

AGENT-BASED DESIGN: TRANSFORMING A HOUSE INTO A HOME

Milena Grbić^{1*}, Milica Nedić², Miljan Vezmar¹

¹ University of Novi Sad, Faculty of Civil Engineering, Subotica, Serbia

² University of Novi Sad, Faculty of Technical Science, Novi Sad, Serbia

* corresponding author: mdelevic@gmail.com

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ABSTRACT:

The intent of this paper is to demonstrate the possibilities of transforming housing according to the contemporary needs of users in the conditions when the user is known.

The methodological work starts from the thesis that housing is one of the demonstrative elements of everyday cultural patterns of a wider culture, a form of everyday behaviours but also that in daily routines of the known user lies the key for the design development direction. Agent(user) based analysis enables architecture to become a real service – not because it gives what is expected of it, but because in order to give what is expected of it, it previously studies a system of possible expectations, and then researches the possibilities of their realization, their understanding and acceptability.

The paper will show the development of the concept of an ongoing design that will be realized and will discuss formal-functional preferences based on the space use analysis and the residents' habits enhanced by a moderate method of designing as the chosen methodological direction.

The contribution of this paper can be seen in the demonstration of the designing process by interpreting ideas, making designing decisions grounded on facts and compromises as standard forms of behaviour in procedures of practical action. In a wider sense the contribution of this paper is in demonstrating the need towards a programmatic questioning of strict differentiations of housing spaces that were brought into question with the modern lifestyle.

KEYWORDS:

housing, home, Subotica, design methodology, design process

1 INTRODUCTION

Phenomenologically interpreted, the term house is a habitat and a human construct that can be viewed multidimensionally. This ambiguity is seen in the dual character of the house as a physical structure, but also from a psycho-social aspect when its character equals with the term home. The designer's task is to reconcile and unite these dualities.

Understanding a house as a physical object – a pure housing unit – includes all housing standards and normative characteristics: the size of the housing space, its structured construction, lighting, infrastructure, flexibility etc. these physical terms, as per Peter Zumthors interpretation, mean pure reality for an architectural designer, i.e. practitioner. A specific builder's task aims for the reality of construction materials and their relations: stone, brick, concrete, fabric, steel, leather etc., the reality of the construction that is applied in order to erect the construction work and in whose characteristics the architect tries to penetrate, also trying with rationality and sentiment, in order to accomplish a successful architectural work where a person could live [1].

However, housing cannot be only brought down to the practical purpose of a shell, it is actually always created from complex structures and symbols that should be enabled in this space.

Concerning the psycho-social aspect, as a form of life, the house represents the essence of our being, a sort of state of mind that is directly linked to a sense of peace and living, connecting the space of living to the finding of personal peace. The house is then also a place where the person is free to organize its own life in a way suited to her. The house is, therefore, a shell, space, taken from the universal space, separated with walls but also a volume that has become a space of security and privacy. It's not just a shelter but also a polygon of human activities, a necessary condition of a personal lifestyle in the outer world, or as Emmanuel Levis precises – a man behaves in the world as he steps into it from a private area, from being at home, where he can withdraw to from that world at any moment [2].

The emotionally based relation between residents and their dwelling represents home. This relation always belongs to a concept or idea, and the immaterial aspects of housing that we name as home are interlinked to the housing space – the shell, forming a clear starting designer's premise: housing cannot be merely understood as to be used in exclusively rational and practical purposes and cannot be integrated in a template.

Nowadays, everyday lives are very susceptible to current changes in our daily routines that also refer to housing. These changes do not require new living spaces, but demand current adaptations that can easily be restored back to the level zero of the organization. Perhaps at one point a guest room will be needed for a day or two for a peaceful study space during the exam period, a winter garden for the plants from the balcony or spice plants, or sometimes a big open space to host a bigger crowd. By including the technological development there have been options where people work from home more. They do not

spend that much time gathering in the living room as before since everybody has their own private screen at hand in the form of a phone, a tablet or a personal computer (replacing physical gatherings to social media contacts). In these circumstances we can reach the conclusion that there are those who do not need a living room or kitchen, which means that the already known schematics of housing are becoming less and less sensitive to the unpredictable housing scenarios.

Knowing that a house doesn't necessarily mean a home, as well as a home is not always a house, paper will represent the designing process of reconstruction and adaptation of a single-family housing space according to the everyday conditions of a known user as methodological procedures of transforming a shell into a connected idea that the shell will become home in order to create a singular spatial experience meaningful for a specific individual and family.

2 BACKGROUND AND METHODS

The design methodology of an exact space, was based on Agent based design (ABD) that is founded on the concept of an agent or user as the basic unit of analysis. The agents are therefore those that are in an incessant interaction to one another, with the space and in the space. On this level, the actions that have a certain intention and that are recognized by choice of space and reveal the important characteristics of the space are key. In that sense the layering of the housing everyday life into characteristic actions and defining habits in using known spaces are also very important. It is enough to only observe clothing, nutrition and work habits in order to establish how a man and its personal cultural habits are connected to the space. It is pure empiricism, since as much as it seems that the everyday life is something too simple and too familiar, its actual analysis always points to the fact that spatial characteristics are never hereditary with the space, nor are they its attribute, but exist in an inter-relation of the concrete individual and the spatial entity. They are defined by an explicit name that the individual assigns to this entity and in that manner one spatial entity can have a different meaning for different people.

Agent based design with elements of interview, applied in a specific case, is based on interesting finding by Sigrid Hintersteiner that noticed that the most obvious weakening of the relation between function and space is observed in the answers of the respondents that were asked to mark and name rooms of an apartment sketched on the spot. The respondents most frequently described activities that they perform in a certain space before naming the rooms with their traditional names. Hintersteiner calls this changed understanding of spaces as multiple codification best represented in the implementation of activities into the living space. This overlapping of functions and the multiple codification of space has been positively noted with respondents in cases where the spaces that will be used can be chosen freely, in contrary to the case where different functions in the space form limitations, where the limit between spatial zones is no longer defined by the distribution of function but an individual possibility of choice. The new

parameters of the contemporary resident are therefore a multiple codification and the diversity of space and place [3].

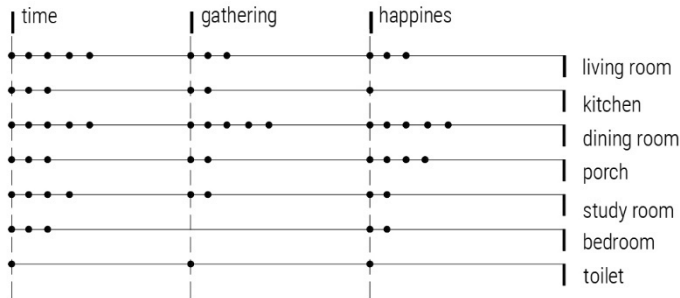


Figure 1: Priority functions and spaces in our case

Agent based analysis enables the designer to simulate different scenarios, to discuss them and to estimate the result of different decisions on the spatial structure. It also enables designers to understand the complexity of the spatial dynamics in real time, which helps with the designing decision making that are more effective to the designing process, for the project itself and finally for a joyful utilization of the future home. And what is most important for the architectural designing process itself, they allow architecture to become a suitable service – not because it gives what is expected of it, but because in order to provide what is expected from it, it previously examines the system of possible expectations, and then researches the possibilities of their realization, interpretation and acceptability [4].

In that sense, according to Umberto Eco, there are three possible design approaches of space-forming linked with the anthropological data of the agent-based analysis available to the designer:

Conventional approach. A more traditional approach enables the usual integration with the already existing normative system – by accepting standard housing forms characteristic for housing of the majority of the society. The designer abides by the demands of the society as it is. He designs a home that allows a traditional system of life without pretension of disrupting it. In that case it is possible and usual that the architect relies on typological determinants of existing standards and norms of architectural design of housing, using conventional spatial organizations based on designing spaces of an impersonalized structure, partially modified according to needs.

Avantgarde approach. In regards to the avant-garde approach, the architect decides to direct people into living in a completely different way compared to the usual way of life. He finds spatial forms that do not allow relations that would look like the traditional ones and that direct to a lifestyle different to the usual one. The designer has the possibility of suggesting unusual realizations of basic housing principles that enable the user to modify the functions that were initially applied. In this approach there is discomfort that the user of the home does not recognize immediately the new possible functions denoted by new forms, since these functions were not articulated according to basic

principles of the majority of the observed community as the user is used to, does not understand them or is not receptive enough for a radical change and he refuses them.

Moderate approach. Based on different information that he has, the architect creates a new system of relations that he will have to support by such spatial realizations that are understandable for the user due to the resemblance with the previous/existing, but are still different enough that they allow the architect new spatial formulations that correspond to the new (such as social, technological) needs in order to develop the home [4].

3 RESULTS AND DISCUSSION

Name of the project	Reconstruction and adaptation of a single-family house
Architects Authors	Milena Grbić _ Miljan Vezmar _ Milica Nedić
Area	135 m ²
Year	2023
Location	Subotica
Status	Ongoing
Drawings and schemes	Documentation during design process procedures

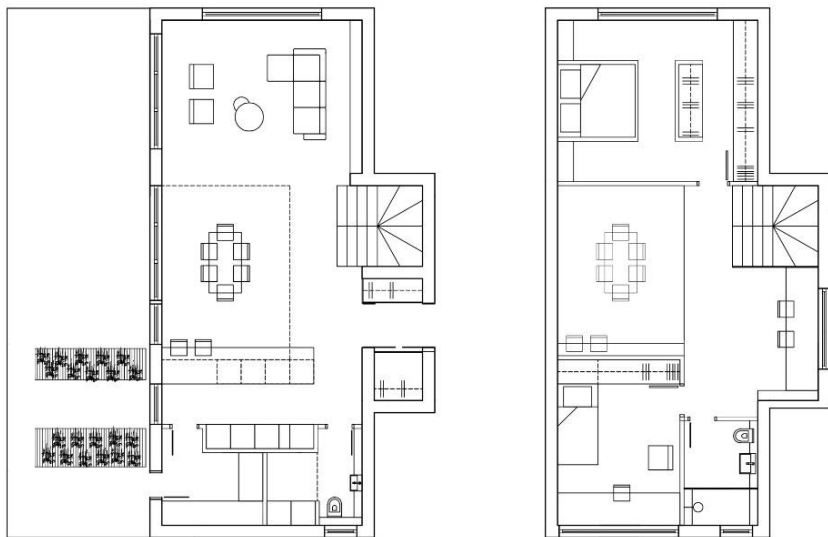


Figure 2: Left: ground plan _ right: floor plan

According to the typology, the construction is a single-family residential building, intended for the three-member family (parents and a child). In a formal sense, it consists of two stories, the first of which, the ground floor, is primarily intended for the daily life of the family and consists of spaces that can accommodate different functions: daily life, sleeping, studying, playing board games, relaxing, dining, preparing food, using the toilet

and working. The second floor is intended for night zones with a certain addition of mixed function. Each member of the family has their own room as part of a large shared living space.

The main orientation of the new floor plan is partially conditioned by the orientation of the existing building (Figure 3), but it was changed and reshaped so that the living area takes advantage of the best view, while the bedrooms are in such a functional and spatial disposition that they are oriented towards more intimate points, both the specific plot and the wider context.

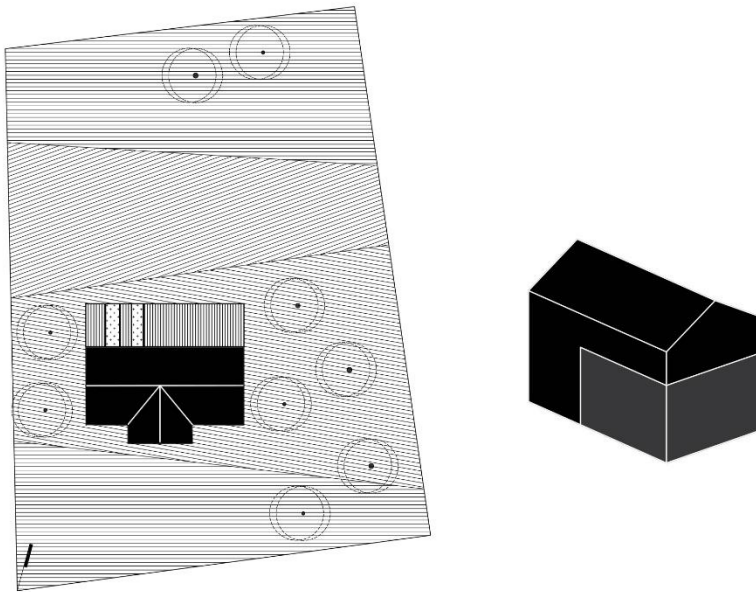


Figure 3: Left: House orientation on the plot _ right: relationship between reconstructed and new

The author's position and design approach, as well as the character of future users, determined the design of the home towards the moderate approach. The result in a functional sense is tailored architecture, not the general one.

The daily lives of the family members are subject to immediate changes that require immediate adjustments and visual and functional inclusions of spaces and interspaces. In order to realize the changing image of the living space, it was necessary to express the different faces of the dynamic character of the way of using the space. In relation to other aspects of everyday life, a design decision was made to propose a living area with a clearly defined horizontal open plan that can support unpredictable functions that appear over time. At the same time, there is no strict division between the living room, dining area and food preparation area. This openness supports family members staying together even when they are engaged in different daily activities.

In the vertical plan, the openness of the space is supported by the introduction of a gallery in the area above the dining room, which connects both floors. The space in the gallery, which would normally be only a horizontal circulation zone - the corridor, is deliberately over-dimensioned, in order to encourage different variations of mixed functions that allow

changeability and greater flexibility of the space. This space can be transformed and furnished according to the needs of individual family members (in this case, it is a study space), which is visually connected to the living area of the ground floor, directly to the dining room, where the family spends most of its time. This spatial connection of the study area and the living area enabled a certain presence of the individual in visual absence during the daily life of the family. In other words, from the father's home office, which floats like a platform on the second level, one can communicate with the library in the living area, or with the kitchen and dining room, much like one can communicate with people on the ground when climbing a tree (Figure 4).

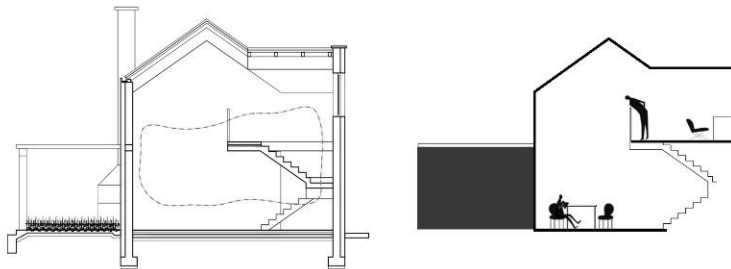


Figure 4: Vertical space integration

The effect of two-story height above the dining room also allows for sufficient air volume to make the favourite space in the house more pleasant to use. In the experience of the space, the dining room area, by changing the usual vertical proportion, gains a certain effect of spirituality during use, which also enhances the importance of this space for the family and supports a special feeling of identification with one's own home.

The house has large openings in the living area that overcome the boundaries between interior and exterior spaces, resulting in a sense of fluidity and dynamism that enriches the experience of a wider space, making it a cleaner and more open space that changes the perception of size. This visual advantage is supported by the direct and wide contact of the living area and the covered porch, as an extension of the living room in the summer, bringing family life outside the limits of the shell (Figure 5). The family that will live here will come into daily contact with the ground, oscillating between the intimacy of nature and the spaciousness of the visually changing dynamics of the nearby horse stable.

Another direct contact with the surrounding grounds was made in the kitchen-porch area. The covered porch that stretches the entire length of the house has its breaks in the floor area, intended to form a handy herb garden (Figure 6). The materialization of the porch in the kitchen area corresponds to the materialization of the kitchen floor, giving the impression that, due to the continuity of the floor covering, this space alternately extends between the interior and the exterior, dematerializing the door-window as a permeable filter to the porch, i.e. the house, within a broader heterogeneous strategy. That broader strategy refers to the displacement of the usual circular connection that is characteristic of the interior space and its movement to the very boundary inside-outside, because that line is increasingly dynamic and unstable in the practice of architectural design, because borders have long since become the battlefield of new realities.

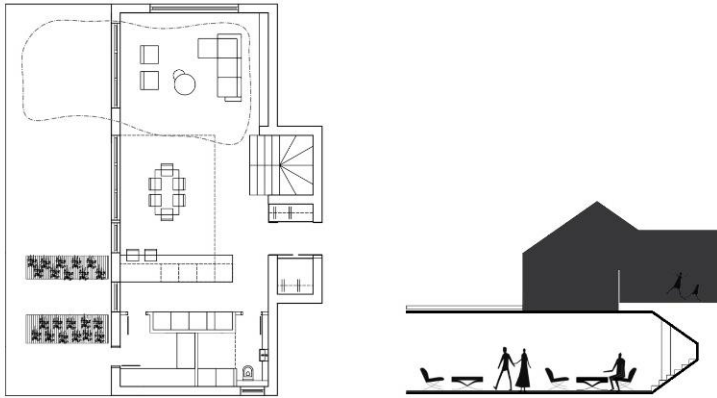


Figure 5: Integration of outdoor and indoor space 1

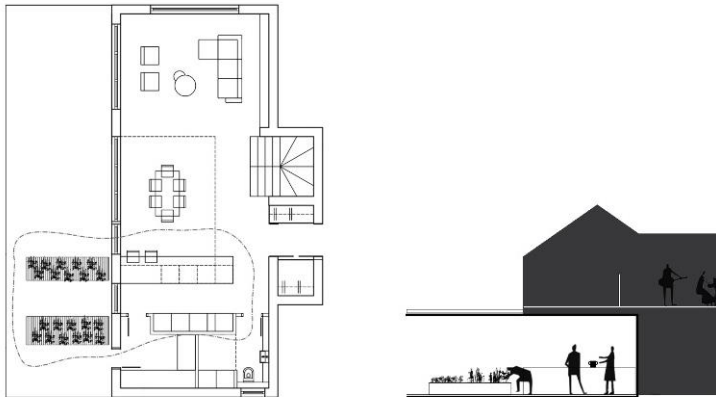


Figure 6: Integration of outdoor and indoor space 2

Another visual strategy was applied as part of heterogeneity and deciding the compositional modelling of openings on the facade. Namely, opposite the entrance zone, more precisely opposite the entrance door to the house, there is an opening that breaks down the shell of the house and opens the view to the natural setting of the immediate environment, making clear one of the design intentions of conceiving the house, which is that the family's joint life takes place in fluid spaces that are loosely visually interrupted by the green fund on the plot.

The project's sustainability ethos only complemented the already established connection with nature and minimized the building's impact on the site. A heat pump provides provides enough energy to heat and cool the house. This strategy also allowed us to specify a very modest space for the mechanical equipment. The sloping roof completes the efficient form of the house, while the large windows additionally minimize the need for artificial light. The family reported that on sunny days in winter, sunlight alone is enough to heat the house.

4 CONCLUSION

Presenting the concept of design rooted in agent-based modelling, that is, the specific requirements, habits, aspirations and everyday life of users, accompanied by the presentation of a concrete example that leans on that concept, has the possibility of opening new questions in the approach to housing design. Instead of a tailor-made design of space, merged with a general perception of needs, which have the capacity to enable the functioning of a specific set of them, it does not represent a spatial organization that is able to correspond with daily changes. Today's user of residential space tends to reflect something else. He faces the immediacy and objectivity of his own. He positions himself in the centre, determines himself, measures himself and uses himself as a measurement.

Today's user has turned the mirror to the architectural profession. He brings back the poetics in housing that years ago tended to be suppressed by design rationality. A long time ago, Henri Lefebvre criticized this rationality, pointing out that man lives as a poet. Henri Lefebvre explained that in housing, the relationship of a human being with nature and his own nature, with a being and his own being is realized and read [5]. The living space is a part of the human being and people strive to enable themselves to live poetically and to fabricate their dwelling in accordance with the changes of everyday life. It is up to the architectural practice to offer an adequate shell that allows the development of contemporary life, thus enhancing and personalizing the house itself, turning it into a home. The presented project represents an attempt to escape from numerous persistent stereotypes that still dominate housing today and shows how gaining more precise knowledge about ways of life can result in a new generation of homes with interesting spatial organizations and significant expectations regarding changes and unpredictable uses.

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