Who Owns Our Future? How to Find a Home?

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Abstract. While the contours of the next few decades were partly clear 50 or 100 years ago, it is a daring attempt to predict the future nowadays. The marketability and influence of the rapidly evolving innovations of technology are often uncertain, our vision of the future may seem to be dim as well. We do not only desire to satisfy our basic human needs regarding our living space, but our intentions to live comfortably and our attraction towards everyday experiences have also become a fundamental part of our life. We frequently replace our objects with newer and newer ones, even with smart devices that make our work and free time much simpler. The direction in developing these smart equipment is rather obvious, the goal is to solve everything right now or possibly in the future by means of the same object. It is a sensible question to ask how these improvements will affect our everyday life in the future, and it is also a rational possibility that we will not carry a mobile phone in our pocket, and our home will function perfectly without a desktop computer. How will this development manifest and influence our habitat? Numerous eye-catching houses are built on a daily basis. Contemporary architects experiment with designing extraordinary forms and spatial connections, as well as they use surprising materials. In some cases the architecture of the present is rationalized merely in interesting proportions and exaggerated spaces. In order to build these individually unique buildings, solvent clients are needed and a spacious estate, which is not really natural. On the other hand, it is also visible that architecture has reached a turning point according to which a nice form is not enough in itself. The aesthetics have to match the possibilities (advantages, disadvantages) and technological innovations of the era, thus we have to discover beauty, excitement and system again. The challenge of the cities today and in the future is to solve the problems of affordable housing. Our current apartments are compact and reflect creative ideas in most of the cases. The topic of small living spaces has to be examined from two perspectives, on the one hand, the number of newcomers to a certain area, and on the other hand, the increased price per square meter. The optimized, and by that also minimized living spaces make us consider not only the fundamental human needs, but we also have to take the aforementioned altered lifestyle into account. It is a fact that a few square meters should be enough to have an affordable solution. A flat has to be simple and easy to use, and it also has to be the reflection of individual needs and demands, in order to form our spaces by ourselves for a reasonable price. The article represents a possible apartment concept for the future and its effects on the environment with its urban context.
1. Introduction
As cities are growing together with demand, supply shortage emerges, which is directly proportional to the dramatic increase in property prices. The sudden growth of apartment costs and rent resulted in social problems, so this rapid development has its winners and losers. The poorest layers of the society might even lose their home.

Fast, quality and affordable housing is a daily topic. A solution has to be found for these challenges in this research.

Creating homes is not only important in terms of satisfying physical needs, but it also affects mental health. If only the history of socialist panel flats and their social effects are examined, it is clearly visible that many viewpoints have to be considered to integrate new residents into a new environment. Living in a community is not new to mankind. The majority of people have learnt what is and is not acceptable in block of flats, thus its culture is established.

What are some of the new challenges? Social isolation will be one of them. It is a more and more common phenomenon that people cannot help using their phone or tablet when they are together. As virtual and social networks are taking hold in our society, a virtual life is more likely to be preferred, which might be the only real relationship for a big number of people. Therefore those living environments have to be formed where public spaces and social relationships are important in order to preserve the mental health of the individual, as well as the connection with nature.

The house (little flat, complementary functions, the lack and finding of the individual): Micro-apartments with their extraordinary and inventive solutions were considered peculiar at the beginning of the 2000s, however, they are not rare anymore. As a response to high prices and the lack of flats in big cities, new living spaces were born, which could establish a full-fledged home even from a tiny little room. There are numerous excellent examples for these flats and some of them use rather expensive solutions to satisfy the needs regarding these living spaces. The small floor area and its well-structured nature are still important aspects today. Cities like New York build apartment houses, which include micro-apartments. In case of capsule houses, which could be the base of these new apartments, it is clearly visible that the furnishing of a small space in a way works many times, and it can be altered with little modifications only. This research intends to investigate if small apartments can be customized in order to make them suitable for mass production with a reasonable price.

The history of preconstruction: (panel and sample flat experiments): Plans and solutions regarding sample flats have been made since the industrial revolution. These ideas are about the way people should live and the solutions for that. The most well-known is Unité d’habitation by Le Corbusier, which establishes a world that is able to ignore the infrastructure of the city. It is a place where everything is almost available. When designing this house, Le Corbusier defined the ideal spatial dimensions and connections, which proportionately correlate with the size of the human body (MODULOR). In spite of its pragmatic nature and extraordinary idea, it did not appeal to everybody due to the low number of variations in terms of furnishing, [1, 2].

Building panel flats is also worth mentioning. It used to serve a good purpose, since it was easy to build and meant a modern flat for those who moved to cities in Europe and worldwide. At the time of their construction they were up-to-date, but generated many social problems. General dislike was the natural reaction to this phenomenon after the 70-80s, and people tried to avoid choosing these flats despite they were made with modern technology and comfort. The majority of residents were not ready for this new lifestyle, a life without a garden, neighbors and optimized little spaces.

In some cases flats proved to be tiny in size, so furnishing them was a difficult job. The old furniture of the residents could not fit into the new apartment, and they could not be transformed to please the liking of the new inhabitants. These unknown obstacles triggered a discomfort feeling. Is there a lesson to learn? Is there a possible way to design a small flat where the needs and personality of people can manifest without being too expensive?
2. The concept
Concept of 30x30 (why not arched?):

- When visualizing the flat of the future, most people imagine soft, arched surfaces, spacious rooms with a possibly sterile construction like a spaceship. Humans often envisage flying instead of travelling by car, which is possible, although Elon Musk fancies a rather different future in which people will travel under the ground at super high speed in order to get from one city to another in 10 minutes. It is a vastly favorable image, since a traffic jam in the sky would not be a preferred morning routine by anyone. This form of transportation would preserve the direct relationship between transportation and sky, but nobody knows what the future holds.

- Regarding the project, the flat of the future should not be appealing due to its spaceship-like form, but it should use spaces in an ideal way, thus transforming them into living spaces. The most economical use of spaces lies in choosing the ideal size, quantity and comfort level in terms of furnishing, with the appropriate amount of space as well. The basic modules were fit to the circulation areas and multiplied furnishing.

  - Defining the basic module was the result of an experiment. Initially the basic module was characterized to fit its function (panel flat) e.g., kitchen, bathroom, bed or corridor. However, none of the units indicated ideal results in terms of living spaces. Compromises had to be made in case of each size, since the relationship among the modules was bound from many perspectives. The module size, adjusted to the function size, does not provide a sufficient number of variations, so a smaller module had to be designed, which is 30cm X 30cm. The 30cm X 30cm size is able to handle furniture sizes and the size of circulation areas when it is multiplied. This module size provides a great deal of variability and a proper number of combinations when living spaces are formed.

  - Its result is the emergence of the individual in mass production (30cm X 30cm).

One of the biggest criticism of mass production is perhaps monotony and being schematic. It also relates to the appearance of the urban view, as well as the character of buildings and flats. This might be a reason why these houses are not considered as first choices, since nobody desires to be one of the many. Most people search for a partner, work, clothes or car throughout their life, so a flat should also match certain personalities. As the clothing or car industry has found the unlimited combination deriving from a limited number of variations, so could the housing industry. The purpose of the 30cm X 30cm base module was to form a system, which provides the possibility of preproduction and mass production, but flats can be customized due to the size of each module. The already-existing micro-apartments have been adjusted to the resident, so their price also reflects this special feature, and it is presumably high. Perhaps its price is still more reasonable than renting or buying a flat of normal size. If an apartment is not customized, it cannot match certain lifestyles. The same statement can be made about big flats, since the size of spaces does not allow flexibility (furnishing options) and alterations cannot be achieved without significant interventions. Some people need a big kitchen, because they cook every day, however, there are many who only make a cup of coffee, but work a lot at home, and some do not. This structural flexibility could provide homes.

The small module size increases variability. The size of furniture and functions is the multiplied form of the base module (30cm X 30cm). The structure of furniture could be given, their surface and material could be variable and customizable.
3. The application
The objective is to develop a “flat editor” application, which helps the emergence of the individual in mass production. There is a need for various apartments, since people are diverse, so are their needs and taste. This kind of diversity could be achieved with the system of 30cm X 30cm modules. The goal for every “user” would be to form a desirably-sized space and spatial connections. With the appearance of the individual, everybody might be able to find their own variation through the given combinations and consider it customized.

- The goal
The goal is to create a designer surface where the user can form the floor plan by themselves, based on specified and hidden rules. The designer software offers possible options, which are given by means of answering questions. After answering the questions, a floor plan is given in which surfaces and materials can be modified by the user. The questions ask about daily activities, in order to discover the lifestyle of the individual. After making this personality map, a customized floor plan is given. Its operation would be identical to the one at Amazon, where the application learns about preferences. After creating a login name, the information of the user would be uploaded to the system, so the application would be more punctual in the long run. It was an important factor not to create another editing application, but a system in which the amateur user does not have to figure out what makes a flat livable and good, but gets a number of variations that seem to be the most ideal for them.

- The role of architects
When phrasing the questionnaire of the application, the purpose was to ask questions, which substitute the communication of architects. These questions derive from the needs of users, so rather easy answers can be given, and they help to fully discover the demands from the designing perspective as well. The main question was the way how the knowledge of designers can be automated. It does not mean that no architects will be needed from now on. The application has to be continuously supervised and adapted to certain action areas and the needs of cities and environment. The emergence of the house would entirely be an architectural task, since the application would only give a system, which could be used by any architect based on their creativity. By means of applying mass production, individuality and versatility in the environment would be the goal both from the perspective of the user and the architect as well. The application would help to monitor the continuous change, replacement of residents and upgrades.

- What can the demo do?
The demo of the application represents the imagined operation process. It also includes the questions that have to be answered by users in order to create the sufficient floor plan. First they have to give their marital status, which defines the size (square meter) of the flat. After that, users have to go through some questions belonging to certain functions until every icon becomes green, thus the ideal floor plan appears. The application demo works with two floor plans, a flatlet and a three-room apartment. Once the floor plan is ready, there is possibility to check the finished product in a 360-degree panorama image through VR glasses. The available demo displays a way of thinking and the future goal of the application and it is also prepared for further upgrades.

- Why is VR important?
Why is that important to see the designed floor plan in 3D? On the one hand, because it is about optimized spaces, so it is vastly important to show the residents the utilization of minimum spaces. On the other hand, it is also essential to be able to imagine the relationship and size of spaces. VR
gives a nearly realistic sense of space, so it is easy to decide whether the flat is available or not, and if not, elements can easily be modified from the inventory to make it fully suitable.

4. Introduction of the apartments

• Concept
When establishing the concept not only the customizable nature of the flats was important, but to form a system, which can cover a whole lifecycle. At one point a person lives by themselves, then with their spouse and family only to see their children leaving them alone again. If a flat is expensive, it has to be considered the most appropriate in order to have a sustainable life. The basic concept of the apartment is able to provide this. With the help of the 30 x 30 basic modules, the flat is expandable and reducible, thus if a module becomes free next to, above or under us, we can attach them to our apartment or detach them. It provides a continuous customizable nature, so residents can customize their living spaces in a system, which is defined by modules.

• Utilizing empty spaces
It can also occur that the empty modules can be used as a parking lot or office. The spaces of the framework cannot only be interpreted as a flat, but as a useful area, which has a function like an algae or render farm. Establishing a puffer space of 10% would be important, thus the customizable nature of flats could be provided.

• Flat
After examining American, Japanese, Chinese, Spanish and French contemporary examples of flats, the designs regarding the flat of the future have been made considering the most up-to-date inventions of technology and the images of some futurologists, [3]. Based on the international experience, houses, flats, needs and developments, an optimist future can be visualized in which humans try to stay humans through keeping in touch with the urban environment, other fellow humans and Mother Nature as well. When creating the concept, modularity, the ability of preproduction and finding the individual were the most important aspects. Besides all these, it was crucial to form functions which are comfortable and not complicated to use (space cannot only be used with folding a reversible furniture). The flat would know our habits, and with the help of moving walls, spaces could change to serve our needs. The digital surfaces work as platforms for getting information, working and having fun. The whole apartment is a machine, which aids us and monitors our sleep and health.

• Small flat
When visualizing a small flat, it was a designing principle to form as much space for objects as possible, besides preserving its spacious and transparent nature. In case of furniture and spaces, it is pragmatic and space-saving, so a traditional angular structure was formed with modern materials. The furniture in the modular system have to be replaceable and variable. The façade of the house can also be a climate façade, which emphasizes an environmentally conscious way of thinking and reduce the maintenance costs of the house. The residents can choose a “green view” (green surface in front of the window) or even a terrace, thus establishing a connection with nature.

• Kitchen
The goal was to create a kitchen which is easy to clean and use, in spite of its small size, it is simple to utilize for everyday cooking. Caleb Harper invented how to produce food with a computer, and this innovation was integrated into this concept, so people can grow a part of their need for vegetables. This is a way to acquire healthy foods and reduce the import and export of the world. This garden would be installed above the kitchen counter to make it not only useful, but a design element of the kitchen. The working counter would be a digital surface, which would be an assistant in cooking. The prototype of
this technology has been introduced by Whirlpool this year. The kitchen would offer recipes based on the taste of individuals, so users would not have to search for long hours. If an ingredient is placed on the counter, the kitchen recognizes it and suggests recipes according to the available resources in the fridge. The working counter would function as a cooking surface depending on the placement of a frying pan, saucepan or mug. According to kitchen designers, the kitchen will be the heart regarding the flat of the future. It will be the place where humans will be able to organize everything, more precisely the kitchen will organize certain things in life. Besides reheating coffee, it will give information about the next bus, density of traffic, right time to get to work, programs of the day or whether shopping is necessary and the system has to place an order. A counter was formed in the window where meals can be eaten. Due to the large windows, the city becomes the part of space.

Figure 1. Example of living space

- **Bathroom**

  The bathroom is a smart bathroom, more precisely the flat could work as a computer, and the rooms would include digital surfaces. News, daily schedules or listening to music would be available even during a simple morning tooth brushing. When creating the bathroom, designing the optimal size was important, since it is only a temporary function, which is not used constantly, so space can be saved in this way. It could be solved with a digitally movable wall called orisystem [4].

Figure 2. Bathroom

  The bathroom would be accessible by pushing a button instead of using a handle. The walls would slide, thus a free opening would function as a door. The doors on the back of the moving wall would automatically close the space, so a sufficient amount of intimacy would be provided. The sanitary is placed on one side of the bathroom, so an empty wall surface is available on the other longitudinal side, which can move. This empty surface would function as a cupboard from the direction of the living room. Regarding its size, the living room is small, but it would be optimal with an enormous sprinkler shower,
which can be adjusted digitally. The floor of the bathroom would be covered with open boarding made of hardwood. Its gaps would function as a secondary water drainage system. The reason why the shower received the wooden floor was to provide a comfortable touch and feeling, apart from being separated from the other part of the bathroom.

- Living-bedroom
In terms of forming the living-bedroom, the optimal utilization of space was also a fundamental aspect. Humans only use the bedroom function in a certain period of the day, so the bedroom and the living room are not often used at the same time, therefore the same moving wall system was used as in case of the bathroom. If it is necessary, a living room of normal size can be formed, or a study, however, at night a well-functioning bedroom can be created by means of moving the walls.

A large glass surface runs through the entire flat, which provides natural light. The large garage door-like windows can fully be opened up (if the pollution level of the air allows it), thus providing a connection with the urban environment. There is at least a small green surface in front of the windows, or a terrace. Panasonic has introduced the “Panasonic Glass TV” this year, which is a transparent foil. This transparent foil can be laminated on the glass surface, and it can be used as a computer, television or shading.

- Big flat
The design of the big flat was born by means of upgrading the small flat. The main objective was to reveal how the structure and furniture of the small flat can be used to create an apartment for a family with one child, together with preserving the old elements, thus showing the variability and flexibility of this unit. The kitchen / bathroom remains the core of the flat, so no modifications are made here, and the place of the living room is also the same. In case of this concept, the wall of the living room does not move in parallel with the window, but perpendicularly.

- Kitchen
The kitchen itself, the counter and cupboards are the same as in case of the small flat. The space is complemented with a dining room including a movable wall behind the kitchen, which serves as the wall and furniture of the nursery. If the kitchen has to be bigger than the nursery, a dining table opens up electronically. When the nursery has to be bigger, the counter works as a dining table similarly to the small flat. The moving furniture functions as a surface of storage from both sides.

- Living-bedroom
The bedroom of parents takes place on the other end of the flat, opposite the bedroom of children. Its operation is similar to the dining room / nursery, as well as the living-bedroom of the small flat. On one side of the moving wall there is a double bad, and there is a sofa on the other side. By moving the wall, a living room and a study are formed or a bedroom, if it is necessary. In this case the bedroom and living...
room / study are fully functional at the same time. The variability of sizes makes the flat suitable for welcoming guest or establishing an office.

- **Furniture**

When choosing the materials, it was important to use surfaces of different quality. Those materials are advisable, which provide a cozy atmosphere. Soft surfaces can trigger this feeling, which can be found in a sufficient proportion with smooth surfaces offering the sensation of cleanliness. The color and surface combinations can be modified according to the needs of residents. These colors and surfaces will function in a system, since the exaggerated nature of colors and surfaces can make spaces narrow. The imagined use of materials on the design plans was to make materials emerge, which are antiallergenic, but also reflects natural and cozy characteristics in the flat. The image regarding the apartment of the future is not only arched, but mainly sterile as well. The main concept should be to provide antiallergenic and easy to clean simple surface, which are combined with natural colors and materials. Most of the furniture are made of plywood, since humans do not protect trees appropriately, so natural wood would be wasteful, therefore processed materials should be utilized.

5. Conclusions

Modularity will provide the ability to integrate into old buildings. These elements or pieces of elements can be integrated into the already-existing buildings by means of a questionnaire complemented with specifications. With the specifications of the inventory, the modules have to be adjusted to the specific environment or location. If these steps have been rationalized, the application can similarly be used to design unique, but mass produced flats.

The elements cannot only be separate furniture, since spaces have to be form in every case, otherwise it is not sure that the residents will be able to use the most ideal spatial structure with the help of combinations. In order to have these specifications, each apartment needs an architect to define the concept, possibilities and basic combinations as well.

It is clearly visible that this concept can be overly individual, however, it cannot function without architectural knowledge. Based on the learnt variations, the application will be able to learn the specifications after a while, but certain human perceptions, ideas and intuitions cannot be fully granted to a "system".

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