, stored and sent around the world. At the same time the containers are also spaces to be used - a wine tavern will be installed at lofty heights. Change is the rack’s nature. In future it will be arranged and constantly rearranged offering visi- tors new attractions. https://www.archdaily.com/167190/genussregal-exhibition-bwm-architekten-partner?ad_medium=gallery

○Concept of change:

［The world of storage logistics (shelves, packing cases, goods, stacking etc.) is the main conceptual/design theme of all architectural parts (exhibition, shop, landmark). The new construction and the existing building can thus be merged into a fascinating large entity. In future it will be arranged and constantly rearranged offering visitors new attractions.］

[B.Capsules’ addition/ structural extension]

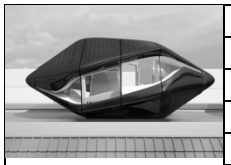
[C.Capsules’ rearrangement]

https://www.archdaily.com/167190/genussregal-exhibition-bwm-architekten-partner

●Renovation:

［None］

◆Type of capsule: Urban (mental)



No.	162
Name	Living Roof Capsule
Year	2011
Architect/Bureau	Nau Architects
Country	Worldwide
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Hotel
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental**, **Mobile** - Nau imagines the Living Roof as a private, mobile penthouse for the wealthy and eco-conscious — it could be rented to friends, used on vacations, or set up as a retreat in their own cities. However, one consideration was not made in regards to the project's green footprint – transportation. Airlifting, as suggested by Nau, requires big oil. Hopefully, if and when Living Roof is realized, electric or solar planes will be available to airlift the pods and cut down on transportation emissions. https://inhabitat.com/nau-architects-unveil-self-sustaining-living-roof-pod-home-concept/?variation=d

○Concept of change:

［Its ultra-insulated shell and regenerative systems allow the Living Roof to exist largely off the grid. Used as a hotel the Living Roof project exists as individual suites spread throughout the city with locations changing every two years.］

[E.Capsules' mobility/movability]

http://nau2.com/portfolios/living-roof/

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	163
Name	Nomad Skyscraper
Year	2011
Architect/Bureau	Luca D'Amico, Luca Tesio
Country	Worldwide
Status	Concept
Way of arrangement	④
No. of capsules	501~1000
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing**, **Mobile -** The main structure provides basic infrastructure as well as recreational areas while the habitable units can be transported by ship, truck, and train to almost every large city worldwide providing a sense of "home" to these modern urban nomads.

○Concept of change:

［The main structure provides basic infrastructure as well as recreational areas while the habitable units can be transported by ship, truck, and train to almost every large city worldwide providing a sense of "home" to these modern urban nomads.］

[B.Capsules' addition/ structural extension]

https://www.evolo.us/nomad-skyscraper/

●Renovation:

［None］

◆Type of capsule: Urban

	No.	164
	Name	Blox Home
	Year	2011
	Architect/Bureau	M3House + UAO Creations
	Country	China
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	2~10
	Shape	Custom
	Function	Residential
	Materials	Plastic
	Capsule size fit	3 m^3
	Application	**Mental** – the innovative unit reflects an ancient chinese idea for self-sustained settlements within the city. the small dwelling continues tradition by adapting to dense built environments, addressing spatial issues within established contexts. **Growing**, **Mobile** - merging the words 'box' and 'block', the elevated white cube contains the cooking, dining, living and sleeping area within a unified space while the bathroom is placed within a smaller adjoining volume. inhabitants may access personal balcony from both rooms. a form of temporary architecture, the structure may be placed upon non-constructible land or implanted into urban public spaces. https://www.designboom.com/architecture/prefab-blox-home-by-m3house-uao-creations/

○Concept of change:

［A form of temporary architecture, the structure may be placed upon non-constructible land or implanted into urban public spaces.］

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

https://www.designboom.com/architecture/prefab-blox-home-by-m3house-uao-creations/

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	165
Name	Suguroku Office
Year	2011
Architect/Bureau	Daiken Met
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	8
Shape	Rectangular
Function	Multipurpose
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental**, **Mobile** - There are many unique things about sugoroku offices, but one of the typical ones is that you can easily install them by assembling seven containers, so if you have an empty space such as a parking lot, you can build an office that can be moved anywhere. https://one-project.biz/2012/12/27/sugoroku-office.html

○Concept of change:

［The firm obtained permission for a temporary structure which didn't require construction below street level. Daiken-Met proposed a steel sturctural grid that is easily assembled and can subsequently be disassembled and reconstructed elsewhere. […] Our office built a used container on a steel frame that can be dismantled and relocated built on a simple foundation. It is suggested that the vacant land be diverted to the place where people and things move instead of the parking lot by the relocatable building unit］

[A.Capsules' replacement/removal]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

https://catesthill.com/2013/01/30/shipping-container-house-by-daiken-met-architects/

●Renovation:

［None］

◆Type of capsule: Urban (mental)

No.	166
Name	Portishead Quays
Year	2012
Architect/Bureau	Container City tm
Country	UK
Status	Concept / Built
Way of arrangement	②
No. of capsules	28
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** - Opening its doors in November 2012 and constructed from 28 recycled shipping containers, Hall & Woodhouse Portishead is located at Portishead Quay Marina in Somerset. http://www.containercity.com/portishead-quays

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban

No.	167
Name	BBC Broadcasting Studios
Year	2012
Architect/Bureau	Container City tm
Country	UK
Status	Concept / Built
Way of arrangement	②
No. of capsules	18
Shape	Rectangular
Function	Office
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – (temporal structure which was later reassembled into different structure) http://www.containercity.com/bbc-broadcasting-studios

○Concept of change:

［For the 2012 Olympic Games, the BBC briefed Container City™ to create new broadcasting studios that incorporated the 2010 World Cup Studio on the roof. Container City™ created a three-storey structure and Allies and Morrison designed a wood-and-glass roof pergola to fit around the old studio.］

[G.Recyclability/Reuse]

●Renovation:

［None］

◆Type of capsule: Urban

	No.	168
	Name	Boxpark Shoreditch
	Year	2012
	Architect/Bureau	BDP
	Country	UK
	Status	Concept / Built
	Way of arrangement	②
	No. of capsules	96
	Shape	Rectangular
	Function	Commercial
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Mental** – BDP's design creates a semi-enclosed market hall – like Covent Garden or La Boqueria in Barcelona – so there is a central focus to the scheme with units arranged around it, as well as outdoor terrace spaces. The change of level between the station entrance and Dingwall Road means people enter from multiple entrances and levels adding spatial interest and animation. **Growing** – Shipping containers are an intrinsic component of the Boxpark brand. There's something quite magical about taking this mundane and ubiquitous object and turning it into something desirable and transformational. We used 96 containers in total, four of which are unaltered. The whole assembly is like a giant 3D jigsaw puzzle but the finished result looks deceptively simple. https://www.archdaily.com/799612/boxpark-croydon-bdp

○Concept of change:

［BOXPARK Shoreditch is a retail revolution – the world's first pop-up mall. Based in the heart of East London, for the next five years. BOXPARK strips and refits shipping containers to create unique, low cost, low risk, 'box shops'. Put them together with a unique mix of international fashion and lifestyle brands, galleries and cafés and you've got the world's first 'pop-up' mall – so named because its basic building blocks are inherently movable: they can, and will, literally pop up anywhere. […] In October 2016 the second Boxpark site was launched, south of the river, in Croydon. Version 2 has focussed entirely on the drinks and dining aspect that has made］

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

https://www.archdaily.com/799612/boxpark-croydon-bdp

●Renovation:

［None］

◆Type of capsule: Urban (mental)

	No.	169
	Name	After Light
	Year	2012
	Architect/Bureau	Interrupt
	Country	Singapore, Australia
	Status	Concept / Built / Demolished
	Way of arrangement	②
	No. of capsules	18
	Shape	Rectangular
	Function	Attraction
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Mental**, **Mobile** – The headline installation at the Singaporean Marina Bay iLight festival in 2012 the final work was presented across 27 containers and 14 screens. The structure also included four art installation spaces by local and New Zealand artists Interrupt. Hindu temples, flaming money and the faces of humanity make up some of the content for this multi screen projection filmed on location in Singapore and New Zealand. https://vjuji.wordpress.com/interactive-installation/after-light-singapore/

○Concept of change:

［Afterlight was a large scale fourteen screen video installation across twenty seven shipping containers that was developed for the Singapore light festival iLight Marina Bay in 2012. The installation was reconstructed for Light Festival, Singapore – 2012, LUX Night Light Festival, Wellington – 2012, Art In The Dark, Auckland – 2013, Vivid Light Festival, Sydney – 2013］

[E.Capsules' mobility/movability]

●Renovation:

［None］

◆Type of capsule: Urban (mental)

	No.	170
	Name	Das Park Hotel
	Year	2006
	Architect/Bureau	Das Park Hotel Ltd
	Country	Germany
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	3
	Shape	Tube
	Function	Hotel
	Materials	Concrete tubes
	Capsule size fit	3 m^3
	Application	**Mental** – (the capsule in a shape of a pipe section provides semi-nomadic and semi-luxury experience) https://www.uniqhotels.com/das-park-hotel

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ▲, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	171
Name	Free Spirit Spheres
Year	2012
Architect/Bureau	Free Spirit Spheres Ltd
Country	Canada
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Shape
Function	Hotel
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental, Mobile** – (the capsules are placed deep in forest and can be ordered to serve as a hobby house or place of meditation; connections are limited to ropes and can be hanged in various places) https://freespiritspheres.com/spheres/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ▲, Climate control: _, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

No.	172
Name	World of Chorophyll
Year	2012
Architect/Bureau	IAMZ Design Studio
Country	USA
Status	Concept
Way of arrangement	④
No. of capsules	201~500
Shape	Rectangular
Function	Multipurpose
Materials	Steel/Metal frame
Capsule size fit	20 m^3
Application	**Mental** – The structure will also include public spaces such as restaurants and retail stores. There isn't much press about the project with only renderings and a few plans and elevations available, but it is enough to wonder why something like this is not in the NY skyline. Is it too radical for the U.S.? Is it merely just a fantasy rather than a reality? **Growing, Mobile** – Based upon all residential units. This makes the building mimics nature, and in conformity with it also makes it easy configuration http://canilive12.blogspot.com/2012/12/metabolism-in-new-york.html

○Concept of change:

［The main idea is that the units take the form of leaves, stems mainly from the column. Based upon all residential units this makes the building mimics nature, and in conformity with it also makes it easy configuration.］

[B.Capsules' addition/ structural extension]

http://canilive12.blogspot.com/2012/12/metabolism-in-new-york.html

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	173
Name	Eco-Pod
Year	2012
Architect/Bureau	Squared Design Lab
Country	USA
Status	Concept
Way of arrangement	②
No. of capsules	1+no limit
Shape	Cube
Function	Farm
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental** – Taking advantage of the stalled Filene's construction site at Downtown Crossing, Eco-Pod proposes to stimulate the economy and ecology of downtown Boston with a temporary vertical algae bio-reactor and new public Commons, built from prefabricated modules. The pods serve as bio-fuel sources and micro-incubators for research and development programs. The voids between pods form a network of vertical public parks/botanical gardens housing unique plant species - a new Uncommon for the Commons. **Growing, Mobile** – The reconfigurable modular units anticipate future deployments on other sites. An instant architecture, the armature allows the structure to transform to meet changing programmatic and economic needs, while the continuous construction on the site will broadcast a subtle semaphore of constructional activity and economic recovery. https://www.squareddesignlab.com/projects/eco-pod

○Concept of change:

［The structure would be made of prefabricated modules, or “eco-pods,” containing materials to manufacture biofuels. The robotic arms would reconfigure the pods to optimize growing conditions. […]The reconfigurable modular units anticipate future deployments on other sites. An instant architecture, the armature allows the structure to transform to meet changing programmatic and economic needs, while the continuous construction on the site will broadcast a subtle semaphore of constructional activity and economic recovery. This is anticipatory, pre-cycled architecture, capable of generating a new micro-urbanism that is local, agile, and carbon net positive.］

[A.Capsules’ replacement/removal]

[B.Capsules’ addition/ structural extension]

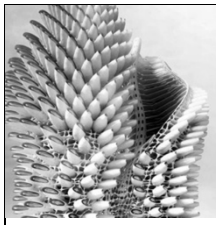
[C.Capsules’ rearrangement]

[G.Recyclability/Reuse]

●Renovation:

［None］

https://www.squareddesignlab.com/projects/eco-pod	
◆Type of capsule: Urban (mental)	



No.	174
Name	Mangal City
Year	2012
Architect/Bureau	Chimera
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	1001~10000
Shape	Egg-shaped
Function	Residential
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental, Growing, Mobile** – Design team Chimera has conceived of an incredible series of spiraling skyscrapers for New York's Hudson Yards that are modeled after the complex ecosystems created by the mangrove tree. Dubbed "Mangal City", the project is an "urban ecological system" composed of modular pod capsules that shift to adapt to environmental and contextual conditions. A beautiful example of biomimicry and certainly a flight of fancy, the plan proposes a futuristic building system based upon flexibility. http://biomimicrykth.blogspot.com/2012/05/mangal-city.html

○Concept of change:

［Dubbed "Mangal City", the project is an "urban ecological system" composed of modular pod capsules that shift to adapt to environmental and contextual conditions. A beautiful example of biomimicry and certainly a flight of fancy, the plan proposes a futuristic building system based upon flexibility. According to the designers, "our vision is to define an urban ecosystem which supports housing and cultural programs and has the ability to adapt, transform, mutate and adjust according to the specific urban and social character of the site".］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

https://inhabitat.com/spiraling-skyscraper-pod-city-for-a-future-london/mangal-ed03-2/

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: × , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity:

_; Flexibility: Movable furniture: _, Functional diversity: _.

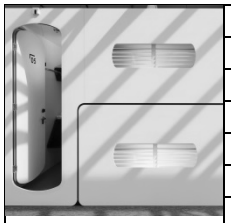
No.	175
Name	Xi'an Youth Capsule Hotel
Year	2012
Architect/Bureau	Unknown
Country	China
Status	Concept / Built
Way of arrangement	②
No. of capsules	21~50
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** – The first "capsule hotel" in mainland China is scoring huge popularity, in part because it's being described as a "space capsule," as if you're sleeping inside a spaceship. Each tiny room includes wireless broadband internet and a little dresser, as well as a bed. The capsules are divided up into different houses of the Zodiac, with the soundproofed "Leo" capsules reserved for people who snore. https://gizmodo.com/chinese-capsule-hotel-lets-you-pretend-youre-sleeping-i-5908397

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: _ , Natural light: _, Climate control: _, Interim space: _, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: _, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.



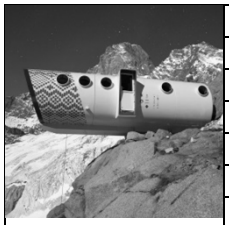
No.	176
Name	City Hub Amsterdam
Year	2012
Architect/Bureau	City Hub
Country	Netherlands
Status	Concept / Built
Way of arrangement	②
No. of capsules	50
Shape	Custom
Function	Hotel
Materials	Wood
Capsule size fit	2 m^3
Application	**Mental** – Amsterdam's CityHub deserves particular attention with its mission to cater for travel in the digital age. Not only does each hub (as they call them here) have an excellent Wi-Fi connection, built-in speakers, and app-controlled lighting – you can actually take your Wi-Fi on the go with a mobile router provided by the hotel **Mobile** – (capsules are available in several locations) https://www.uniqhotels.com/cityhub-amsterdam#video

○Concept of change:	●Renovation:
［None］	［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ▲, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ▲, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	177
Name	New Bivouac Gervasutti
Year	2012
Architect/Bureau	Leapfactory
Country	Italy
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Tube
Function	Hotel
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Mental** – Named New Refuge Gervasutti, the survival unit was designed by Italian architects LEAPfactory, who specialise in modular accommodation for extreme environments. **Mobile** – LeapHut is modular, built entirely downstream, suitable for being transported with a helicopter and installed with very limited operations at height. The modules are set up for specific functions. For each location it is possible to organize the optimal configuration in terms of beds, living spaces, entrances. https://www.leapfactory.it/projects/new-bivouac-gervasutti/# https://www.dezeen.com/2011/12/03/new-refuge-gervasutti-by-leapfactory/

○Concept of change:

［Easy to install, with a greatly reduced environmental impact, LEAP/s1 can be used to provide extensions of traditional buildings in natural environments (refuges and alpine hotels, resorts, motels…).］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

https://www.leapfactory.it/projects/new-bivouac-gervasutti/#

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	178
Name	Uplift Concept
Year	2012
Architect/Bureau	Basecampzero
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	24
Shape	Rectangular
Function	Multipurpose
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental** – Our proposal interrogates the humanist, cultural, environmental and social conditions of human occupation by appropriating the space of the automobile. UpLIft thus liberates conditions of site and context in an effort to re-envision space of human occupation. **Mobile** – Our response re-appropriates existing car park structures with 'plug-n-play' units completely prefabricated, injection molded panels made from recycled materials. http://www.basecampzeroarchitects.com/#/alps-1/

○Concept of change:

［Our response re-appropriates existing car park structures with 'plug-n-play' units completely prefabricated, injection molded panels made from recycled materials.］

[A.Capsules' replacement/removal]

[C.Capsules' rearrangement]

[G.Recyclability/Reuse]

http://www.basecampzeroarchitects.com/#/alps-1/

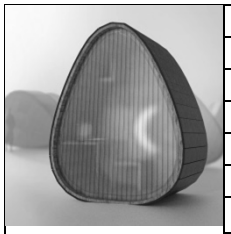
●Renovation:

［None］

◆Type of capsule: Urban (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	179
Name	Egg Microhouse
Year	2012
Architect/Bureau	Hiteca
Country	Russia
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Egg-shaped
Function	Residential
Materials	Wood
Capsule size fit	2 m^3
Application	**Mental**, **Mobile** – (the project combines three functions in human life and the rhetorical question "what was first – egg or chicken?"; the house is transformable by rolling it on a side) https://www.hiteca.ru/2012/11/microhouse-yaico.html

○Concept of change:

［The multifunctionality of the microdom is that it can be used in three positions.］

[F.Change of capsules' functions]

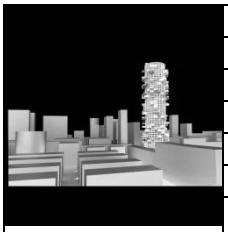
●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	180
Name	Vertical Community
Year	2012
Architect/Bureau	Baichuan Song
Country	Worldwide
Status	Concept
Way of arrangement	③
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	5 m^3
Application	**Mental**, **Growing, Mobile** – (the project is typical one utilizing Metabolism principles with capsules serving the changing community needs, are replaceable from structure to structure and, hence, mobile) http://cargocollective.com/baichuan/VERTICAL-COMMUNITY-Re-think-Metabolism

○Concept of change:

［Units may plug in and out of the building and combine to capsule clusters to form facilities. The capsules may move to other cities to plugged in similar structures.］

[A.Capsules' replacement/removal]

[E.Capsules' mobility/movability]

http://cargocollective.com/baichuan/VERTICAL-COMMUNITY-Re-think-Metabolism

●Renovation:

［None］

◆Type of capsule: Urban (mental)

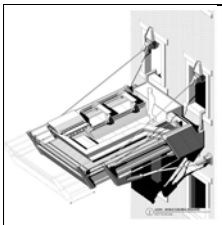
LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

No.	181
Name	Suburbia Tower
Year	2012
Architect/Bureau	Aaron Berman
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	26
Shape	Polygonal
Function	Attraction
Materials	Steel/Metal frame
Capsule size fit	3 m^3
Application	**Mental** – The Lawn Ferris wheel, while acting as the main spectacle of the project, allows the public to experience an essential piece of the mobile service (the suburban lawn) as it is being cared for. The Ferris wheel is comprised of a series of greenhouses attached to a vertical conveyor belt, that small lawns can be housed within. https://www.aaron-berman.com/SUBURBIA-TOWER

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban (mental)



No.	182
Name	Mobile Suburbia
Year	2012
Architect/Bureau	Aaron Berman
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	1+no limit
Shape	Custom
Function	Extension
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental**, **Growing, Mobile** – Mobile Suburbia is a mobile service that aims to bring the 'pleasures' of suburban life to an urban context, specifically New York City. The mobile service takes the form of a prosthetic facade adaptor kit that New Yorkers can rent in order to temporarily enjoy an 'urban suburbia.' This proposal opportunistically uses mobility as an enabler of shared infrastructure and space. With the ability to be deployed daily to different residential locations throughout New York City, the concept of a private, 'suburban back yard' becomes a reality for the urban dweller. After all, most suburban yards are only used for a few hours a week — why pay extra for a balcony or roof deck when you can just rent private outdoor space as needed? https://www.aaron-berman.com/MOBILE-SUBURBIA

○Concept of change:

［This proposal opportunistically uses mobility as an enabler of shared infrastructure and space. With the ability to be deployed daily to different residential locations throughout New York City, the concept of a private, 'suburban back yard' becomes a reality for the urban dweller.］

[B.Capsules' addition/ structural extension]

https://www.aaron-berman.com/MOBILE-SUBURBIA

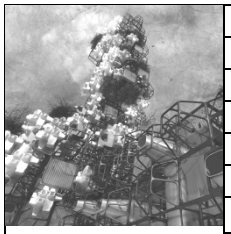
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	183
Name	Interchangeable Habitation
Year	2012
Architect/Bureau	Jonas Erssoni
Country	Sweden
Status	Concept
Way of arrangement	④
No. of capsules	1+no limit
Shape	Custom
Function	Multipurpose
Materials	Plastic
Capsule size fit	20 m^3
Application	**Mental**, **Growing, Mobile** – It is becoming apparent in today's world that existing and living are two disparate yet related concepts. To exist is to be satisfied in the here and now. To live, it might be said that one must have a contingency plan. Something to ensure that tomorrow is just as comfortable. Interchangeable Habitat strives to provide this in several dimensions. Reminiscent of Moshe Safdie's Habitat 67 in Montreal, it is a self-similar building of scales. The module, present in the large scale structural framing of the project, is scaled down to provide individual living units. These units have the ability of being slotted/ coupled in and out, combined or rearranged to satisfy any present or future programmatic needs. In addition, and this is where the 'living' ideal comes in, the modules have the capacity for technological installations such as solar cells, diesel-producing algae farms, water purification and wind turbine. https://www.arch2o.com/interchangeable-habitation-jonas-ersson/

○Concept of change:

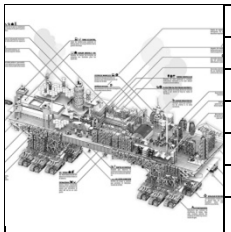
［The idea of an interchangeable architecture has been a driving force behind many of the experimental movements during the 20th century. In my scheme I revisited some of the ideas of the metabolist and structuralist movements but tried to reevaluate the basic premise. Unlike the metabolist idea of wear and tear, I envisioned a system that instead of constantly being replaced would allow a systematic reconfiguration to suit changing needs. In essence, modular living-units connect to a corresponding modular steel framework, as well as to each other, to create possibilities for specialized and interchangeable configurations. The design also allows for a customization within the living-unit itself where technical installations such as solar cells, diesel producing algae, water purification and ventilation can be plugged into the unit depending on the positioning of each unit relative to influences such as prevailing wind-direction and the amount of direct or indirect sunlight a unit recieves.］

[C.Capsules' rearrangement]

●Renovation:

［None］

[D.Capsules' joint or fusion] [F.Change of capsules' functions] https://www.arch2o.com/interchangeable-habitation-jonas-ersson/	
◆Type of capsule: Urban (mental) LIVING STANDARDS: Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: _, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.	



No.	184
Name	Moving City
Year	2013
Architect/Bureau	Manuel Dominguez
Country	Spain
Status	Concept
Way of arrangement	②
No. of capsules	1001~10000
Shape	Rectangular
Function	Multipurpose
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – (modular towers are equipped with cranes to allow manipulating the living and functional units) **Mobile** – Its mobility is proposed as a way to encourage reforestation of the static cities which it replaces, and part of its day-to-day function is the management of this environment. https://www.archdaily.com/443701/a-walking-city-for-the-21st-century

○Concept of change:

［The design for the "Very Large Structure" expands on the Walking City by including strong proposals for energy generation on board the city. ］

[E.Capsules' mobility/movability]

https://www.archdaily.com/443701/a-walking-city-for-the-21st-century

●Renovation:

［None］

◆Type of capsule: Nomadic

No.	185
Name	Toretore Village
Year	2013
Architect/Bureau	Toretore Village Ltd
Country	Japan
Status	Concept / Built
Way of arrangement	①
No. of capsules	133
Shape	Dome
Function	Hotel
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental**, **Growing, Mobile** – (domes are made of theme park resorts and can be transported in dismantled conditions; a singular dome can be modified and prolonged by adding new sections) http://www.suzusangyou.co.jp/dome03.html https://travel.rakuten.co.jp/HOTEL/44126/44126.html

○Concept of change:

［Separate domes may form larger structures.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

http://www.suzusangyou.co.jp/dome03.html

https://travel.rakuten.co.jp/HOTEL/44126/44126.html

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

	No.	186
	Name	T2
	Year	2013
	Architect/Bureau	SUS Corporation
	Country	Japan
	Status	Concept / Built / Renovation via recycling
	Way of arrangement	③
	No. of capsules	11~20
	Shape	Rectangular
	Function	Residential
	Materials	Steel/Metal frame
	Capsule size fit	5 m^3
	Application	**Mental** – "T2" is short for "Transfer Technology Unit". Each T2 is built in a factory and then delivered to the residence site via flatbed. T2 is the brainchild of the SUS Corporation, an aluminum parts manufacturer. **Growing** – (experimental multicapsular building can nest several capsules) **Mobile** – (capsules are mobile and can be transported by a truck) https://ecoms.sus.co.jp/products/t2/example.php https://kotaku.com/want-to-live-in-a-large-aluminum-box-in-japan-you-can-471469513

○Concept of change:

［Can extend infinitely beyond the standard 9 m2 size. Also supports spatial extension. Similarly, business scenarios constantly change based on customer needs and trends.t2 is a product that can be linked to extend as required, or separated and minimized readily. The unit responds flexibly to certain future changes. […]SUS Co., Ltd. (Head office: Shizuoka City, Shizuoka Prefecture) has developed an urban model of an aluminum minimal space t2 (Tee-Two) that can realize a living space matched to changes in life by increasing, decreasing or moving . "Additional installation" to the land already used such as a parking lot, "time-limited installation" such as 2020 is possible, and the new land utilization method is based on characteristics such as fireproof certification acquisition and short-term construction etc.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

[F.Change of capsules' functions]

https://ecoms.sus.co.jp/products/t2/example.php

●Renovation:

［Available via company support ］

[ii.Maintenance]

[iv.Structural repairs]

[v.Cosmetic repairs]

◆Type of capsule: Leisure (mental) LIVING STANDARDS: Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.	

No.	187
Name	Office Complex Bogota
Year	2013
Architect/Bureau	Unknown
Country	Columbia
Status	Concept / Built
Way of arrangement	②
No. of capsules	17
Shape	Rectangular
Function	Office
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – The building, which will be known as Inbox creative offices, "aims to be the first of its kind to offer a solution and alternative that contributes to this cycle of reusing materials to generate savings and help the ecosystem," explained Andrés Gutiérrez Vallejo, director of the company. https://www.portafolio.co/economia/finanzas/bogota-tendra-edificio-oficinas-contenedores-67534

○Concept of change:

［In December of this year (2013) we will launch our second office point, which will be located on Carrera 18 with 109th Street, in Bogotá.］

[B.Capsules' addition/ structural extension]

https://www.portafolio.co/economia/finanzas/bogota-tendra-edificio-oficinas-contenedores-67534

●Renovation:

［None］

◆Type of capsule: Nomadic

No.	188
Name	Aether Apparel - PROXY
Year	2013
Architect/Bureau	Envelope A+D
Country	USA
Status	Concept / Built
Way of arrangement	②
No. of capsules	3
Shape	Rectangular
Function	Office
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – When Aether Apparel, an online purveyor of design-conscious, technical outerwear, made the leap to brick-and-mortar retail, PROXY offered many advantages over conventional spaces, including the opportunity to experiment with the clothing store concept itself. Working within PROXY's container vocabulary, we created a temporary, stand-alone building in the heart of Hayes Valley to provide Aether with an icon fitting their brand—and a more nimble business model. **Growing** – Modular design is an exercise in efficiency and ingenuity. For Aether, we stacked and staggered three 40-foot shipping containers to stake out a compelling urban form. **Mobile** – Like PROXY itself, this store won't remain on its site forever. But thanks to our durable and portable design, Aether can disassemble their store and move it to a new home, changing location without losing this signature structure. https://architizer.com/projects/aether-apparel/

○Concept of change:

［Aether wanted a striking physical presence with the unconventionality of a pop-up venue. They were drawn to our use of shipping containers at PROXY as highly customized modular units that are built to be durable rather than disposable, bold instead of drab.］

[F.Change of capsules' functions]

https://architizer.com/projects/aether-apparel/

●Renovation:

［None］

◆Type of capsule: Urban (mental)

No.	189
Name	Swiss Tubes
Year	2013
Architect/Bureau	TCS Camping Company
Country	Switzerland
Status	Concept / Built
Way of arrangement	②
No. of capsules	5
Shape	Tube
Function	Residential
Materials	RC
Capsule size fit	5 m^3
Application	**Mental**, **Growing** – (capsules are placed as a nomadic shelters in natural environment as a leisure spaces; structure uses round tubes from recycled materials)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: ● , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

	No.	190
	Name	A-Kamp47
	Year	2013
	Architect/Bureau	Stephane Malka
	Country	France
	Status	Concept / Built / Demolished
	Way of arrangement	③
	No. of capsules	23
	Shape	Custom
	Function	Attraction
	Materials	Plastic
	Capsule size fit	2 m^3
	Application	**Mental**, **Growing** – The illegitimate son of the minimal "unité d'habitation" of Le Corbusier and Claude Parent's "oblique housing environment", A-Kamp47 vertical camp takes a stand at La Friche de La Belle de Mai in Marseille, on a wall between a cultural center and a railroad network.<…> A logical evolution of light-weight shelters, the tent has the ability to be very mobile. But the problem is that isolated tents are more exposed; exposed to the cold, and also to theft and police raids. https://stephanemalka.com/portfolio/a-kamp47-inhabit-the-wall-marseille-2013/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ×, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ▲, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

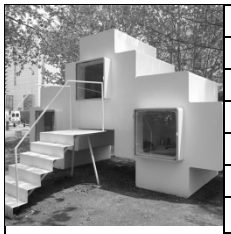
No.	191
Name	Pengheng Space Capsules Hotel
Year	2013
Architect/Bureau	Pengheng Space Capsules Hotel
Country	China
Status	Concept / Built
Way of arrangement	②
No. of capsules	21~50
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental** – The hotel is almost entirely staffed by robots! The 24-hour front desk where you book your sleep capsule and is operated almost entirely by robots. From this desk, you can also book tours of the city and sights around Shenzhen. All the capsules come with flat-screen TVs and Tablets, which you are free to use. They are also equipped with a small work desk and electrical outlets. https://www.uniqhotels.com/pengheng-space-capsules-hotel

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	192
Name	Micro House in Tsinghua
Year	2013
Architect/Bureau	Studio Liu Lubin
Country	China
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental**, **Growing**, **Mobile** – <…>chinese studio liu lubin has recently finished the private 'micro-house' in beijing. it is based on the minimum space people need for basic indoor movement, such as sitting, laying and standing. the form of the 'micro-house' is designed to act as a combination of furniture and architecture elements. when being rotated, the unit of the concept will shift its spatial context, such as resting, working, washing and cooking, etc. the unit can not only be used as a single-functional room, but also can be grouped together as a housing suite, or even residential cluster. https://www.designboom.com/readers/the-micro-house/

○Concept of change:

［This micro house in Beijing by Chinese architect Liu Lubin comprises three cross-shaped modules that can be flipped around to turn a living room into an office or bathroom. Studio Liu Lubin used a fibre-reinforced foam composite for the structure of the modules, making them light enough to lift. This allows residents to rotate the rooms if they need to swap simple shelves for a desk or sink. The Micro House units can not only be used as single-function rooms, but also can be grouped together as a housing suite, or even residential cluster. A village can be built up from hundreds of modules］

[B.Capsules' addition/ structural extension]

[F.Change of capsules' functions]

https://www.dezeen.com/2013/06/29/micro-house-in-tsinghua-by-studio-liu-lubin/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ×, Foundations: ×; Quality: Water and lavatory: ●, Electricity:

●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	193
Name	Pop-up Neighborhood
Year	2013
Architect/Bureau	James Alfandre
Country	USA
Status	Concept / Built
Way of arrangement	②
No. of capsules	4
Shape	Rectangular
Function	Attraction
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – (the capsular structure is a dominant in the temporarily created cultural space for the local neighbourhood) **Mobile** – (the capsules are stored and in the case of event are transported to the site) https://www.youtube.com/watch?v=66qiVmN6RWo

○Concept of change:

［For six months, Granary Row become a pop-up neighborhood-- flanked by 2 lanes of traffic -- where fledgling entrepreneurs could get a start (year one saw clothing stores, a bike shop, an art gallery and a local humane society), food trucks parked, affordable shipping container micro-housing was displayed and the neighborhood got to know each other better.

Granary Row will pop up again- other ideas that came out of the neighborhood: gardens, dedicated bike lanes, parks or plazas -, but Alfandre hopes that at some point it will become more permanent.］

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

https://www.youtube.com/watch?v=66qiVmN6RWo

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

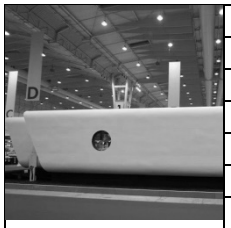
No.	194
Name	Archipod
Year	2013
Architect/Bureau	Archipod Ltd
Country	UK
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Wood
Capsule size fit	3 m^3
Application	**Mobile** – <…>in 2010, the Archipod took teleworkers by storm with a new backyard office concept "designed around the idea that a garden building should become part of the garden landscape." The 3m-diameter sphere is hooked up with electric heat, ventilation, power outlets, natural light from a roof skylight, and is prefabricated in sections for easy assembly. https://www.architectmagazine.com/design/podzook-live-work-play-pods-constructed-with-locally-sourced-materials_o

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ×.



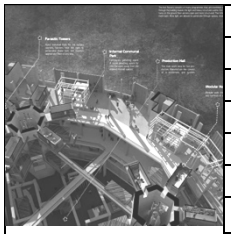
No.	195
Name	Eagle Concept
Year	2012
Architect/Bureau	Agueda Concept
Country	Portugal
Status	Concept / Built
Way of arrangement	①
No. of capsules	2~10
Shape	Rectangular
Function	Residential
Materials	Wood
Capsule size fit	10 m^3
Application	**Mobile** – The project is based on a concept of sustainability, based on the environmental component and you want to drive the development of the local economy in order to make it strong enough to succeed in the global market. The first example of this cooperation comes in the form of a house modular architecture built from recycled materials fully equipped for the various valences products partner network. http://arquitecturaengenhariamagazine.blogspot.com/2013/06/agueda-concept-casa-modular-portugal.html

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



	No.	196
	Name	The Hut Factory
	Year	2014
	Architect/Bureau	Haseef Rafiel
	Country	Malaysia
	Status	Concept
	Way of arrangement	③
	No. of capsules	51~100
	Shape	Rectangular
	Function	Multipurpose
	Materials	RC
	Capsule size fit	5 m^3
	Application	**Mental**, **Growing**, **Mobile** – (the megastructure is contrasted to the surrounding urban environment as informal; capsules are movable and can be produced inside the structure) https://displacenonplace.wordpress.com/2015/04/23/work-in-progress-haseef-rafiei/#jp-carousel-2036

○Concept of change:

［The huts represent ‘freespace’; spaces without any predetermined function which encourages creativity and spontaneity in appropriation of space.］

[B.Capsules’ addition/ structural extension]

[H.Production of capsules]

https://displacenonplace.wordpress.com/2015/04/23/work-in-progress-haseef-rafiei/#jp-carousel-2036

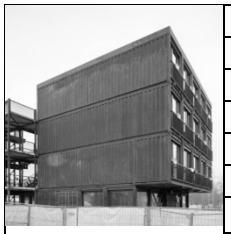
●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: _, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: _; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	197
Name	EBA51
Year	2014
Architect/Bureau	Holzer Kobler Ltd
Country	Germany
Status	Concept / Built
Way of arrangement	②
No. of capsules	15
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – EBA15, named after its address: Eichbuschallee 51, in the Berlin borough of Treptow-Köpernick, has on approach a Las Vegas-style sign welcoming visitors to "fabulous Frankie & Johnny". Frankie and Johnny are the names of two almost parallel bar-shaped multi-container blocks that when fully completed will stretch back from the road across the 10,000m2 site, with a third block, Nelly, stretched alongside them at a slight angle. Giving the blocks monikers, the intention has been to give them an immediate sense of interacting "characters", lying alongside each other on the site, making more of a sense of place, especially for students who will also be interacting with each other, and creating their own temporary sense of home there. https://www.uncubemagazine.com/blog/15970711

○Concept of change:

［The first section of Nelly (author's comment: name of the complex) is due to be finished at the start of November in time to welcome a further 56 students, with its second phase scheduled to open in December. The completion of Frankie and Jonnny will then follow in Spring 2016.］

[B.Capsules' addition/ structural extension]

https://www.uncubemagazine.com/blog/15970711

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: _, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

COMMUNITY:

Inside activity: local chat, official page, art-project, music festivals

Building's management: Communication with residents is done one to one with a person of operating company (real estate) deployed within a building

Outreach: occasional tours

No.	198
Name	Modular Home Prototype
Year	2014
Architect/Bureau	Garrison Architects
Country	USA
Status	Concept / Built
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental**, **Growing**, **Mobile** – Developed for the New York City Office of Emergency Management, the modular housing is designed by Garrison Architects to be installed within 15 hours on any site, giving displaced city residents a temporary home without asking them to leave their community. https://www.dezeen.com/2014/06/25/garrison-architects-post-disaster-housing-new-york/

○Concept of change:

［Developed for the New York City Office of Emergency Management, the modular housing is designed by Garrison Architects to be installed within 15 hours on any site, giving displaced city residents a temporary home without asking them to leave their community. The 15-hour installation involves transporting the modules to a site on the back of a lorry, craning them into place and plugging them into local utilities.］

[E.Capsules' mobility/movability]

https://www.dezeen.com/2014/06/25/garrison-architects-post-disaster-housing-new-york/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

No.	199
Name	Mill Junction
Year	2014
Architect/Bureau	CITIQ
Country	SAR
Status	Concept / Built
Way of arrangement	②
No. of capsules	56
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental**, **Growing** – <…>Mill Junction opened, an eleven-storey dormitory built by Citiq Students (a satellite company of Jika Properties Pty) inside five abandoned silos, previously used to store grain, to which were added, on the side and top a series of 50-year old containers.<…> Finally, the coloured containers that characterise the building have been salvaged and well-insulated, saving them from a slow, costly as well as polluting process of elimination. https://www.domusweb.it/en/architecture/2014/05/13/mill_junction.html

○Concept of change:

［The model seems to be replicable. “We’re currently busy with one, two, three, four other properties in Johannesburg which follow sort of the same themes,” Lapham says. Further downtown, another row of grain silos is expected to get the shipping container treatment. As Lapham explains, “the basic structure of the silos are extremely—what can I call it?—non-leaky,” making them amenable to this kind of reuse.］

[B.Capsules’ addition/ structural extension]

https://metropolismag-com.webpkgcache.com/doc/-/s/metropolismag.com/projects/johannesburg-colorful-dorm-made-from-shipping-containers/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: ●, Functional diversity: ●.

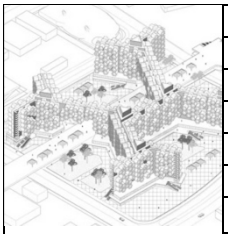
COMMUNITY:

Inside activity: Official page, art projects, sport activities;

Building’s management: Company initiated building’s construction and sold to another company;

company initiates projects, events and competitions among students

Outreach: Tours, exhibitions; SNS, public page, personal blogs



No.	200
Name	Rotating Plug-in Capsules
Year	2014
Architect/Bureau	Bojing Qu
Country	China
Status	Concept
Way of arrangement	③
No. of capsules	501~1000
Shape	Honeycomb
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	5 m^3
Application	**Growing**, **Mobile** – <…>consequently, the idea of a rotating apartment has been conceived to produce a living system enclosed by a light gauge steel structure that can quickly be produced and assembled on site. individually, each capsule is made up of two main parts: one is a rotating component that involves the main daily living functions such as a living room, bed room, and dining room, while the other is a fixed module that contains the subsidiary functions such as a kitchen, toilet, and storage room. this system challenges the minimum living dimensions of human beings and multiplies the space available to them simply by rotating. https://www.designboom.com/architecture/bojing-qu-shanghai-urban-sprawl-rotating-plug-in-capsules-06-04-2014/

○Concept of change:

［The idea of a rotating apartment has been conceived to produce a living system enclosed by a light gauge steel structure that can quickly be produced and assembled on site. These rotating apartment towers are located on the old site of the 2010 expo in shanghai where they can grow throughout the years to meet the expanding population of users.］

[B.Capsules' addition/ structural extension]

[F.Change of capsules' functions]

https://www.designboom.com/architecture/bojing-qu-shanghai-urban-sprawl-rotating-plug-in-capsules-06-04-2014/

●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	201
Name	Attrap'Reves Bubble Hotel
Year	2014
Architect/Bureau	Attrap'Reves Ltd
Country	France
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Sphere
Function	Hotel
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental** – Your bubble is located in a secluded glade with a bang-to-rights view. It's a short walk away from the hotel's main building where you can peer through telescopes, eat food, and relax in the Jacuzzi. Your bubble is kept constantly inflated by a silent blower which also recycles the air inside. You have a king-size bed, a reading lamp, and tables and chairs https://www.attrap-reves.com/en/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ▲.

No.	202
Name	Songpa Microhousing
Year	2014
Architect/Bureau	SSD Architecture
Country	Korea
Status	Concept / Built
Way of arrangement	②
No. of capsules	16
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Mental** – Songpa Micro-Housing provides a new typology that extends the limits of the housing unit to also include semi-public circulation, balconies, and the thickness of walls. Like the ambiguous gel around a tapioca pearl, this 'Tapioca Space' becomes a soft intersection between public/private and interior/exterior, creating social fabrics between neighbors. http://www.ssdarchitecture.com/works/residential/songpa-micro-housing/

○Concept of change:

［By mining the discrepancy between maximum floor area ratios and maximum zoning envelopes, Songpa Micro‐ Housing provides a new typology that extends the limits of the unit to also include semi‐public circulation, balconies, and visual extensions. In terms of dynamically flexible mixed‐use housing, fourteen 'unit blocks' allow residents to either claim a single unit, or in the case where a couple or friends require more space, recombine the blocks for larger configurations.］

[D.Capsules' joint or fusion]

https://www.area-arch.it/en/songpa-micro-housing/

●Renovation:

［None］

◆Type of capsule: Urban (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	203
Name	Hive-inn
Year	2014
Architect/Bureau	OVA Studio
Country	China
Status	Concept
Way of arrangement	④
No. of capsules	101~200
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing**, **Mobile** – the 'hive-inn' is a hotel structure designed by hong-kong-based OVA studio that allows containers to travel in and out of it. offering maxi-mum flexibility and mobility, the project envisions possibilities for applications such as emergency housing or medical care units. https://www.designboom.com/architecture/ova-studio-traveling-container-hotel-rooms-hive-inn-04-14-2014/

○Concept of change:

［The rooms can be shipped to whatever location is required and used for multiple functions such as offices, leased to various individuals or companies who temporarily need space. Focusing on sustainability, recycled containers are used for the modular pieces that are then slotted and plugged in independently of what is above or under them – enabling the building grow and or decrease in relation to demand.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

https://www.designboom.com/architecture/ova-studio-traveling-container-hotel-rooms-hive-inn-04-14-2014/

●Renovation:

［None］

◆Type of capsule: Urban

No.	204
Name	Pont9 New Bridge
Year	2014
Architect/Bureau	Stephane Malka
Country	France
Status	Concept
Way of arrangement	③
No. of capsules	11~20
Shape	Rectangular
Function	Multipurpose
Materials	Steel/Metal frame
Capsule size fit	4 m^3
Application	**Mental, Growing** – In response to mass production, the economic crises, and the spatial segregation inherent in real-estate prices, this structure not only co-opts impoverished or outlying spaces, but also upscale places through the use of an active system.<…> This nomadic micro-city is organized around multiple activities that include residences, offices, and meeting rooms, as well as art galleries, recording studios, shops, playgrounds, canteens, and night clubs. All of these activities are run by the residents themselves. The structure consists of a modular system, footbridges, and public spaces, all mounted on scaffolding. https://stephanemalka.com/portfolio/pont9-i-on-the-bridges-paris-2014/

○Concept of change:

［This moving metropolis can be easily and quickly disassembled, and can be adapted to various urban configurations developed according to the number of participants.］

[A.Capsules' replacement/removal]

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

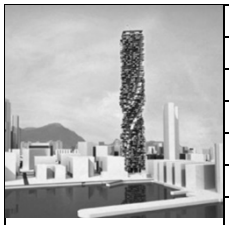
[F.Change of capsules' functions]

https://www.contemporist.com/pont9-by-malka-architecture/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)



No.	205
Name	Unit Fusion
Year	2014
Architect/Bureau	Y Design Office
Country	China
Status	Concept
Way of arrangement	③
No. of capsules	501~1000
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	5 m^3
Application	**Growing**, **Mobile** – The modules are not just prefabricated, they're also completely mobile. Every five years, a complete unit would be moved to another zone on the tower. This move creates new social bonds, a new living experience for the residents, and a unity throughout the entire tower. https://inhabitat.com/unit-fusions-moveable-modules-could-be-the-future-neighborhoods-of-hong-kong/

○Concept of change:

［The thing is that it is just a bizarre modular tower concept for the center of Hong Kong. Y Design Office pictured a Jenga-like 75 story building where residential units are to be rearranged every five years. Plug-in/plug-out mechanical system to provide easy relocation of the steel and concrete units varied in size from XS to XL and in the arrangement of the interior blocks (like kitchen, bathroom, balcony, etc.) in according to the customer's requirements.］

[C.Capsules' rearrangement]

[F.Change of capsules' functions]

https://www.vice.com/en/article/ypnkxj/this-modular-tower-concept-looks-like-a-giant-jenga

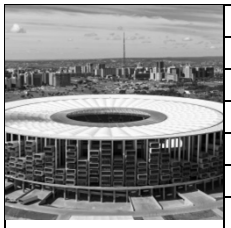
●Renovation:

［None］

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	206
Name	Casa Futebol
Year	2014
Architect/Bureau	Alex de Stampa, Sylvain Macaux
Country	Brazil
Status	Concept
Way of arrangement	④
No. of capsules	501~1000
Shape	Rectangular
Function	Residential
Materials	RC
Capsule size fit	7 m^3
Application	**Mental, Growing**, **Mobile** – In these hypothetical designs entitled "Casa Futebol", Architects Axel de Stampa and Sylvain Macaux of 1Week1Project have proposed a reappropriation of Brazil's World Cup venues by inserting housing units of approximately 105 square meters into the existing structures. The designs are tailored to each stadium, allowing them to continue to operate smoothly, with part of the money raised by ticket revenue used to finance the construction and maintenance of dwellings. By either replacing part of the stands with the prefabricated units or by occupying the external facade, Casa Futebol adds a human scale to these monumental buildings.<…>no matter what the space, whether it be urban, rural or digital, there are always new possibilities it can offer, waiting to be borne out: to turn it into a leisure space, to bring out dramatic emotions, to place the public back at the center of the design, and endless others. It's up to us to give it a new identity and reveal the place for what it is https://www.archdaily.com/526191/casa-futebol-proposes-a-different-olympic-legacy-for-brazil-s-stadiums

○Concept of change:

［By either replacing part of the stands with the prefabricated units or by occupying the external facade, Casa Futebol adds a human scale to these monumental buildings.］

[B.Capsules' addition/ structural extension]

[G.Recyclability/Reuse]

https://www.archdaily.com/526191/casa-futebol-proposes-a-different-olympic-legacy-for-brazil-s-stadiums

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: _, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: _, Electricity: _; Flexibility: Movable furniture: _, Functional diversity: _.

No.	207
Name	Wow Pod
Year	2014
Architect/Bureau	IDEO Design Consultancy
Country	Worldwide
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Vehicle
Function	Multipurpose
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mental, Growing**, **Mobile** – WOW [Work on Wheels] pods might occupy a location between two offices, splitting travel times for both teams," said the designers. "Or it could be parked by a site-specific project, like a building under construction."<…> The interlocking cube-like offices on wheels could also present options for employers looking to provide "greater access to daylight and natural ventilation, as well as views and green space". https://www.dezeen.com/2014/11/26/ideo-self-driving-driverless-vehicles-car-21st-century-mules-cody-truck-wow-pod-work/

○Concept of change:

［"WOW [Work on Wheels] pods might occupy a location between two offices, splitting travel times for both teams," said the designers. "Or it could be parked by a site-specific project, like a building under construction." Each pod would be reconfigurable via a booking service to meet a company's specific needs, while autonomous support vehicles could provide on-demand services when and where required.］

[E.Capsules' mobility/movability]

[F.Change of capsules' functions]

https://www.dezeen.com/2014/11/26/ideo-self-driving-driverless-vehicles-car-21st-century-mules-cody-truck-wow-pod-work/

●Renovation:

［None］

◆Type of capsule: Urban (mental)

No.	208
Name	B-And-Bee
Year	2014
Architect/Bureau	B-And-Bee Project
Country	Belgium
Status	Concept / Built
Way of arrangement	②
No. of capsules	13
Shape	Honeycomb
Function	Hotel
Materials	Wood
Capsule size fit	2 m^3
Application	**Mental, Mobile** – 'B-and-BEE' is developed for quick setup, where up to four floors may be stacked with an incredibly small 100m² footprint capable of housing over 50 visitors. it can be installed in the middle of the action, allowing occupants to lie comfortably and safely 3 meters above the ground while watching the stage with a cozy king-sized bed that can be easily transformed into a plush lounge seat. <…> the colonies are spaces of social interaction, relaxation, comfort, safety and community. this is an example of culturally and environmentally responsible integrative design: developed as a product-service-system, produced and operated by social entrepreneurs, using durable and low eco-footprint materials https://www.designboom.com/design/b-and-bee-stacked-festival-housing-07-28-2014/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	209
Name	Containerville
Year	2015
Architect/Bureau	Scott Kyson
Country	UK
Status	Concept / Built / Expanded
Way of arrangement	②
No. of capsules	45
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – Our upcycled shipping container offices are the blank canvasses that allow you to create the workspace of your dreams. They come fully equipped and ready to move into, because we believe all of your focus should be on building your brand and nurturing your business. https://www.containerville.co.uk/workspaces

○Concept of change:

［In 2015, 45 units were snapped up in when the development first launched. It is now set to expand by 33 in April, bringing total to 78. In London Fields and the Oval Space we've got planning permission for up to another 144 and we're exploring further options for other sites］

[B.Capsules' addition/ structural extension]

https://www.inyourarea.co.uk/news/containerville-the-workspace-in-london-fields-thats-shaking-things-up/

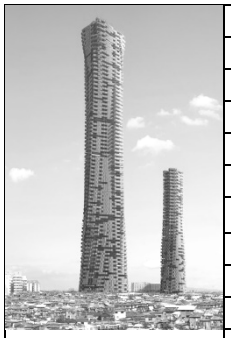
●Renovation:

［Renovation was done via expansion to 78 units］

[iv.Structural repairs]

https://www.inyourarea.co.uk/news/containerville-the-workspace-in-london-fields-thats-shaking-things-up/

◆Type of capsule: Urban



No.	210
Name	Container Skyscraper
Year	2015
Architect/Bureau	SRG Architects
Country	China
Status	Concept
Way of arrangement	②
No. of capsules	2500
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing, Mobile** – The height of the towers is 400 and 200 meters, which would not only radically change the view of the skyline in the city, but, according to the authors, would also become a guide for future development of one of the most socially depressed areas in the city. **<…>**In addition to residential areas, the buildings provide numerous public spaces: vertical gardens, medical service rooms, small shops, schools for children and adults, as well as places for entertainment. https://www.admagazine.ru/architecture/neboskreb-iz-kontejnerov-v-mumbae

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

	No.	211
	Name	Clipper House
	Year	2015
	Architect/Bureau	Container City tm
	Country	UK
	Status	Concept / Built
	Way of arrangement	②
	No. of capsules	44
	Shape	Rectangular
	Function	Residential
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Mental** – Recycled from the 2012 Olympic Broadcasting Studios at Stratford Olympic Park, Clipper House is one of the latest additions to the vibrant community at Trinity Buoy Wharf. http://www.containercity.com/clipper-house

○Concept of change: ［Recycled from the 2012 Olympic Broadcasting Studios at Stratford Olympic Park.］ [G.Recyclability/Reuse]	●Renovation: ［None］
◆Type of capsule: Urban (mental)	

No.	212
Name	Sleeping Pod
Year	2015
Architect/Bureau	Yazdani Studio
Country	USA
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Plastic
Capsule size fit	5 m^3
Application	**Mental, Growing, Mobile** – The prototype pod is a 7’ x 7’ prefabricated room (55 square feet) that incorporates all the furniture found in a standard single dorm room – including demountable book shelves, a full-sized bed, nightstand, closet, medicine cabinet, and full-length mirror – all in a well-designed layout that is simultaneously compact and comfortable. Each pod has its own individual climate control. Daylight, which is plentiful in the loft space thanks to huge floor-to-ceiling windows, enters the pod through top-corner clerestories and through a glass door and wall, which can be blocked with a privacy curtain. <…> The entire front site of the pod has floor-to-ceiling windows that allow enough natural light into the space, and thanks to integrated acoustic panels, the pods can be placed even in noisier environments or close to communal spaces. https://inhabitat.com/tiny-sleeping-pod-for-entrepreneurs-in-utah-doubles-as-a-guesthouse-and-office/ http://yazdanistudio.com/2017/02/sleeping-pod/

○Concept of change:

［CannonDesign's Yazdani Studio has created a tiny student prefab housing unit that can also be used as a mobile guesthouse. ］

[D.Capsules’ joint or fusion]

[F.Change of capsules’ functions]

https://inhabitat.com/tiny-sleeping-pod-for-entrepreneurs-in-utah-doubles-as-a-guesthouse-and-office/yazdani-studio-sleeping-pod-1/

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

No.	213
Name	Common Ground
Year	2016
Architect/Bureau	Urbantainer
Country	Korea
Status	Concept / Built
Way of arrangement	②
No. of capsules	51~100
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – Common Ground is the result of an experiment of revitalising unused land in the middle of the city. By applying prefab methods, e.g. producing modules in a factory, transporting them to the construction site and assembling them on-site, it was possible to reduce the construction time of the 5300 m2 building to five months. https://www.archdaily.com/805302/common-ground-urbantainer

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban

No.	214
Name	Living Roof
Year	2011
Architect/Bureau	Nau Architects
Country	Worldwide
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	7 m^3
Application	**Mental**, **Mobile** - Nau imagines the Living Roof as a private, mobile penthouse for the wealthy and eco-conscious — it could be rented to friends, used on vacations, or set up as a retreat in their own cities. However, one consideration was not made in regards to the project's green footprint – transportation. Airlifting, as suggested by Nau, requires big oil. Hopefully, if and when Living Roof is realized, electric or solar planes will be available to airlift the pods and cut down on transportation emissions. https://inhabitat.com/nau-architects-unveil-self-sustaining-living-roof-pod-home-concept/?variation=d

○Concept of change:

［Its ultra-insulated shell and regenerative systems allow the Living Roof to exist largely off the grid. Used as a hotel the Living Roof project exists as individual suites spread throughout the city with locations changing every two years.］

[E.Capsules' mobility/movability]

https://www.arch2o.com/living-roof-adnau/

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	215
Name	Shiftpod
Year	2015
Architect/Bureau	Christian Weber
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Polygonal
Function	Multipurpose
Materials	Plastic
Capsule size fit	2 m^3
Application	**Growing**, **Mobile** – (shiftpods are movable and can create joined structures) https://gearjunkie.com/camping/shiftpod-xl-luxury-glamping-tent

○Concept of change:

［Designed to suit a range of scenarios — from festival campsites to emergency relief zones — SHIFTPOD can be deployed globally, successfully providing shelter in some of the worst conditions imaginable. SHIFTPOD 2.0 offers an extra two inches of headroom, new seam and fabric sealant to improve weather resistance, and increased strength at key structural points. however, perhaps most intriguingly, two SHIFTPODS can now be joined together with a 'tunnel connector', while six pods can be linked to form a 6-SHIFTPOD house.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

https://www.designboom.com/video/shiftpod-advanced-shelter-system-pop-festival-tent-11-15-2017/

●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ▲, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ▲, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ×; Flexibility: Movable furniture: ●, Functional diversity: ▲.

No.	216
Name	Eco-Capsule
Year	2015
Architect/Bureau	Eco-Capsule Ltd
Country	Slovakia
Status	Concept / Built / Renovation via warranty
Way of arrangement	①
No. of capsules	1+no limit
Shape	Egg-shaped
Function	Residential
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mental** – <…> despite its relatively small size, the energy-efficient pod is capable of comfortably accommodating two adults. a built-in kitchenette offers running water, while the structure also contains a flushing toilet and hot shower — allowing occupants to live in a home-like atmosphere. in addition to a folding bed, the ecocapsule also features plenty of storage space for sporting or research equipment. **Mobile** – <…> in fact, the ecocapsule can be shipped, airlifted, towed or even pulled by a pack animal. https://www.designboom.com/architecture/ecocapsule-launches-production-02-08-2018/

○Concept of change:

［The entire unit fits into a standard shipping container and no special preparations and precautions are necessary to transport the product worldwide. In fact, the ecocapsule can be shipped, airlifted, towed or even pulled by a pack animal. The only modification required is to put the extendable wind turbine pole into its lowest position. When you arrive at your destination, you just extend the pole to its maximum height again, and you're all set to generate power using your wind turbine.］

[E.Capsules' mobility/movability]

https://www.saurenergy.com/solar-energy-news/self-sustaining-micro-home-by-nice-architects-the-ecocapsule

●Renovation:

［We offer a standard warranty on the manufacturing quality of the entire unit. The length of the warranty depends on the country of delivery.］

[ii.Maintenance]

https://www.ecocapsule.sk/faq

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

<table>
<tr><td rowspan="9">  </td><td>No.</td><td>217</td></tr>
<tr><td>Name</td><td>VACT Sleeppod</td></tr>
<tr><td>Year</td><td>2015</td></tr>
<tr><td>Architect/Bureau</td><td>VACT</td></tr>
<tr><td>Country</td><td>Vietnam</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>①</td></tr>
<tr><td>No. of capsules</td><td>1+no limit</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td></td><td>Function</td><td>Hotel</td></tr>
<tr><td></td><td>Materials</td><td>Wood</td></tr>
<tr><td></td><td>Capsule size fit</td><td>3 m^3</td></tr>
<tr><td></td><td>Application</td><td>Mental – Vietnam Airlines Tourism Company (VATC) is a relatively new venture that is aimed at revolutionizing the aviation and tourism industry. The SleepPod service is a mini-hotel venture in the Noi Bai International Airport.

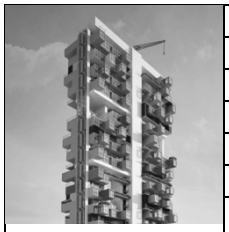
https://www.uniqhotels.com/vatc-sleeppod</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ▲, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.</td></tr>
</table>



No.	218
Name	Container Skyscraper
Year	2015
Architect/Bureau	Ganti+Associates
Country	India
Status	Concept
Way of arrangement	③
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Mental, Growing** – From the architect: India's commercial capital Mumbai, Dharavi spreads over 500 acres. Besides being a dwelling place, it is also a work center and a center for recycling and small scale industries, where people live and work together, making it a truly green community. Houses consists of ground or ground plus one units attached end on end to form a complex and highly dense linear mass. The streets, often only 4'wide, run like the arteries through the settlement, providing light and ventilation to each of its units made from recycled tin or plywood planks nailed together. https://www.archdaily.com/772414/ga-designs-radical-shipping-container-skyscraper-for-mumbai-slum?ad_medium=gallery

○Concept of change:

［Keeping in line with its modular and recyclable character, a vertical high-rise made from recycled shipping containers seems to fit the need.］

[B.Capsules' addition/ structural extension]

[G.Recyclability/Reuse]

http://condicionstemporals.blogspot.com/2015/09/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	219
Name	Prouve House
Year	2015
Architect/Bureau	Richard Rogers & Partners
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	2
Shape	Cylinder
Function	Utilities
Materials	Steel/Metal frame
Capsule size fit	3 m^3
Application	**Growing, Mobile** – Rising to the occasion, the RSHP team surpassed the specifications of Seguin's assignment by designing an adaptive prototype that has the potential to be mass-produced and applied to other historical models. Outfitted with an electrical system powered by solar panels and a recycled grey water system, the new structure is self-sustaining and luxuriously restrained in a way that doesn't takeaway from the poetic engineering of the original. It a masterful balancing act that feels perfectly aligned with Prouvé's legacy as a pioneer and a humanist. https://www.artsy.net/article/artsy-editorial-architect-ivan-harbour-on-bringing-jean-prouve-s

○Concept of change:

［The RSHP adaptation was designed to be showcased at Art Basel 2015 before transferring to an outdoor setting. As well as a new holiday retreat, it has potential to become a blueprint for future transportable and demountable refugee housing in keeping with Prouvé's original vision.］

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

[G.Recyclability/Reuse]

https://www.designingbuildings.co.uk/wiki/Adaptation_of_Jean_Prouv%C3%A9%E2%80%99s_6m_x_6m_demountable_house_by_RSHP

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	220
Name	Lifepod
Year	2015
Architect/Bureau	Michael R Weekes
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Egg-shaped
Function	Residential
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mobile** – (Lifepod is a minimal mobile home in case of a disaster) https://www.facebook.com/tinydomehome/

○Concept of change:

［Lifepod is what Weekes calls “the most house that can be built on a Jet Ski trailer” and pulled by a regular car. Weekes has traveled 1000 miles with the towable shelter and continues to try to improve the design.］

[E.Capsules’ mobility/movability]

https://www.youtube.com/watch?v=5duPhZ491D8

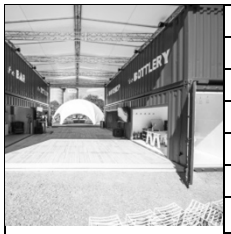
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ▲, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	221
Name	Creative Space
Year	2015
Architect/Bureau	Skog&Stuveback
Country	Sweden
Status	Concept / Built
Way of arrangement	②
No. of capsules	21~50
Shape	Rectangular
Function	Office
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – The Creative Space was inaugurated in the Gröndal area of Stockholm, a formerly industrial area targeted by the city for future residential use. “They were situated in a parking lot so no one really used it,” explains Stuveback. “It’s also so nice because with the temporary structure you can also change the feeling of an area for a shorter period of time and then you can remove it. https://faircompanies.com/videos/gothenburg-stacked-cargo-containers-as-instant-houseoffices/

○Concept of change:

［The containers were designed to be easily packed up and rebuilt anywhere else in the world. The walls plywood boxes on the walls are storage space for transit (the cardboard chairs fit perfectly). The provisional kitchen is plumbed with simple plastic containers to ensure it will plug and play anywhere. The Creative Space was inaugurated in the Gröndal area of Stockholm, a formerly industrial area targeted by the city for future residential use. “They were situated in a parking lot so no one really used it,” explains Stuveback. “It’s also so nice because with the temporary structure you can also change the feeling of an area for a shorter period of time and then you can remove it.］

[B.Capsules’ addition/ structural extension]

[C.Capsules’ rearrangement]

[E.Capsules’ mobility/movability]

https://faircompanies.com/videos/gothenburg-stacked-cargo-containers-as-instant-houseoffices/

●Renovation:

［None］

◆Type of capsule: Urban (mental)

No.	222
Name	Living Roof Capsule 2
Year	2015
Architect/Bureau	Nau Architects
Country	Germany
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Tube
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	5 m^3
Application	**Mental, Mobile** – (See. 214, Living Roof Capsule) http://nau2.com/portfolios/living-roof-2-0/

○Concept of change:

［The new construction is lighter in weight and therefore more convenient for transportation via truck. Atop a roof in the city or standing alone in a pristine natural park, the Living Roof 2.0 combines luxury and ecology for a new way of life.］

[E.Capsules' mobility/movability]

http://nau2.com/portfolios/living-roof-2-0/

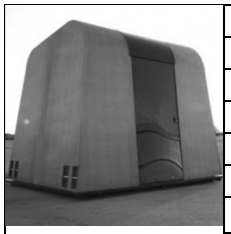
●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.



No.	223
Name	Exo
Year	2015
Architect/Bureau	Michael McDaniel
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Residential
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental, Growing, Mobile** – Inside, two sets of bunk beds fold down from the walls, leaving a person-size aisle clear in the middle. The walls themselves are made of a proprietary blend of metal and plastic that's engineered to be recyclable. Just barely translucent, they give the place a soft, homey glow.<…> Reaction Housing's mission is to make temporary shelters for victims of natural disasters. But before the Exos help victims, they'll serve as crash pads at a music festival, the result of a deal that Reaction made this summer with the Hyatt hotel chain. "People were kind of worried about music festivalgoers after the show, coming back a little tipsy and seeing the dots<…> https://www.fastcompany.com/3042416/hotel-30

○Concept of change:

［Reaction Housing built a better temporary shelter for disaster victims. What he envisioned was a kind of modern tepee, something that could be shipped easily and was movable by hand, but that would provide privacy, security, and enough modern conveniences to make it feel at least a little bit like home. […] According to his measurements, about 16 of them could fit, stacked, on the bed of a single semitrailer.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

https://www.fastcompany.com/3042416/hotel-30

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	224
Name	Sleeperoo
Year	2015
Architect/Bureau	Langefreunde Design Studio
Country	Germany
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Multipurpose
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mobile** – <…>We offer a "special night" where you can fall asleep in places where ordinary people cannot set up tents, such as in the gardens and museums of old castles, on the rooftops of hotels, on piers, and in the middle of ranches. https://tabi-labo.com/289577/wt-sleeperoo?fbclid=IwAR0cCJuDOIrebCipabPafH5QGn7dY-tno86K5qrI7bYB-k9vFRex3Mkm8uw

○Concept of change:

［In the plug-in principle, it is easy to assemble and disassemble.］

[E.Capsules' mobility/movability]

https://tabi-labo.com/289577/wt-sleeperoo?fbclid=IwAR0cCJuDOIrebCipabPafH5QGn7dY-tno86K5qrI7bYB-k9vFRex3Mkm8uw

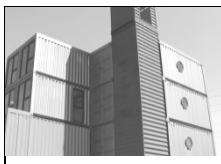
●Renovation:

［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	225
Name	BA Head Office City
Year	2016
Architect/Bureau	Container City tm
Country	UK
Status	Concept / Built
Way of arrangement	②
No. of capsules	10
Shape	Rectangular
Function	Office
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing** – After careful preparation, the prefabricated structure was installed over five days in April 2016. A Chinese box puzzle of interrelated modules, the building presents an arresting facade with colour used to good effect to emphasise the B&A brand. http://www.containercity.com/bristol-avon-group-hq

○Concept of change:

［The building was constructed entirely from shipping containers to assist with the speed of procurement and construction and to allow for future flexibility and expansion, but also because shipping containers, being highly recyclable, fitted perfectly with the company's highly sustainable credentials.］

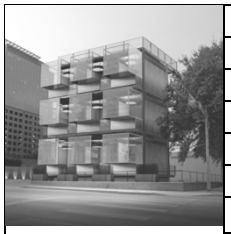
[G.Recyclability/Reuse]

http://www.containercity.com/bristol-avon-group-hq

●Renovation:

［None］

◆Type of capsule: Urban



No.	226
Name	Kasita
Year	2016
Architect/Bureau	Kasita
Country	USA
Status	Concept / Built / Maintenance support provided by company
Way of arrangement	②
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Growing, Mobile** – The mobile structure is a rectilinear pod clad in metal and glass, with one side featuring a cantilevered glazed box.<…> It is intended to slot horizontally into an engineered steel frame, or "rack", which can include many units stacked high and wide. https://www.dezeen.com/2016/08/12/kasita-prefabricated-tiny-micro-house-slots-into-racks-smart-home-technology/

○Concept of change:

［Based in Austin, Texas, Kasita offers housing units that can sit by themselves or stack to form apartments. The pre-fabricated homes can be assembled off-site and delivered in two to three weeks. It is intended to slot horizontally into an engineered steel frame, or "rack", which can include many units stacked high and wide. Designed to be assembled in under a week, each Kasita would be able to swap between different racks.］

[A.Capsules' replacement/removal]

[E.Capsules' mobility/movability]

https://www.dezeen.com/2016/08/12/kasita-prefabricated-tiny-micro-house-slots-into-racks-smart-home-technology/

●Renovation:

［Support provided by the company. Some capsules were relocated connected to change of business operation type］

[ii.Maintenance]

[iii.Change of location]

https://www.businessinsider.com/kasita-tiny-stackable-home-photos-2017-3#the-way-we-build-housing-and-even-skyscrapers-hasnt-changed-substantially-in-over-100-years-and-a-lot-of-that-lag-is-because-we-havent-updated-the-way-we-approach-building-he-said-19

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>227</td></tr>
<tr><td>Name</td><td>QUO Container Center</td></tr>
<tr><td>Year</td><td>2016</td></tr>
<tr><td>Architect/Bureau</td><td>BZZ Arquitectura</td></tr>
<tr><td>Country</td><td>Argentina</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>②</td></tr>
<tr><td>No. of capsules</td><td>57</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Commercial</td></tr>
<tr><td>Materials</td><td>Containers</td></tr>
<tr><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td colspan="2">Mental – Inspired by London’s Container City, this colorful mall also features round apertures similar to a porthole. These flood interiors with natural light and frame window displays.<…> BZZ Arquitectura’s founder Cecilia Bertezzolo designed QUO Container Center and EcoSan built it. It is situated in a leafy town, an hour and a half away from the capital of Argentina, called Ingeniero Maschwitz. Perfect for a weekend escape from the bustling city, Quo is the place to go to find unique clothes and objects, have lunch al fresco and enjoy some nature.

Growing – It consists of 57 maritime containers rescued from the port and arranged to ensure plenty of open green spaces. The restaurants, contemporary offices, eco-friendly clothing, and decor shops as well as a gallery cafe are scattered throughout the triple-story mall. One of the eateries is completely glazed and suspended like a bridge, offering a space to eat, see and be seen, literally.

https://inhabitat.com/bright-and-bold-quo-shipping-container-mall-springs-up-in-buenos-aires/</td></tr>
<tr><td colspan="3">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="4">◆Type of capsule: Urban (mental)</td></tr>
</table>

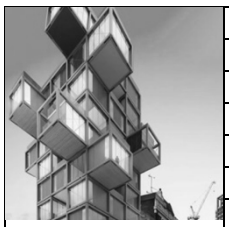
No.	228
Name	Tsukiji First Cabin
Year	2019
Architect/Bureau	First Cabin Ltd
Country	Japan
Status	Concept / Built
Way of arrangement	①
No. of capsules	160
Shape	Rectangular
Function	Hotel
Materials	Wood
Capsule size fit	3 m^3
Application	**Mental** – The First Cabin Tsukiji in Tokyo, Japan, is a Japanese-style pod hotel with an aviation theme that houses 160 people. There are 119 male cabins and 41 female cabins. Tsukiji's pods are equipped with flat-screen TVs, Wi-Fi, electric plugs, AC, house slippers, and toiletries. In addition, the hotel offers a lounge, a large 24-hour communal bath area, shared shower areas, luggage storage facilities, and a fully stocked bar. https://www.uniqhotels.com/first-cabin-tsukiji

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	229
Name	Tree House
Year	2016
Architect/Bureau	Richard Rogers
Country	Worldwide
Status	Concept
Way of arrangement	①
No. of capsules	101~200
Shape	Cube
Function	Residential
Materials	Wood
Capsule size fit	4 m^3
Application	**Growing** – Tree House is the latest volumetric housing project developed by RSHP, to provide low-cost homes that can be rapidly assembled and deployed. Tree House uses a timber structure that can be assembled in low tech factories from locally-sourced timber, and can typically be stacked over ten storeys. https://rshp.com/projects/residential/tree-house/

○Concept of change:

［Designed in response to the theme of the 2016 Venice Biennale 'Reporting from the Front' Tree House proposes a concept for flexible housing that can be manufactured from a simple kit of parts using uncomplicated tools and adapted to suit varied sites or circumstances as housing need demands.］

[D.Capsules' joint or fusion]

https://rshp.com/projects/residential/tree-house/

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

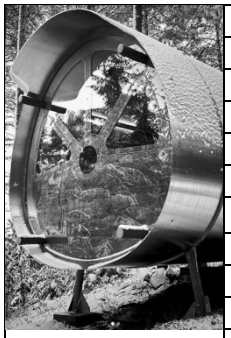
No.	230
Name	Campera Bubble Suite
Year	2016
Architect/Bureau	Capmera Hotel
Country	Mexico
Status	Concept / Built
Way of arrangement	①
No. of capsules	12
Shape	Sphere
Function	Hotel
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental, Mobile** – A collection of 12 bubbles popped up in the vines, this eco-resort is all about allowing guests to feel fully immersed in the vineyard experience. Each bubble has a cozy full size bed with luxe linens, and there's a private bathroom connected to the room. For guests traveling with a third amigo in tow, an upgrade to a bubble suite means an extra bed can be added. https://www.venuereport.com/blog/there-s-a-bubble-hotel-in-the-vineyards-of-mexico-where-you-can-gaze-at-5-million-stars/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ▲.



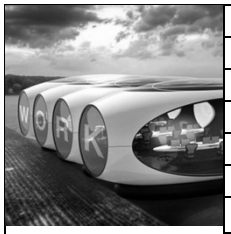
No.	231
Name	Fuselage
Year	2016
Architect/Bureau	Tree Tents Company
Country	UK
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Custom
Function	Hotel
Materials	Wood
Capsule size fit	7 m^3
Application	**Mental, Mobile** – Using modern aerospace design principles, Tree Tents have created a lightweight and portable accommodation type that is equally at home mounted on stilts as it is suspended from trees.<…> The modular design of the Fuselage means that base unit extensions can be added to increase the space and capacity of the unit. The extensions are available in increments of 1.5 meters, but if you are looking to suspend the Fuselage from trees it may be best to stick with the original unit size. https://www.glampingbusiness.com/2019/03/13/the-fuselage-from-tree-tents/

○Concept of change: ［None］	●Renovation: ［Support provided by a company.］] [ii.Maintenance]

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	232
Name	Xpod
Year	2016
Architect/Bureau	Denoldervleugels
Country	Netherlands
Status	Concept
Way of arrangement	①
No. of capsules	1+no limit
Shape	Tube
Function	Multipurpose
Materials	Plastic
Capsule size fit	10 m^3
Application	**Mental, Growing, Mobile** – (The modular unit is concept of futuristic functional space which can expand by fusing units by a longer side. The whole strucrture is dismantable and movable) https://www.behance.net/gallery/3414595/XPOD-HOUSING-UNITS

○Concept of change:

［Modular housing units, lightweight and transportable. For living and working.］

[D.Capsules' joint or fusion]

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: _; Safety: Firm structure: ●, Easy navigation: _, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: _, Functional diversity: ●.

No.	233
Name	3d Printed Office Unit
Year	2016
Architect/Bureau	Winsun Global
Country	UAE
Status	Concept
Way of arrangement	①
No. of capsules	3
Shape	Rectangular
Function	Office
Materials	RC
Capsule size fit	7 m^3
Application	**Mobile** – The site will serve as the temporary offices for between 12 and 20 foundation staff members for now. Dubai hopes it will kick-start its plans to transform the emirate into an incubator for emerging technologies. It has an ambitious goal of using 3D printing in a quarter of all buildings by 2030. https://gulfnews.com/uae/futuristic-dubai-office-showcases-3d-printings-potential-1.1840485

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>234</td></tr>
<tr><td>Name</td><td>Container Market</td></tr>
<tr><td>Year</td><td>2016</td></tr>
<tr><td>Architect/Bureau</td><td>Siyabonga Gondwe</td></tr>
<tr><td>Country</td><td>SAR</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>②</td></tr>
<tr><td>No. of capsules</td><td>101~200</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Commercial</td></tr>
<tr><td>Materials</td><td>Containers</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td>Growing – The second aisle of containers has been converted into a food market which offers traditional African delicacies from Senegal, Ghanaian dishes and the odd South African favourite Sphatlho (aka bunny chow). Marketing and media liaison officer, Siyabonga Gondwe, said the centre featured over 80 stalls which offered something new and exciting to the city centre.

http://www.iolproperty.co.za/roller/news/entry/container_market_in_cbd_a</td></tr>
<tr><td colspan="2">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="3">◆Type of capsule: Urban</td></tr>
</table>

No.	235
Name	Shipping Container Home on Amazon
Year	2017
Architect/Bureau	Mods International
Country	USA
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mobile** – The conversion of shipping containers to living spaces is not a new concept—but being able to purchase them online and have them delivered by e-commerce giant Amazon is. Deliveries by the Seattle-based (and seemingly endlessly expanding) company are becoming a staple for most American households: dogs have never barked so much at the postman, porches have never been so littered with empty boxes, and never before has almost every product on the market been available from one place without even having to leave the house. https://www.archdaily.com/882699/you-can-now-buy-a-shipping-container-tiny-house-from-amazon-but-should-you

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: _, Proper bedding: _; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

	No.	236
	Name	Quadrum-Gudauri
	Year	2017
	Architect/Bureau	Quadrum Ski & Yoga Resort
	Country	Georgia
	Status	Concept / Built
	Way of arrangement	②
	No. of capsules	20
	Shape	Rectangular
	Function	Hotel
	Materials	Containers
	Capsule size fit	7 m^3
	Application	**Mental** – The idea was inspired by the mountains that resemble a triangle, consisting of shipping containers, the hotel “Quadrum” is shaped like a pyramid. The architect Sandro Ramishvili and Irakli Eristavi are the minds behind this extraordinary creation. Built in a minimalist style, the hotel seems to repeat the local terrain, cascading down the mountainside. https://www.boredpanda.com/quirky-shipping-container-hotel-at-2200-meters-above-sea-level/?media_id=Quadrum-92-58b7e309bfd6a__880&utm_source=pinterest&utm_medium=social&utm_campaign=organic

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	237
Name	Drivelines Studios
Year	2017
Architect/Bureau	Lot-Ek
Country	SAR
Status	Concept / Built
Way of arrangement	②
No. of capsules	51~100
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental** – As a leader in urban regeneration, over the past few years Propertuity has single-handedly transformed the heart of the Maboneng precinct into a vital hub of leisure, cultural and commercial life. Our building introduces also housing in this urban mix. The massing - entirely made of upcycled ISO shipping containers - is organized in a V generating a triangular open yard with swimming pool and sundeck. https://lot-ek.com/DRIVELINES-STUDIOS

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban (mental)

LIVING STANDARDS:

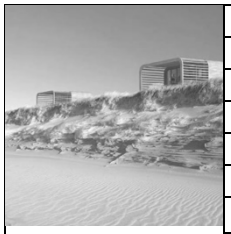
Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

COMMUNITY:

Inside activity: art projects, outer decorations

Building's management: Real estate company owns a building

Outreach: occasional interaction with media



No.	238
Name	Coodo
Year	2014
Architect/Bureau	Coodo Ltd
Country	Germany
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Multipurpose
Materials	Wood
Capsule size fit	7 m^3
Application	**Mobile** – <…>the desire for freedom, individuality and connection to the natural environment is universal. but while we live in a mobile world, we reside in immobile homes. by creating coodo, german company LTG lofts to go has introduced a flexible, mobile and smart habitable unit that can be placed and enjoyed pretty much anywhere. <…> https://www.designboom.com/architecture/ltg-lofts-to-go-coodo-mobile-units-02-24-2017/

○Concept of change:

［By creating coodo, German company LTG lofts to go has introduced a flexible, mobile and smart habitable unit that can be placed and enjoyed pretty much anywhere. […] Many elements of the interior can be chosen by you and modified. Due to the modular concept of coodo, you can expand your business to different locations, thus establishing your brand more rapidly in the market.］

[B.Capsules' addition/ structural extension]

[D.Capsules' joint or fusion]

[F.Change of capsules' functions]

https://www.designboom.com/architecture/ltg-lofts-to-go-coodo-mobile-units-02-24-2017/

●Renovation:

［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	239
Name	Mobile Podcast Studio
Year	2017
Architect/Bureau	Dn&Co and Fathom Architects
Country	UK
Status	Concept / Built
Way of arrangement	①
No. of capsules	1
Shape	Cube
Function	Utilities
Materials	Plastic
Capsule size fit	4 m^3
Application	**Mental, Mobile** – <…>in london's white city district, a mobile podcast studio has been conceived by creative agency dn&co and fathom architects as the first nomadic structure of its kind to be available for public use. 'pod' can seat up to six people within its 12 square meter space, and hosts a fully functional studio for podcast recordings. on its façade, a print made up of 350,000 'pixels' has been generated from a digital script translation of the first spoken words ever to be transmitted by radio: one, two, three, four. is it snowing where you are mr. thiessen?<…> https://www.designboom.com/design/mobile-podcast-studio-fathom-architects-london-dnandco-03-05-2017/

○Concept of change:

［'We also wanted to build a place that seemed to 'appear out of nowhere', so we worked with box deluxe, a fabrication studio that specializes in building for movies and live events, to build the pod entirely offsite – for it to be installed overnight.'］

[E.Capsules' mobility/movability]

https://www.designboom.com/design/mobile-podcast-studio-fathom-architects-london-dnandco-03-05-2017/

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

	No.	240
	Name	3 Living Units
	Year	2017
	Architect/Bureau	Ofis Architects
	Country	Slovenia
	Status	Concept / Built
	Way of arrangement	②
	No. of capsules	3
	Shape	Rectangular
	Function	Multipurpose
	Materials	Wood
	Capsule size fit	4 m^3
	Application	**Mental** – They can be used as holiday cabins, hide away, tree houses or short-time habitations for research, tourism or shelter; their small size allows easy and different transport possibilities. **Growing** – The research for the Cabin was initiated by OFIS, C+C, C28 and AKT along with contractor Permiz to develop Self-contained wooden shell, which can be flexible and adaptable on different locations, climate conditions and terrains. **Mobile** – Slovenian studio OFIS Arhitekti has found a new use for the micro house it designed earlier this year – the modular structure recently served as a temporary library in the grounds of Ljubljana Castle. https://www.archdaily.com/874241/living-unit-ofis-architects https://www.dezeen.com/2017/10/29/ofis-arhitekti-combines-modular-living-units-pop-up-library-ljubljana-castle/

○Concept of change:

［They can be used as holiday cabins, hide away, tree houses or short-time habitations for research, tourism or shelter; their small size allows easy and different transport possibilities. The basic unit can contain habitation for 2 people with double bed, wardrobe, table with chairs and possibility to install bathroom, and kitchenette. If needed 2 or more cabins can be combined together creating a larger habitation that could inhabit 4-6 people. They can be combined vertically or horizontally.］

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

[E.Capsules' mobility/movability]

[F.Change of capsules' functions]

●Renovation:

［None］

[G.Recyclability/Reuse] https://archello.com/nl/project/living-unit	

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ▲, Easy navigation: ×, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	241
Name	Pod Vending Machine Skyscraper
Year	2017
Architect/Bureau	Haseef Rafiel
Country	Japan
Status	Concept
Way of arrangement	④
No. of capsules	1+no limit
Shape	Cube
Function	Utilities
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mental, Mobile -** Inspired by the popularity of vending machines in Japan, the skyscraper offers prospective homeowners the facility to customise and manufacture a modular home, which is then slotted into a high-rise framework. **Growing** – Customers would be able to choose from an array of ready-to-use housing pods to design their home, based on their needs. The home would then be manufactured on-site by a pod printer installed above the the building. Once printed, the pods are plugged into spaces in the structure below by crane arms attached to the skyscraper. https://www.dezeen.com/2017/05/19/pod-vending-machine-haseef-rafiei-3d-printed-housing-modular-homes-mini-living-movies/

○Concept of change:

［Inspired by the popularity of vending machines in Japan, the skyscraper offers prospective homeowners the facility to customise and manufacture a modular home, which is then slotted into a high-rise framework. Customers would be able to choose from an array of ready-to-use housing pods to design their home, based on their needs.］

[B.Capsules' addition/ structural extension]

[C.Capsules' rearrangement]

[D.Capsules' joint or fusion]

[H.Production of capsules]

https://dezignark.com/blog/pod-vending-machine-tackles-demand-for-housing-by-printing-modular-homes/

●Renovation:

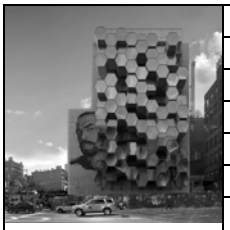
［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: _, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:_; Safety: Firm

structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



No.	242
Name	Shelter with Dignity
Year	2017
Architect/Bureau	Framlab
Country	USA
Status	Concept
Way of arrangement	③
No. of capsules	51~100
Shape	Honeycomb
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	4 m^3

Application	**Mental, Growing, Mobile** – As available land is limited and expensive, Framlab's proposal makes use of the "vertical lots" formed by building walls to create temporary shelters. The scheme imagines the construction of scaffolding onto windowless facades across the city, and slotting the hexagon-shaped modules inside.<…> Each pod would house one person, in order to maintain their privacy and safety, compared to conditions in the communal facilities often provided by shelters. The solo housing system is also reminiscent of the city's old single-room occupancy units (SROs) that previously provided low-cost accommodation for one or two people. SROs were phased out between the 1950s and 1970s following the introduction of a housing code that prevented their construction or conversion – an event that Framlab attributes to the increase in the homeless population. https://www.dezeen.com/2017/11/21/homed-famlab-parasitic-hexagonal-pods-new-york-homeless-shelters/

○Concept of change:

［The hexagonal modules have been designed for easy and inexpensive assembly, and would be slotted into scaffolding structures affixed to windowless facades around the city. […] Meanwhile, a modular range of fittings would allow residents to customise each pod according to their needs.］

[B.Capsules' addition/ structural extension]

[F.Change of capsules' functions]

https://www.dezeen.com/2018/01/26/video-framlab-new-york-homeless-housing-movie/

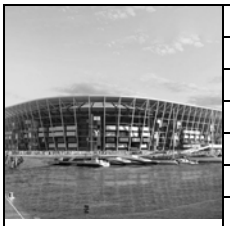
●Renovation:

［None］

◆Type of capsule: Urban (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ▲, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	243
Name	Ras Abu Aboud Stadium
Year	2017
Architect/Bureau	Fenwick Iribarren Architects
Country	Qatar
Status	Concept
Way of arrangement	④
No. of capsules	201~500
Shape	Rectangular
Function	Sports
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Growing, Mobile** – The venue is designed to be can be effectively recycled after the 2022 FIFA World Cup, either by being moved to a new location to host future games or repurposed into several smaller sports and cultural venues. https://www.dezeen.com/2017/12/07/qatar-2022-fifa-world-cup-shipping-container-stadium-football-fenwick-iribarren-architects-doha/

○Concept of change:

［The Spanish architecture practice's modular design means the stadium can be dismantled and moved to a new location after the football tournament. Repurposed steel containers will be arranged in an "elegant curved square" and each will be modified to contain elements of the 40,000-seat stadium, including removable seats, concession stands and bathrooms. The venue is designed to be can be effectively recycled after the 2022 FIFA World Cup, either by being moved to a new location to host future games or repurposed into several smaller sports and cultural venues.］

[C.Capsules' rearrangement]

[E.Capsules' mobility/movability]

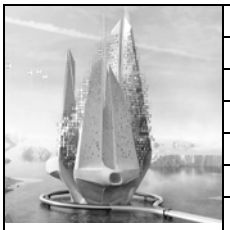
[G.Recyclability/Reuse]

https://www.dezeen.com/2017/12/07/qatar-2022-fifa-world-cup-shipping-container-stadium-football-fenwick-iribarren-architects-doha/

●Renovation:

［None］

◆Type of capsule: Urban



No.	244
Name	Heal-Berg
Year	2017
Architect/Bureau	Luca Beltrame, Saba Nabavi Tafreshi
Country	Antarctica
Status	Concept
Way of arrangement	③
No. of capsules	501~1000
Shape	Cube
Function	Utilities
Materials	Glass
Capsule size fit	3 m^3
Application	**Mobile, Growing, Mobile** – First HEAL-BERG unveiling ceremony: Antarctica May 27th 2022 Our vision for HEAL-BERG is to create independent complexes (in terms of energy and mobility), designed to cease, heal and reverse the process of climate change and its impacts on the earth.<…> Transportation Hyperloop: fast access and connectivity Drones: mobility of residential units between different complexes http://www.evolo.us/heal-berg-reverse-climate-changing-machine/

○Concept of change:

［Our vision for HEAL-BERG is to create independent complexes (in terms of energy and mobility), designed to cease, heal and reverse the process of climate change and its impacts on the earth. Drones: mobility of residential units between different complexes.］

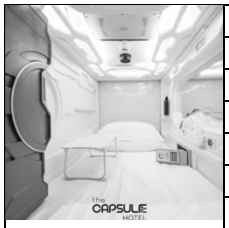
[E.Capsules' mobility/movability]

http://www.evolo.us/heal-berg-reverse-climate-changing-machine/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)



No.	245
Name	The Capsule Hotel
Year	2017
Architect/Bureau	The Capsule Hotel
Country	Australia
Status	Concept / Built
Way of arrangement	②
No. of capsules	11~20
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	3 m^3
Application	**Mobile** – Opened in Sydney's CBD, The Capsule Hotel, is the first of its kind in the country and its 70 wallet-friendly, futuristic-looking pods, are touted as offering the comforts of a traditional hotel room — just without the "room" part. https://www.news.com.au/travel/australian-holidays/nsw-act/review-the-capsule-hotel-sydney/news-story/3741a77fd8eb81da63950ae2c31c9aed

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ×; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ▲, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

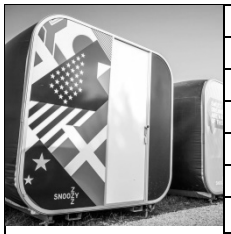
No.	246
Name	Container Hostel
Year	2017
Architect/Bureau	Kinzo Architekten
Country	Germany
Status	Concept / Built
Way of arrangement	②
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental, Mobile** – The Dock Inn is made out of multiple repurposed shipping containers that have been carved out to create 64 guest rooms which all feature a vibrant interior design that mixes urban chic with industrial charm.<…> Throughout the common areas, the designers used several reclaimed materials such as the old shipping pallets that were configured into ample seating space in the lounge. https://inhabitat.com/harbor-town-in-germany-unveils-urban-chic-hostel-made-out-of-repurposed-shipping-containers/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.



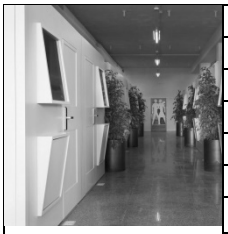
	No.	247
	Name	Snoozebox
	Year	2017
	Architect/Bureau	Snoozebox Hotel
	Country	UK
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	1+no limit
	Shape	Rectangular
	Function	Utilities
	Materials	Plastic
	Capsule size fit	2 m^3
	Application	**Mobile** – Hence the odd sight of a series of cubes landing at Swansea City's training ground. Called Snoozeboxes, these portable structures are inflated to create rooms with enough space for a comfy double bed. As Garry Monk puts his charges through double sessions, the lads can catch some shut-eye in between the morning and afternoon drills. https://www.fourfourtwo.com/performance/training/sleep-your-way-top

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ▲, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



No.	248
Name	Bed And Boarding
Year	2017
Architect/Bureau	Carlotta Tartarone and Studiotre of Naples
Country	Italy
Status	Concept / Built
Way of arrangement	②
No. of capsules	51~100
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental, Mobile** – We've shared capsule hotels before (see here and here) but this hospitality concept has made its way across the pond to Napoli, a first for Italy. Similar to a hostel, the Bed and Boarding (of Dorelan and DorelanHotel) designed by Carlotta Tartarone and Studiotre of Naples provides the necessities for travelers who are looking for a simple place to rest that won't break the bank but doesn't sacrifice on comfort.<…> Design draw: Each capsule is only 4 square meters but you don't get the sense that you're staying in a prison cell with the hotel's colorfully painted capsules and fruit trees planted around the lobby. https://design-milk.com/capsule-hotel-comes-town-napoli/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ▲, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

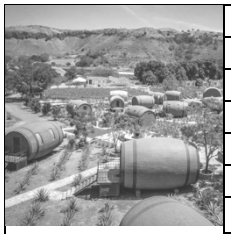
	No.	249
	Name	Inn The Park
	Year	2017
	Architect/Bureau	Inn The Park Company
	Country	Japan
	Status	Concept / Built
	Way of arrangement	①
	No. of capsules	3
	Shape	Sphere
	Function	Hotel
	Materials	Plastic
	Capsule size fit	3 m^3
	Application	**Mental, Mobile** – (the capsules are hanged in a forest and can easily change their location) https://www.innthepark.jp/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ×, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.



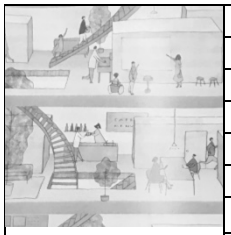
No.	250
Name	Matices Hotel de Barricas
Year	2017
Architect/Bureau	Matices Hotel de Barricas
Country	Mexico
Status	Concept / Built
Way of arrangement	①
No. of capsules	21~50
Shape	Custom
Function	Hotel
Materials	Other objects
Capsule size fit	3 m^3
Application	**Mental** – In the Mexican town of Tequila, there's a hotel that lets you sleep inside a giant tequila barrel and sample authentic tequila drinks. Oh, and there are tequila shots upon arrival. https://swirled.com/tequila-barrel-hotel/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

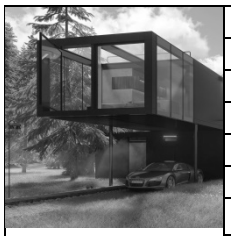
Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ●, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ▲; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.



No.	251
Name	Common Space Which Blowing the Building Out
Year	2017
Architect/Bureau	Chidai Keisuke
Country	Japan
Status	Concept
Way of arrangement	①
No. of capsules	201~500
Shape	Rectangular
Function	Residential
Materials	Wood
Capsule size fit	4 m^3
Application	**Growing, Mobile** – (the capsules are private spaces which can appear and be dismantled everywhere within the structure)

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban



	No.	252
	Name	Cozy Box
	Year	2017
	Architect/Bureau	S&T Architects
	Country	Ukraine
	Status	Concept
	Way of arrangement	②
	No. of capsules	2
	Shape	Rectangular
	Function	Residential
	Materials	Steel/Metal frame
	Capsule size fit	10 m^3
	Application	**Growing, Mobile** – (two houses are arranged as blocks of 1st and 2nd floor)

○Concept of change: ［House consists of two living units which can be arranged in different ways and are completely mobile.］ [C.Capsules' rearrangement]	●Renovation: ［None］

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>253</td></tr>
<tr><td>Name</td><td>Kaohsiung Stereo Container Inn</td></tr>
<tr><td>Year</td><td>2018</td></tr>
<tr><td>Architect/Bureau</td><td>ML Architect</td></tr>
<tr><td>Country</td><td>China</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>③</td></tr>
<tr><td>No. of capsules</td><td>51~100</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Hotel</td></tr>
<tr><td>Materials</td><td>Containers</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td colspan="2">Mental, Growing, Mobile – This building is ten-story high and can be said to be the highest "container house" in Taiwan. But strictly speaking, the main structure of this building is still steel, and the container is just a module inserted into it. It is rumored that it is scheduled to be used as a hotel.<…> Now it seems that the importance of "metabolism" is more in architectural ideas, and the actual completed works are very rare, so the Zhongyin Capsule Tower is particularly valuable. However, there is a gap between the ideal and the reality. The building has never been reorganized, and as the building decayed, the problem of toxic building materials also caused the building to face demolition for a time.<…> Back on Wufu Road, can this container-based hotel become a symbol of a new building like the Bank of China Capsule Tower, even surpassing the unfinished work of the "Metabolism School" and driving new possibilities for "Circular Construction"? Perhaps it is a direction worth developing in Kaohsiung.

https://takaogooday.org/20180304-3/</td></tr>
<tr><td colspan="3">○Concept of change:

［None］</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="4">◆Type of capsule: Urban (mental)</td></tr>
</table>

<table>
<tr><td rowspan="10">  </td><td>No.</td><td>254</td></tr>
<tr><td>Name</td><td>Starbucks in Taiwan</td></tr>
<tr><td>Year</td><td>2018</td></tr>
<tr><td>Architect/Bureau</td><td>Kengo Kuma and Associates</td></tr>
<tr><td>Country</td><td>Taiwan</td></tr>
<tr><td>Status</td><td>Concept / Built</td></tr>
<tr><td>Way of arrangement</td><td>②</td></tr>
<tr><td>No. of capsules</td><td>29</td></tr>
<tr><td>Shape</td><td>Rectangular</td></tr>
<tr><td>Function</td><td>Commercial</td></tr>
<tr><td>Materials</td><td>Containers</td></tr>
<tr><td></td><td>Capsule size fit</td><td>7 m^3</td></tr>
<tr><td></td><td>Application</td><td colspan="2">Mental – The instantly-recognisable round green icon with the Starbucks two-tailed mermaid is fixed to one side of the top-most container.

Kuma arranged the containers to reference the spreading foliage of coffee trees and traditional Chinese bucket arches – the layered brackets set between the column and crossbeam under the eaves of historic palaces and temples.

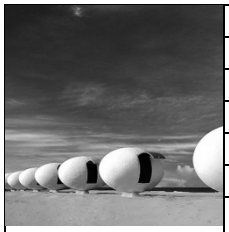
https://www.dezeen.com/2018/10/15/kengo-kuma-shipping-container-starbucks-coffee-shop-taiwan-architecture/</td></tr>
<tr><td colspan="3">○Concept of change:

［This Starbucks reuses 29 containers that have been used for 30 years, and also points to care for the environment.］

[G.Recyclability/Reuse]

https://www.dezeen.com/2018/10/15/kengo-kuma-shipping-container-starbucks-coffee-shop-taiwan-architecture/</td><td>●Renovation:

［None］</td></tr>
<tr><td colspan="4">◆Type of capsule: Urban (mental)</td></tr>
</table>



No.	255
Name	Albang Capsule
Year	2018
Architect/Bureau	Yoon Space + Song Pyoung
Country	Korea
Status	Concept / Built
Way of arrangement	①
No. of capsules	7
Shape	Egg-shaped
Function	Hotel
Materials	RC
Capsule size fit	3 m^3
Application	**Mental, Mobile** – It's a beach shelter like you have never seen before: meet Albang, the relaxation pod of the future, an oval space with a flexible interior plan optimized for sleeping, socializing, or relaxing. In Albang, located in Gangwon-do province on South Korea's coastline, aerodynamics, vivid colour, and clever design meet minimalist futuristic architecture. Realized by Korean firm Yoon Space Design, Albang was designed to replace traditional means of temporary habitation, blending the functionality of pod hotels with the efficiency of a simple tent for camping.

○Concept of change:

［The size of the pods allows them to be transported to a different site if necessary. Yoon Space Design intends to expand the pod into further exotic locations to provide refuge for travels in unexpected places, having patented the design with the intention to produce more pods for use beyond the project's current beachfront confines.］

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

https://www.archdaily.com/582413/yoon-space-design-s-egg-shaped-beach-pod-offers-shelter-in-unexpected-places

●Renovation:

［None］

◆Type of capsule: Leisure (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ▲, Climate control: ×, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	256
Name	Silver Bullet
Year	2010
Architect/Bureau	Airstream
Country	USA
Status	Concept / Built / Renovation via company support
Way of arrangement	①
No. of capsules	1+no limit
Shape	Vehicle
Function	Residential
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Mobile** – With Airstream, you'll find lower maintenance costs, higher resale value (sometimes as high as the original purchase price), and the lowest cost of ownership of any trailer on the market. You'll even save on gas, because their aerodynamic shape translates to up to 20% better fuel economy. https://www.airstream.com/heritage/why-airstream/quality/

○Concept of change:

［Our iconic riveted aluminum travel trailers are passed down from generation to generation. In fact, more than 75% of the Airstreams we've created over the course of nearly 100 years are still on the road today.］

[E.Capsules' mobility/movability]

●Renovation:

［Airstream also offers 24/7 assistance on all current-year models, as well as after-hours technical support.］

[ii.Maintenance]

◆Type of capsule: Leisure

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ▲ , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	257
Name	Sphere Hotel
Year	2017
Architect/Bureau	Huisten Bos (HTB) Company
Country	Japan
Status	Concept / Built
Way of arrangement	①
No. of capsules	2
Shape	Sphere
Function	Hotel
Materials	Steel/Metal frame
Capsule size fit	7 m^3
Application	**Mental, Mobile** – Huis Ten Bosch, a subsidiary of HIS (HIS), has started a demonstration experiment for the operation of a mobile spherical floating hotel. The hotel is the world's first mobile water hotel that connects Huis Ten Bosch and an uninhabited island, and will be the second "world's first hotel" following the "strange hotel" where the robots that have become a hot topic serve customers. The experiment is to test accommodation while berthed or moving. First, prepare a hotel with two boats and aim to start monitoring accommodation during Golden Week. After that, in anticipation of the full-scale launch this summer, we plan to operate 10 to 20 boats in the medium term. https://www.wwdjapan.com/articles/579696

○Concept of change:

［The theme park hopes to launch the new hotel service this summer after making test stays. The plans are for the mobile capsule to be towed by a boat from a harbor near the theme park to an unhindered island about six kilometers away which is also owned by the park.］

[E.Capsules' mobility/movability]

http://www.bubblemania.fr/en/hotels-boules-nagasaki-japon/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ▲, Easy navigation: ▲, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ●, Functional diversity: ●.

No.	258
Name	Opod Tube Housing
Year	2018
Architect/Bureau	James Law Cybertechture
Country	China
Status	Concept / Built prototype
Way of arrangement	②
No. of capsules	13
Shape	Tube
Function	Residential
Materials	Concrete tubes
Capsule size fit	5 m^3
Application	**Mental, Growing, Mobile** – OPod 1 is a low cost, micro living housing unit to ease Hong Kong's affordable housing problems. Constructed out of low cost and readily available 2.5m diameter concrete water pipe, the design utilizes the strong concrete structure to house a mirco-living apartment for one/two persons with fully kitted out living, cooking and bathroom spaces inside 100 sq.ft. Each OPod 1 is equipped with smart phone locks for online access as well as space saving furniture that maximises the space inside. OPod 1 can be stacked to become a low rise building and a modular community in a short time, and can also be located/relocated to different sites in the city. http://www.jameslawcybertecture.com/?section=projects&id=1087

○Concept of change:

［The idea is that these tubular structures could easily relocated using a crane, to stack on top of each other in the unused spaces between existing city buildings.］

[B.Capsules' addition/ structural extension]

[E.Capsules' mobility/movability]

[G.Recyclability/Reuse]

https://www.dezeen.com/2018/03/16/movie-james-law-cybertecture-opod-tube-housing-micro-homes-water-pipes-video/

●Renovation:

［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ×, Visual comfort/Quality of interior: ▲; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ▲.

No.	259
Name	9h Akasaka
Year	2018
Architect/Bureau	Design Studio S
Country	Japan
Status	Concept / Built
Way of arrangement	②
No. of capsules	168
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental** – a comfortable place to rest … 1 hour shower, sleep for 7 hours, have a one hour break / total 9h. guests can spend up to 17 hours in a single stay https://www.designboom.com/architecture/9-h-nine-hours-capsule-hotel-in-kyoto/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ▲, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior: ×; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

No.	260
Name	Keetwonen
Year	2006
Architect/Bureau	Tempohousing Company
Country	Netherlands
Status	Concept / Built / Renovated
Way of arrangement	②
No. of capsules	1034
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	7 m^3
Application	**Growing, Mobile** – While the words “back to school” may conjure up images of new backpacks and pencil boxes, for a very lucky few Dutch students it means moving into some very hip and well-designed dorm accommodations. Keetwonen, a student housing project in Amsterdam, turns shipping containers into 1000 units and provides all the amenities a student could ever want. And aside from the obvious green usage of surplus shipping containers, Keetwonenhas integrated a rooftop to accommodate efficient rainwater drainage while providing heat dispersal and insulation for the containers beneath. Designed by TempoHousing and completed last year, this is a great example of large-scale shipping containers serving as functional and comfortable space. https://inhabitat.com/prefab-friday-keetwonen-container-student-housing/

○Concept of change:

［Although this project was initially meant to only stay on this site for 5 years (and to be relocated to a new location – shipping container homes are ideal for that purpose), it is expected that the relocation will be postponed until end of 2018. The project started at the end of 2005 (first 60 homes commissioned in September 2005) and was completed in May 2006 – a construction speed of 150 homes per month. […]Well, the initial plan was to keep this project on this location only for 5 years, but it was extended until end of 2019. Although the containerhomes have a life span of at least 40 years (and why not longer ... the basic steel structure is extremely sturdy and non corrosive), the current location of the "Keetwonen" project must be vacated to make place for many new homes in the city of Amsterdam, that faces a significant housing shortage.］

[B.Capsules’ addition/ structural extension]

[C.Capsules’ rearrangement]

[E.Capsules’ mobility/movability]

●Renovation:

［So the project will now be dismantled and that will take place in two phases. The first 249 homes (building A and B) have been removed and rebuilt in the city of Groningen. The remaining 751 homes (building C to F) will stay in use and will be vacated beginning October 31, 2019. together with the 2 office buildings, supermarket and café.］

[iii.Change of location]

[vii.Adapt function]

[G.Recyclability/Reuse] http://www.tempohousing.com/projects/keetwonen/	

◆Type of capsule: Urban

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ●; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ▲, Functional diversity: ●.

COMMUNITY:

Inside activity: residents express their living with outer decoration elements

Building's management: Company manages containers while not owing the land itself

Outreach: occasional interaction with media

No.	261
Name	Cocoon Modules
Year	2018
Architect/Bureau	Nastazia Spyropolou
Country	Greece
Status	Concept / Built
Way of arrangement	①
No. of capsules	1+no limit
Shape	Rectangular
Function	Residential
Materials	Containers
Capsule size fit	10 m^3
Application	**Mobile** – By up-cycling shipping containers Cocoon Modules introduces an affordable and eco-friendly living solution. Modularity ensures that over time you can grow your dwelling to your needs. This modular concept promotes environmental design, while allowing construction to respond to the currents needs of the modern day. It's earthquake resistant and has been designed and crafted by an experienced team of architects and engineers who have created an energy-efficient solution that is completely turnkey to the end user. Transforming ubiquitous corrugated boxes into sleek pop-up homes, shops, and shelters, Cocoon Modules is redefining what a container can be. https://www.cocoonmodules.com/

○Concept of change:

［Our philosophy is based on environmental design providing units that can be mobile and modular in order to respond to the needs of the contemporary nomad.］

[G.Recyclability/Reuse]

https://jobs.archisearch.gr/company/cocoon-modules-2/

●Renovation:

［None］

◆Type of capsule: Leisure

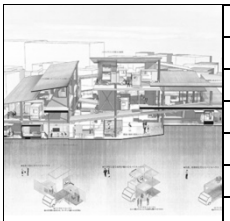
LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ●; Comfort: Habitable area: ● , Natural light: ●, Climate control: ●, Interim space: ●, Public space: ×, Visual comfort/Quality of interior:●; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ●, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ●.

No.	262
Name	Stackt Market
Year	2018
Architect/Bureau	Stackt Market
Country	Canada
Status	Concept / Built
Way of arrangement	②
No. of capsules	51~100
Shape	Rectangular
Function	Commercial
Materials	Containers
Capsule size fit	7 m^3
Application	**Mental, Growing** – <…>the city's newest shopping and dining destination made entirely out of shipping containers. The two-level market occupies a massive area on King Street West, and will be home to tons of pop-up shops, restaurants and artist spaces. https://www.narcity.com/toronto/torontos-massive-new-market-made-entirely-out-of-shipping-containers-is-already-standing-photos

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Urban (mental)



No.	263
Name	Home Coming Home
Year	2018
Architect/Bureau	Shota Minakami, Daiki Kadota
Country	Japan
Status	Concept
Way of arrangement	①
No. of capsules	51~100
Shape	Rectangular
Function	Residential
Materials	Wood
Capsule size fit	5 m^3
Application	**Growing, Mobile** – In Japan, where we live, we often work in a way that is tied to place and time. Therefore, we considered the possibility of moving architecture. By moving the residential part that has not been moved until now, the owner changes depending on the time zone, and the way the residential part is used when working, which has not been used until now, changes. It has the flexibility to respond to the rapidly changing Internet society by moving itself. By making the house move in the future, the residents will gather as they like and the house will go out to find a new base. Find a flexible way of working that is not tied to place or time, and propose a "home to go home." https://shinkenchiku.net/haseko/2018/award_1st.html

○Concept of change:

［Japan, where we live, often works in a way that is bound by place and time. So we considered the possibility of moving architecture.The movement of the part of the residence that has not moved so far causes a change in the owner's change depending on the time of day, and the way in which the part of the housing that has not been used before is used. It is flexible enough to respond to the rapidly changing Internet society from now on by moving itself. By letting the house move in the future, the residents gather as they like, and they go out to find new bases. Find a flexible way of working that is not tied to place or time, and propose a "home to go home".］

[C.Capsules’ rearrangement]

[E.Capsules’ mobility/movability]

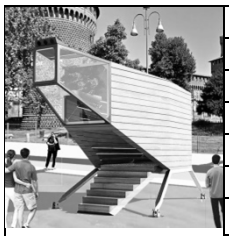
[F.Change of capsules’ functions]

https://shinkenchiku.net/haseko/2018/award_1st.html

●Renovation:

［None］

◆Type of capsule: Leisure



	No.	264
	Name	Rubner House
	Year	2018
	Architect/Bureau	Paolo Scoglio, Cesare Griffa
	Country	Italy
	Status	Concept
	Way of arrangement	①
	No. of capsules	1+no limit
	Shape	Custom
	Function	Residential
	Materials	Wood
	Capsule size fit	5 m^3
	Application	**Mental, Mobile** – <…>rubner haus spaceship has been conceived as an intelligent container of vital processes and is configured as a passive module, which can be implemented with bio-responsive technologies that allow it to react actively to the environmental stimuli of the host context. the side walls are internally lined by a vertical vegetable garden, a source of vegetable proteins with a high nutritional value. this type of food is also recommended by the world health organization, as of a balanced diet essential for a healthy life and able to significantly reduce the incidence of cardiovascular diseases and tumors, and able to considerably slow down the aging of cells. the plants and algae present in such a restricted environment are also fundamental elements for the regeneration of the air through the absorption of the carbon dioxide produced by breathing, and the production of oxygen. the solar greenhouse on the tail of the ship also allows a natural purification system. https://www.designboom.com/architecture/rubner-haus-ied-spaceship-eco-friendly-living-unit-04-16-2018/

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Leisure (mental)

No.	265
Name	Capsule Hotel Lucerne
Year	2019
Architect/Bureau	Hirschengraben Coworking + Innovarion
Country	Switzerland
Status	Concept / Built
Way of arrangement	②
No. of capsules	11~20
Shape	Rectangular
Function	Hotel
Materials	Plastic
Capsule size fit	2 m^3
Application	**Mental, Mobile** – Following the Japanese capsule hotel trend, the Lucerne location consists of self-contained pods that afford as much privacy and comfort as is possible in a very small space. The pods feature individually-controlled ventilation, a safe, sizeable mirror, dimmable mood lighting, and a charging station. You can also upgrade to a version with a flat TV or go for a Premium Capsule that looks a lot more like a conventional hotel room. https://www.uniqhotels.com/capsule-hotel-lucerne

○Concept of change: ［None］	●Renovation: ［None］

◆Type of capsule: Nomadic (mental)

LIVING STANDARDS:

Sleep: Bedding type: ●, Proper bedding: ▲; Comfort: Habitable area: × , Natural light: ×, Climate control: ●, Interim space: ×, Public space: ●, Visual comfort/Quality of interior:_; Safety: Firm structure: ●, Easy navigation: ●, Foundations: ×; Quality: Water and lavatory: ×, Electricity: ●; Flexibility: Movable furniture: ×, Functional diversity: ×.

Questionnaire (English version). Corresponds to Chapter 4.

Study on capsule architecture: living in a capsule.

Thank you for participating in this research. It is dedicated to the living inside so-called capsule architecture from the viewpoint of its residents.

* Required

Results of the study with be used as a part of own doctoral thesis at Tokyo Insitute of Technology

For details, please contact Volodymyr Dereznichenko, PhD student, Tokyo Institute of Technology, Faculty of Architecture and Building Engineering - vladimir.dereznichenko@gmail.com

All answers are anonymous. The obtained data will ba used solely for research purposes. Please do not write your real name or address.

1. 1. Please write a name of your capsule or building's name (Example: Nakagin Capsule Tower). *

2. 2. How much time do you live (or lived) in your capsule (Example: 2weeks, 3 years, etc.)? *

3. 3. Nationality (If you do not want to mention - please leave it empty)

PART 1. Resident

4. 4. Age *

Mark only one oval.

- ◯ 10s
- ◯ 20s
- ◯ 30s
- ◯ 40s
- ◯ 50s
- ◯ 60s
- ◯ 70s
- ◯ 80s
- ◯ 90s

5. 5. Gender *

Mark only one oval.

- ◯ Male
- ◯ Female
- ◯ Prefer not to say

6. 6. Occupation *

Mark only one oval.

- ◯ Student
- ◯ Other: _____

7. 7. Do you leave (or lived) alone? *

Mark only one oval.

- ◯ Alone
- ◯ With friend(s)
- ◯ With spouse/family
- ◯ With a pet
- ◯ Other: _____

8. 8. Marital status *

Mark only one oval.

- ◯ Single
- ◯ Married

PART 2. Use of Capsule

9. 9. Type of housing *

Mark only one oval.

- ◯ Main residence
- ◯ Second house (or just belonging, possession as a real estate property, etc.)
- ◯ Other: _____

10. 10. Function (several answers allowed) *

Check all that apply.

- ☐ Living
- ☐ Office
- ☐ Workshop
- ☐ Showroom
- ☐ Meeting/Party space
- ☐ Lounge
- ☐ Space for hobby
- ☐ Other: _____

11. 11. Do you rent a space? *

Mark only one oval.

- ◯ I rent the space
- ◯ I am an owner
- ◯ Other: _____

12. 12. How much time do you spend in a capsule a day? (*in hours. Example: about 10 hours) *

13. 13. What do you have in your capsule? (several answers allowed) *

Check all that apply.

- [ ] Kitchen
- [ ] Toilet
- [ ] Shower (or bathtub)
- [ ] Washing machine
- [ ] Bed
- [ ] Sofa
- [ ] Armchair
- [ ] Working space (or just desk)
- [ ] Wardrobe (or chest or cupdoard)
- [ ] Lights
- [ ] Electricity
- [ ] Air conditioning
- [ ] Heater
- [ ] Computer (including laptop, etc)
- [ ] Decor (including pictures, carpets, sculptures,
- [ ] Greenery (of any size)
- [ ] Other: _____

PART 3. Circumstances of moving into a capsule

14. 14. What was the reason that you decided to move into a capsule? (several answers allowed) *

Check all that apply.

- [ ] Price
- [ ] Community
- [ ] Location
- [ ] Visual appeal of a building
- [ ] Interest or curiosity
- [ ] Adventure spirit (f.e. try to experience new living)
- [ ] Accident (combination of different circumstances)
- [ ] Other: _____

15. 14.1 If you want do describe the above in more details, please use the space below

16. 15. How did you know about the capsule/building? *

Mark only one oval.

- ◯ Advertisement or real estate poster
- ◯ Article in media (or in a book)
- ◯ Saw the building at the street
- ◯ Attended exhibition/event
- ◯ Other: _____

Additional questions (arbitrary)

17. 1 out of 10 what is your overall satisfaction with living in a capsule?

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Less satisfied	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	More satisfied

18. Do you have any accidents worth mentioning while living in a capsule?

19. What do you think is a feature of a living in a capsular space?

Thank you very much for participating! Please feel free to leave your feedback or commentary if any at vladimir.dereznichenko@gmail.com

Questionnaire (Japanese version). Corresponds to Chapter 4.

カプセル建築の研究: カプセルでの暮らしに関する調査

アンケートにご参加いただきどうもありがとうございます。このアンケートはカプセル建築にどんな人がどのように暮らしているかを調査するものです。

*必須

私は東京工業大学の博士課程でカプセル建築の研究をしており、調査の結果は、自身の博士論文の資料として活用する予定です。

ご質問・詳しい情報などは、デレズニチェンコ　ヴォロディーミル (Dereznichenko Volodymyr (東京工業大学環境・社会理工学院/建築学系/建築学コース 博士課程）までご連絡くださいvladimir.dereznichenko@gmail.com

また、アンケートは匿名であり、研究の資料として個人情報は一切使用しません。個人情報を表すもの（本名または住所など）を回答に書かないよう、よろしくお願いいたします。

PART 1. 住人

1。 1. お住まいのカプセルの名前またはビルの名前を教えてください（例:　中銀カプセルタワービル）。 *

2。 2. カプセルに住んでいる（住んでいた）期間はどれぐらいですか。（例：２週間、３年、など） *

3。 3. 国籍を教えてください（指摘したがらない方は空欄にしてください）。

4。 4. 年齢 *

1 つだけマークしてください。

- ◯ 10代
- ◯ 20代
- ◯ 30代
- ◯ 40代
- ◯ 50代
- ◯ 60代
- ◯ 70代
- ◯ 80代
- ◯ 90代

5。 5. 性別 *

1 つだけマークしてください。

- ◯ 男
- ◯ 女
- ◯ 答えたくない

6。 6. 職業 *

1 つだけマークしてください。

- ◯ 学生
- ◯ その他: _____

7。 7. カプセルでお一人で住んでいますか（住んでいましたか）。 *

1 つだけマークしてください。

- ◯ 一人で住んでいます
- ◯ 友達と一緒に
- ◯ 家族/配偶者と一緒に
- ◯ ペットと一緒に
- ◯ その他: _____

8。 8. 結婚状況 *

1 つだけマークしてください。

- ◯ 未婚
- ◯ 結婚しています

PART 2. カプセルの利用

9。 9. 住居のタイプ *

1 つだけマークしてください。

- ◯ メイン住居として使用
- ◯ セカンドハウス (または所有するもの・不動産)として使用
- ◯ その他: _____

10。 10. 機能 (複数回答可) *

当てはまるものをすべて選択してください。

- [ ] 居間
- [ ] オフィス
- [ ] 工房
- [ ] ショールーム
- [ ] 集合/パーティールーム
- [ ] ラウンジ
- [ ] 趣味向けのスペース
- [ ] その他: _____

11。 11. カプセルを借りていますか *

1 つだけマークしてください。

- ◯ 借りています
- ◯ オーナーです
- ◯ その他: _____

12。 12. 毎日カプセルではどのぐらいの時間を過ごしますか (例: 10時間、など) *

_____

13。 13. カプセルにあるもの (複数回答可) *

当てはまるものをすべて選択してください。

- [ ] キッチン
- [ ] トイレ
- [ ] シャワー (浴槽)
- [ ] 洗濯機
- [ ] ベッド（布団）
- [ ] ソファー
- [ ] 椅子
- [ ] アームチェア
- [ ] 作業スペース（あるいはデスク）
- [ ] 押し入れ （収納）
- [ ] 照明
- [ ] 電気
- [ ] エアコン
- [ ] ヒーター
- [ ] パソコン（ノートパソコンなど）
- [ ] 装飾 (絵、カーペット、彫刻等)
- [ ] 植物
- [ ] その他: _____

PART 3. 住むことになった経緯

14。 14. カプセルに引っ越した動機　(複数回答可) *

当てはまるものをすべて選択してください。

- [ ] 値段
- [ ] コミュニティ
- [ ] 場所・ロケーション
- [ ] 外見
- [ ] 興味、関心
- [ ] 冒険者の気分 (たとえば、新しいものを体験したい)
- [ ] 偶然
- [ ] その他: _____

15。 14.1 上記について詳しく教えてください(任意)

16。 15. 物件についてどのように知りましたか。 *

1 つだけマークしてください。

- ◯ 広告または不動産のチラシ
- ◯ webまたは本・新聞の記事
- ◯ 建物を実際に見ました
- ◯ 展示会やイベントで知りました
- ◯ その他:

追加の質問 (任意)

17。 カプセルの暮らしにはどのぐらい満足していますか

1 つだけマークしてください。

	1	2	3	4	5	6	7	8	9	10	
不満足	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	満足

18。 カプセルで暮らしている間に、共有したいと思う出来事はありましたか

19。 カプセルでの暮らしはどのようなところが特徴的だと思いますか

改めてご参加深く感謝いたします! ご質問やコメントは、どうぞ
vladimir.dereznichenko@gmail.com までお願いいたします

Interviews (Corresponds to Chapter 4)

●Transcript of interview with a resident of EBA51

Q. How many people live there? I saw this architecture changes over time because it consists of the containers, so is it the same size when you first moved in?

A. There should be around 70 people. Some containers are double apartments so there are two people in them. And nothing changed at all and it was the same structure as originally planned. I live in a single container of about 25 sq m in area. This is more than adequate for one person. I have my own kitchen.

Q. Do you have a public space?

A. There is a common meeting point downstairs. Everybody knows everybody, we have grilling sessions, and also during football matches we put out projector and grab beer and watch. This is just a public open space.

Q. Are there any other public spaces?

A. No, but regarding services, there are office of a company managing the building where we have laundry room with 3 industrial washing machines and three dryers for the entire block but I use my own, the portable one.

Q. How much the community is diverse? Age, gender, background, etc.

A. It is extremely diverse. Almost 40-50 nationalities live here. It is mostly university students, also those who go through so-called public trainer. We have a neighbor who does technical training sponsored by a government. Another neighbor moved from France to Germany for an internship. If you a student you can move in but this is only entry criteria, so you do not have to live when you are done.

Q. So also you have said that the space's ownership type is renting. Do you have a local chat?

A. We have a common WhatsApp group. Everybody in the building does it first then they come (join). If somebody did laundry and forgot to take it out, or if somebody wants to give away something for free.

Q. Do you know your neighbors very well? Do you speak to them often? There are no alienation or separation, are there?

A. Yes, I know them very well. This is beautiful part about EBA, if you go outside you have to move around and pass other people's doors so you have to interact with them. It was a huge boom during corona pandemic, during lockdown everybody knew everybody in EBA, and in the end of the day you still have your community, they still grilling downstairs and you do not feeling like pandemic at all. While you could feel alone during those times, here everybody listens to the music, dancing, and everybody knows everybody.

Q. Did you visit rooms of your neighbors and do you invite sometimes your neighbors to you?

A. If you know a person, of course, you can go to their room and stay. That is not a problem at all and it is not like a controlled environment. We have regulations but that is to not smoking inside (flats).

Q. How often do you have events in your public space you mentioned?

A. I would say every three days there is something happening all the time. Berlin is famous for art and techno music, and some students can have a complete DJ set as their project or thesis what attracts huge crowds from outside as well. Grilling sessions are almost every weekend or every other weekend in worst-case scenario.

Q. Do you have any sports activities?

A. We are located in so-called Sports ground so we have football area and basketball ground and tennis tables, and you can always access them across the street, as well parks for people doing jogging and fitness. Also swimming pools, boxing arenas.

Q. Does anybody express themselves through the interim space as decorating a place outside their door or putting flower pots on their balconies, etc.?

A. There is not much space outside to put something for self-expression but there is one demonstration container downstairs and it is open for art students who put a lot of graffiti to it and organization encourages it.

Q. Do you have any kind of organization of residents regarding management of the facility?

A. These buildings are owned by one company called Howoge, and one person is deployed by a company for this establishment. He is a building caretaker and always available to our needs and requirements.

Q. Do you have residents' projects, media, and blogs?

A. Cannot think of any. This is quite interesting project but when you come here and live it becomes a home space and you do not think of it a lot. You do not invest your time in this kind of stuff.

Q. If a new person moves in to the building and needs help; does he or she receive help from other residents? And how about you when you moved here first time?

A. Berlin is known for being a cold city in terms of that it is difficult to make friends here. And then you come to communities like EBA since everybody had to go through the same process they embrace you with open arms. In my case, I did not speak language and had to do bureaucracy in German, and even before asking I was offered help from neighbors. I am kind of extravert, so I am ok to talking to others. You keep seeing the same faces over time and by this you are making friends. And also alcohol is communication lubricant.

Q. Are there any strange or peculiar rules in the community or facility?

A. None that I can think of. There are no set of rules by Howoge except no smoking in rooms and if you have pets you have to inform Howoge, probably for insurance reasons. Country also imposes some rules as no loud music after 10 o'clock in the evening, sorting of garbage, cleaning, this kind of rules. Also steel containers during winter, they tend to have mold especially if there is a steam coming from a bathroom. Containers getting less light tend to get mold periodically, and resident has to move to another apartment and entire container should be shut down to get cleaning from mold what can take 6-7 months to complete.

Q. Do Howoge has a Facebook page of EBA?

A. Yes, but it is not so popular, at least here in Germany.

Q. What kind of features does EBA51 has?

A. The only thing I can think of is that the community is so strong here. The community is what makes these steel boxes livable and fun to live. Other than that there is nothing so distinguishing. For 455 euros what is rent you do not get such a living space including basic amenities as heating, electricity and water.

Q. Can you think of any kind of a symbol of EBA51?

A. The thing in the front – Frank and Johnny (Las Vegas Style billboard at the entrance). I have no idea about the backstory of this.

●Transcript of interview with a resident of Nakagin Capsule Tower (translated from Japanese)

Q. How many people lived in the building at most?

A. Those who lived and those who kept capsules as offices and for other uses, their number differs. But is to judge from how it felt, in 140 capsules 70 or 80 were used, and among those who was constantly living – about 1/3 of that, 1/3 for offices and 1/3 is for capsules used for hobby. 20-30 as upper limit for those who lived all the time.

Q. Do you know your neighbors well?

A. Yes, and also I was responsible for some activities connected to the building so I knew a lot of people there.

Q. Did you invite neighbors to your capsule? Did you visit others' capsules?

A. Yes, it was frequent.

Q. What kind of events and activity did you have in the building?

A. There was a lot of tours to the building and capsules, at that were most frequent. Many people wanted to see inside capsules. Monthly capsule system also can be called an event, probably.

Q. What else except meetings in capsules were the means for getting together among residents and users of capsules?

A. For example online Talk Events during the corona pandemic. We invited a sociologist or another day – entrepreneur. Also music events, DJ events, there were several of them.

Q. Did the sense of community and nature of living in the building changed much?

A. During corona there were a lot of online events, and since capsule's space is narrow many people cannot participate, but there were also online events before. Members and residents are changed a lot since the first time I came to the building.

Q. Did you have any other kinds of activities as a community, for example sports or going somewhere together?

A. For example we rented a public bath together and another day went travelling to Capsule House K (another capsular building by Kisho Kurokawa). Also a house of one of our neighbors.

Q. In Nakagin Capsule Tower there are no public space, are there? What about a lobby on the first floor?

A. It cannot be said that that is a public space.

Q. Inside capsules' interiors may be different but outside, near the doors residents may put some decorations in order to highlight their identity, am I right?

A. But this did not happen often. There is not much space near the door, so sometimes the number plate of the door, which could be customized but this is not what could be seen often.

Q. What kind of questions the community of capsules' owners could discuss among them and together with a landlord?

A. This is apartment building (Japanese: mansion) so most questions were related of how to make living better, questions related to dilapidated parts of the building, also about from 10 years ago there were voices about demolition of the building. So, on the other hand, residents were proposing change old capsules to the new ones.

Q. And regarding the negotiations with the landlord how often was that?

A. For this the representative of union of capsules' owners had some meetings with a landlord (a company) each month once. And for the all members, they could vote for any decision or plan at least once a year.

Q. And regarding personal projects or other projects in the building, I heard some residents could stream from a capsule and also there was a so-called capsule bank.

A. Yes, it was a capsule bank for renting the capsules, also for buying and selling. Also renovations, I did renovation to capsules, including capsules of others. Also there were a lot of art projects when artists could use their capsules as exhibition spaces. It was as art-residence; they could live there and create art. Also there was exhibition of students of Tokyo University of Science about the building.

Q. If somebody moves in to the building can them expect receiving help from other residents do you think?

A. Like advice? I did not get any kind of support when moving in to the building but I contacted some residents myself.

Q. Are there any rules in Nakagin Capsule Tower?

A. If you use a capsule as an office you cannot invite your clients there. AirBnB was also prohibited. But regarding tours we could get permission from building's management and promised not to cause troubles to other capsules' residents and owners. And staying at night was prohibited for short term but if to make it one month that would count as renting so that allowed organizing Monthly Capsules. And for just simply coming to see somebody who lives in a building that was also allowed.

Q. There is an official page on Facebook for the building, is it right?

A. Yes.

Q. And as far as I remember one of the residents did blogging.

A. It was from previous times, and I myself was introduced to the building through their blog and bought a capsule for myself later.

Q. Do many other residents do blogging as well?

A. It is not that everybody do blogging, but may be one or two, and in later times SNS became more popular, and there was an increase of those who post about their life or the building on SNS like Facebook, Twitter, Instagram.

Q. Do you think the building has a feeling of space, do you think there are some features?

A. Of course there are some features as small space, that is, probably, the most noticeable.

Q. Is there any symbol? Both architectural and which is not related to architecture.

A. As a symbol the capsule can be it, what has a physical shape. Also Kisho Kurokawa as an architect of the building and Metabolism architectural concept too. This is a symbolic word for the building.

Q. If there are any comments, could you add something?

A. The building is interesting as architecture. There was a concept of Metabolism and change of capsules that is very exciting. And as for people, many creative people were living there and the building itself was the residence for such people. So buildings like this are not common in my opinion.

Q. Do you think such community has strong connections?

A. Yes, indeed. Even now we still see each other (after the residents were asked to move out in spring 2021). Even today we had a dinner with another acquaintance from the building.

●Transcript of interview with a resident of Bolwoningen

Q. Is one home for one person? How many residents life there? If there are 50 houses there should live around 50 people.

A. Yes. It is built in groups of five and there are no empty houses.

Q. Do you have a public space in the area?

A. No, it is all individual. We just have a garden in the middle, and also a path to walk and brushes (benches in a shape of brushes) which you can seat there on.

Q. Is the community diverse?

A. There are different ages, we have a women of 75, we have people about 25 so it is different, man, women.

Q. Type of the ownership?

A. These are rental, they were built as an experiment in 1984, an architect got subsidy to build 50 of these houses. They meant to be built everywhere but they have a lot of problems – leakages or heat. Architect's house was another one big Bolwonen (globe house) nearby and after architect's death few years ago I do not know if it is still there. The buildings are going to be under protection by UNESCO.

Q. Do you have a local chat with neighbors?

A. There is one by I went out. It is WhatsApp. It was used for private things so I went out of it.

Q. Do you speak to and know your neighbors?

A. Some of them, the woman of 75, I cook for her sometimes. We have a barbeque in summer. Probably 5-6 persons. Barbeque we have about three times in the summer and in the winter we have a drink of vine around Christmas or New Year. We have a garden day once a year in spring. Everybody works in their garden and help each other. This is not because it is mentality of people on Netherlands but because first people did not look after their gardens, so the corporation organized it and many residents volunteered.

Q. Do you feel freshness over time? Do you think it would be better to have more parties and events?

A. No, I don't think so. It is enough. We have to work and we have our own friends and families. We do not any sports-related activities.

Q. Usually people do not decorate their houses outside?

A. These houses do not, but ordinary houses do. That is usually plants.

Q. Do you have meetings with an operating company to discuss matters related to the facility?

A. No, if there is something wrong we can call them and they will fix it. It is one to one communication and nor community-based thing.

Q. Do you know if somebody does blogging about their lifestyle?

A. I have my own Instagram page but this is a personal page just for fun.

Q. Do you receive any help from others if you are new to the place?

A. If they ask for help we will, of course, do.

Q. Are there any rules?

A. Corporation said not to put paintings on the walls (inside) because of leakages and you may not drill the walls. Trees also cannot be more than 2-3 meters because that would hide the houses. Pets are allowed and you can bring as many as you wish.

Q. Are there any tours to the houses for tourists or those who wants to live here?

A. No tours but a bus with tourists occasionally come here, Japanese and Chinese. They stop and walk around half an hour. I do not let tourists in but I am prepared they would ask questions. Also some local tourists come here by car. Also media comes here too, one time it was featured on Eurovision (song contest).

Q. What do you think are the features of the place?

A. I think it is like you are in the space. I live here for a long time but it feels like I have a constant holiday. View is nice, there is a river and people skate there during the winter. It is quiet, also quite safe because burglars do not know what to expect inside.

Q. What do you think can be a symbol of a place?

A. I would say the brushes (benches) can be that. Also the information board is also round, in the same style.

Q. If you have any commentary you can add something as well.

A. So I can say about negative things, it is small, sometimes it is like camping. Stairs also a trouble that if you have to go get something you have to use stairs and that is sometimes annoying. Also it is difficult to clean the place. It is not practical at all; you must not be practical to live here.

Futuro House in Maebashi, Japan. Site visiting report (Corresponds to Chapter 4).

Backhround

Futuro House by Matti Suuronen was built in 1960s in Finland in a total number of 100 units, and is considered one of the most successful examples of implementation fully movable houses. After 60 years of start of production, currently Futuro houses can be found in many places outside Finland, including Japan. In 1970s two Futuro houses were bought by local dealers to promote the house, installed in Karuizawa. Later in 2001s one of the Futuro moved to Maebashi to become a part of Felica Architectural College. The building is used for studies and occasional tours which are restricted to a common public.

At the "Transformation in Modern Architecture" exhibition held at the MoMA Museum of Modern Art in New York in 1979, Futuro was introduced along with the architecture of Kenzo Tange. After that, in 1998, the documentary film was released in Finland and the Futuro exhibition was held at the Helsinki Museum of Architecture, which attracted attention again in Europe.

Many architects and designers in Japan visited the house when it was released at "Designer's Week" held in Tokyo in 2001. In this way, even now that it has disappeared from the front stage of history and has become a phantom house, it continues to be introduced at major events in each country.

Fig.1. Futuro occupies around of two lots of parking before the school’s building.

Exterior

The Futuro House is a plastic house which could come out in different colours. The house represents a typical image of an alien spaceship and utilizes which idea in its appearance, futuristic design or exterior and automatically moving entrance door.

Fig.2. Foundations are on the contrete legs which were not included in the original concept and additional stairs were needed in order to be able to come inside a house. The blue upper stairs are made of plastc with metal elements for joints, and originally were automatic and controlled by buttons inside a house

Fig.3. Fiberglass-reinforced polyester plastic panels are connected and sealed by thick layer of silicon. The blurred windows are for bedroom, bathroom unit and other technical spaces.

Fig.4. Metal loop and V-shaped legs assure the structure’s stability

Fig.5. Hole which can be also sealed is for connecting to communications

Fig.6. Stains of corrosion can be seen on the roof but no water leackages or cracks in the structrure were reported to date

Interior

Interior is presented as a luxurious summer house with a big main room of a dome ceiling and three additional spaces separated by doors – entrance area, bedroom and bathroom. The doors are of elipce shape and the whole design of the interior is predetermined with some possible configurations of furniture and placement or elements. Kitchen is semi-separate space serving as an

addition to the main room. The main room in the observed Futuro consisted from six armchairs/beds and many plastic shelves. The interior is completely centristic and typical in the colour scheme for interiors from 60s (the inside of a house is primarily light-blue for plastic parts and purple for walls. Details are highlighted in either orange or red (chairs, bed, elements of décor).

Fig.7. Inside the main room. On the right – attached kitchen, on the left (opened door) – bedroom for 1 or 2 people, opened door in the center – door to the entrance area. In the center of the room – table which is surrounded by six beds-lounge chairs.

Fig.8. Entrance area with originally automatic doors and oval-shaped lights

Fig.9. Bathroom consisting from shower, toilet and sink

Fig.10. Small bedroom for a house owner

Fig.11. Niche-type kitchen

Interview and further information

During a site visit the additional information on the house was provided by the head of a college with the related discussion about a house and it’s interior. First, the chairs surrounding the

main table in this configuration of Futuro were able to expand and transform to beds, so the whole family (or group of friends) were able to lay around with their legs pointing to the center of the main room. The conversation continues with the history of the Futuro after Tokyo “Designer's Week” when the building was put on sale and bought by Felica College. The house was disassembled and put in its current place. Since the building was rearranged, some minute details (as small perforated bucket on the ceiling) were added; however, in general the house remained the same from inside and outside (including colours). Originally the fireplace could be put in the middle (where table stands) and the smoke followed to a ventilation shaft right on top on it. Elevating door which originally could automatically go up and down was already out of service when the house was bought by the college. The other Futuro houses all over the world either in Turkey or New Zealand were also presented during various exhibitions with 200-300 thousants visitors attending them each time what highlights the popularity of a house. The house is argued to be either small or feeling spatious and big inside due to the dome structure. The day of the visit was extremely hot and humid, so it was even hotter inside a house, so there was not apparently any air-conditioning system set up for hot summers, and, on the opposite the house would suit better as a winter house or cabin put somewhere on a mountain top by a helicopter. Setting up the house after it was brought disassembled on site was done primarily by hand with a crane positioning the lower part on legs and balancing the structure. This was followed by installation of floor and upper walls. The reaction of people passing by differs from excitement to more reserved what highligts the unique nature of a house. Maintenance of a house includes primarily cleaning but the gradual degradation also is considered. After 20 years no general repair works were done to the house.