NEW COMFORT: TOWARDS THE POST-PANDEMIC LIVING

ABSTRACT
Recent periods in global history have put some heavy strains on the human condition. Changes in living have subsequently led to spontaneous bottom-up adjustments of housing units. During 2020 and 2021 the definition of spatial features of these changes has been the main objective of three Master’s course workshops at the Department of Architecture and Urban Planning, Faculty of Technical Sciences, Novi Sad. Results of those workshops served as a pool of solutions for the research that followed. Using obtained data, abstract diagrams of architectural functionality are transcribed. They are applied to an algorithm and computer software that implements the algorithm, which has produced a wide range of spatial solutions. Both analytical and numerical approaches to the produced solutions, with additional criteria that have been applied and tested against some well-known theoretical thoughts from recent history, provide an insight into the possible future of multifamily housing.

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INTRODUCTION

Research conducted in the field of influence of living restrictions imposed by the pandemic conditions in global society on possible architectural outcomes is still quite rare. There are many reasons for this: the world has not yet faced post-pandemic circumstances, while restrictive terms that underline most of the everyday activities are still in the state of constant reconsideration and change. Both of these facts oppose the very nature of architectural thinking and design: being the discipline that aims at comprehension of ephemeral as ever-changing parameters inside of much more resilient architectural forms and structures, from the smallest spatial levels (e.g. inside the room) to the very complex ones (e.g., urban environment), extremes of the spectrum of possible activities are very important to be set and repeated in order for architectural design to ‘react’. This ‘reaction’, as can be noted with some previous pandemics (most prominent being the 1918 Spanish flu and the Modernist movement that followed), usually leads to the form of a new architectural paradigm.

This phenomenon has been of interest to some authors, especially when overlapped with rather strict regulations for architectural certifications such as BREAM and LEED or standards for indoor air quality. Conclusions in this research point to the need for restrictive usage of mechanical ventilation systems in buildings due to necessary prevention of disease spread, which has been recognised in artificial environmental conditions. This means that future architectural design should rely on natural double-sided ventilation and more openable windows as a way of protecting residents from future health epidemics. This human-centred approach changes the standpoint from which the architectural research community has been investigating energy-efficiency matters.

Some authors have noted that home design will be the one with the most probable change, pointing to flexible and adaptable spaces, but also to the necessity of more prominent partitions between departments with wider corridors and doorways in buildings as well as more staircases. This kind of conclusions regarding apartment building layout illustrate not only the spatial results of rules regarding social distancing, but also shed a new light on the public-private space relationship in a pandemic and, probably, in post-pandemic times.

In recent times, the interior of homes has also undergone significant changes. Working from home, lack of interactions in public space and blurring the line between private and office time or real and virtual communication has led to self-made home-offices, home-gardens and even home-gathering spaces in controlled environments. The emphasis on personal needs and interests, which
are now manifested in their entirety due to restricted movement, together with sanitary regulations, are the most prominent characteristics of the transitions and transformations that the home interiors have endured. Likewise, the extension of real to include virtual has also been observed, as previously stated in the papers researching the ways technology changes human condition in the last decades of the 20th century. Therefore, it can be concluded that future home and apartment spaces, irrelevant of newly built or remodelled, call for not only changes in layout, but also a new architectural vocabulary and new hierarchy of architectural value, where architectural standard formulated as “one-size-fits-all” has become outmoded.

Putting aside strong relations that architecture as discipline has had through history with politics and capital, as well as professional aspirations towards landmarks that illustrate triumph of human over nature, even the idea of post-pandemic utopia of “wishful abundance of moral awareness, harmony with nature, grassroots empowerment and technological smartness”, architecture is at the point where, with accumulated knowledge and adjustment of professional ethical scale, it could significantly contribute to the transdisciplinary endeavour that pandemic has put before researchers, thus contributing to the social comfort that has always been one of the focuses of discipline. The aim of this research is to offer a design methodology that could help with this process, while avoiding the obvious shortcoming of abolishing one spatial or ethical standard only to create another. Although the whole method strongly relies on advanced computer usage, precisely on the automation on the part of the architectural design process, architectural expertise still holds the key point. Algorithms and custom-made computer software are considered in this research as experimental instruments of the highest value, introducing knowledge that traditionally belongs to the non-architectural field and fostering a transdisciplinary approach, while allowing the creativity process to take unexpected turns. This appears especially at the point where spatial layouts are being qualified.

To reach that point, the main goal of research has been set: to observe and classify bottom-up changes that appear in home interiors, separate the essentials that have the significance to change the existing standards, and implement those standards to create a pool of solutions chosen by the criteria of compatibility. This criterion allows for the chosen solutions to create simple spatial connections in between units, thus creating the possibility of apartment building or rowhouses plan layout. Primary data set observed from bottom-up has been gathered as a starting point for discussion during workshops at the Department of Architecture and Urban Planning, Faculty of Technical Sciences, Novi Sad, in 2020 and 2021, and resulted in layouts that concluded the workshops.
2. METHODOLOGY

Methodology that has been applied for this research is as follows:

1. Architectural solutions and data obtained as the results of workshops held during the academic years 2019/2020 and 2020/2021 have been analysed to establish functional patterns that transcend the programme of the building itself. This means that these patterns appear the same in designs for public or private buildings.
2. These patterns have been transformed into an algorithm that describes functional and spatial connections and relations.
3. An algorithm has been translated into software.
4. Since software represents a specific type of model, meaning that it incorporates a relatively high level of abstraction, functional solutions that appear because of software use take over different spatial configurations, while remaining constant in assigned functional relations and patterns.
5. In order to classify the pool of solutions produced, additional criteria have been introduced. These criteria are necessary to establish initial units that could be used further on as a starting point for the composition of multifamily housing.
6. Finally, obtained solutions have been compared with prominent examples of contemporary architectural experiments.

Main part of the research, where algorithms and software are used, may not be considered a traditional approach to architectural design. However, it is also not a new one. As Silvio Carta states, “Unlike traditional architects, computational designers need to start their work by modelling the design problem and elaborating a logic that allows all parts of the design to be hierarchically related and processed. Once the design logic has been elaborated, this approach requires the use (or development) of an algorithm whose implementation will allow the final design to be computed.” Unfortunately, the idea of this automated architectural design process is very often vaguely interpreted, leading to the vision of computers utterly replacing architects and designers, followed with a multitude of justified criticism. At this point in time, the development of this methodology is quite far away from that vision. The main reason is the fact that good design metabolises a plethora of subjective quantifiers: intuition, emotion, nostalgia, and artistic expression being some of them. This means that logic and function, no matter how well studied and implemented, cannot stand alone as a guarantee of good or even excellent design. Even neural networks, as technology that is being widely used today, faces difficulties when it comes to selection of training data: regardless the uneven design quality of, for example,
existing layouts that are used for training, there is also a lack of any existing layout example if the design problem is rather new (as we are facing with post-pandemic architecture right now). These ideas have been summarised in the opinion of David Rutten, “Ultimately, a computer has no idea what it’s doing, let alone why it’s doing it. Understanding stuff is what humans are good at.” In this research, the computer is used as a design tool only in the parts where unforeseen results are expected, creating countless possible solutions that could be clustered and classified in order to reveal some aspects of design that might stay hidden for the human alone. In that sense, this research could be classified as a hybrid approach, synthesising the possibilities of machines and human designers.

3. WORKSHOPS RESULTS

Workshops have been organised in the following manner:

3.1 Workshop 1

In October 2020, 20 Master’s students were encouraged to act as student mentors to the fourth-year students from undergraduate studies (94 students) in order to collect case studies of spatial transformations in public or private buildings alike, focusing on the following: entrance zones, separation of visitor space and space used by residents/employees, self-isolation spaces and spatial changes that are imposed by social distancing. Undergraduate students were to use the pool of collected case-studies for their subsequent studio projects related with different types of public buildings. Formulation of the patterns themselves is the result of discussions between undergraduate and 20 Master’s students, divided into groups together with the teaching staff.

The results of the Workshop 1 demonstrate the recognition of the following spatial patterns, or new additional zones in architectural space:

- Containment space (94/94): space with specific equipment used in order to separate external, possibly contagious environment, from internal, sanitary, thread-reduced space and space used by significantly less residents/visitors in the specific moment in time.
- Increase in the number of entryways or exits, where possible (37/94): this approach has multiple benefits, amongst which are: reduction of bidirectional movement in the interior space, possibility of creating isolated zones, or differentiation between visitor and residential space.
- Increase in hybrid interior zones (35/94): living room/home office, bedroom/home office, glazed balcony/home office, being the most prominent.
- Increase in green areas in the interior (32/94): due to the lockdown restrictions, genuine human need for natural environment (biophilia) has been manifested through different forms of home or office gardening.
- Increase in provisional elements that can create isolated bedroom and/or toilet space isolated apartment), where available (23/94).

### 3.2 Workshop 2

In November and December 2020, following the data collected, analysed and processed, 20 Master’s students designed 14 different architectural typologies, whose layout is a direct result of the research conducted in the first phase (Figure 1). Additionally, special attention has been attributed to the matters of architectural theory and historical and contemporary thoughts and examples that could serve as a framework for the presented research.

It is well known that the separation of functions from the domain of the private to the domain of the public sphere, as one of the dominant programme and spatial strategies of housing policies during the 20th century, especially when it comes to the apartment and its transformation, make the domain of a private family apartment even more isolated and separated from the “sphere of social reproduction.” However, in recent decades, we have witnessed the process of hybridisation of public and private through the renewal of private sphere functions. It is also present in the domain of household economy through work and activities related to consumption, but also through spheres of society, such as culture and education which culminated in the last two years of COVID-19. Today, Peter Sloterdijk’s thesis stands as never before, that “citizen seeks to expand his living room into a cosmos and at the same time impresses the dogmatic form of a room on the universe”. In this way, a large number of micro-worlds are formed, “micro-interiors” that appear today as a spatial form, created as part of the process of individualisation of society, “where everyone creates a city for themselves” reaching its zenith under the influence of the COVID-19 pandemic.

The question arises as to how architectural practice today can respond to these hybridisation processes? How to find an adequate spatial and programmatic framework for complex public-private relations which are traditionally linked to the spatial level of the city? And what is more important, how to give an answer simultaneously to the process of individualisation and ‘purification’ on the one hand, and the process of hybridisation on the other hand, whose influence in the pandemic situation is evident?
UP: Fig. 1. The containment space, an example of the Workshop 2’s result, designed by Master’s students Nikoleta Stamenković and Tamara Milutinović.

CENTER AND DOWN: Figs. 2a, 2b, 2c. The transformation of the existing building according to the conclusions of the previous Workshops (authors: Staša Zeković, Marko Mihailović, Andrej Grković – Master’s students, together with Petar Mirković, Dejan Ecet, Jelena Atanacković Jeličić – teaching staff).
3.3 Workshop 3

Finally, the work in April and May 2021 was completely dedicated to further examination of new possible post-pandemic relations between public and private space inside a multifamily building, where a specific case study was analysed and transformed. The selected case study had a number of limitations, where the most important ones were the following: historical importance and central location in the city (thus lacking green spaces in the nearby surroundings). Biophilic design, as well as the availability of double-sided ventilation, as concluded in previous workshops, were the leading ideas of the project (Figures 2a, 2b, and 2c). The workshop was organised with five Master’s students and three members of teaching staff.

4. ALGORITHM AND COMPUTER SOFTWARE

4.1 On Algorithm And Software

The application of algorithms in architectural design is one of the techniques that, although not new, have recently experienced rapid development. In support of this thesis is the fact that all mainstream CAD software, in addition to basic tools which primarily serve as an aid in more efficient production of architectural drawings, integrate a special segment of advanced tools into the palette, the so-called script editor. In addition to the script editor add-on, which implies some knowledge of the programming language, there is also an add-on for the so-called visual programming. The basic idea of these software add-ons is to deepen the interaction between the human and computer in order to transform the role of the architect into the creator of the mechanism, generating appropriate solutions in relation to the set parameters. The parameters can be of different character depending on the programming language in which they are expressed. At the same time, parameters represent the greatest challenge in terms of quantification of architectural problems, i.e., how to convert an architectural problem into a number or parameter that can serve as an input to an algorithm that will generate appropriate solutions based on this data.

For the purpose of this research, an algorithm was developed in the Python programming language, which uses Rhinoceros software for an advanced level of the manipulation of geometric elements as a modern tool in architectural design. In the case of this research, the algorithm, simply put, serves as a tool that generates the disposition of rooms within a residential unit in relation to the dimensions of the rooms and their mutual relations.
Functional schemes that were the result of the research presented in the previous chapter were used as input data for the algorithm. Functional schemes, as an aid in architectural design, are identified as an integral part of design in various forms. In this case, the functional scheme is defined by the rooms and mutual relations that make up one housing unit. Relations are defined by a direct connection, or more precisely by answering the question: Does the room have an opening from the immediate environment? (Figure 3)

In the context of the algorithm, each room contains input data which, in the basic case, contain the name of the room, the dimension of the room (width and length expressed in meters) and the relation, that is, the interconnection. Since determined systems or predefined systems reduce the possibility of unforeseen solutions, a variation of room dimensions (width and length) was introduced, as well as the contact between rooms defined by a matrix. Hence, the final description of the functional scheme shown in the previous illustration in the form of the programme code consists of the room name, width (w), length (h), width + variation ($\Delta w = w + \Delta$), length + variation ($\Delta h = h + \Delta$) and ordinal number of the room, and the contact is defined by a matrix, binary: 1- with contact, 0-no contact (Figure 4).

After the input data defined in this way, the algorithm calculates the possible layout of the rooms and generates solutions that in large numbers correspond to the initial functional scheme. Each generated housing unit, in addition to the form consisting of rooms with predetermined dimensions and relations, also contains metadata which consist of the following:
- Area of generated layout, and
- Perimeter of generated layout.

Due to the fact that the algorithm generates a large number of solutions that fully correspond to the set initial conditions, it was necessary to introduce additional parameters that would reduce the set in the direction of those solutions that have a greater possibility of combining with each other. This possibility is important from the point of view of creating the floor base of the inter-family housing unit and/or increasing the housing density on the construction plot. For the purposes of this research, and in order to achieve the above, the bases with a higher degree of compactness were selected to make the interconnection easier. Compactness is qualified through two parameters (Figure 5):
- Perimeter and area quotient, and
- Number of vertices of generated layout.
UP: Fig. 3. The relationship matrix, the initial graph and a layout from the set of possible optimised layouts.

CENTER: Fig. 4. The relationship matrix (initial graph in the lines of the programme code).

DOWN: Fig. 5. The figure displays an example of a generated layout. In this case, the layout is under ordinal number 133, area (A): 216m², perimeter (P) 108m, perimeter and area quotient (P/A): 0.5 and 24 vertices (C).
4.2 The Use Of The Proposed Method In The Context Of Previously Established Set Of Criteria In Relation To Post-Pandemic Condition

The first step in the application of the algorithm is to define the functional scheme (initial graph), i.e., to define the dimensions of the rooms and their relations. For the purposes of this research, three spatial dispositions were selected (Figures 6-11). Functional schemes (graph) as well as the dimensions and purposes of space represent a synthesis of the results of research conducted in Workshop 1 and described in the chapter titled ‘Workshop results’. The entrance zone in the proposed schemes is defined as a block and represents a kind of the disinfection barrier (containment space) in which it is possible to disinfect food and clothes before entering the clean part of the apartment. The bedrooms, living room as well as a glazed balcony are at the same time workspaces. The bedrooms are dimensioned to include ancillary spaces (toilets and additional work area).

4.2.1 Scheme 01
An example is a model that, in addition to the listed rooms, contains a visitor space. The visitor space is connected by one type of entrance hall, which allows a division in two ways of movement: for guests and residents, as well as a possible additional exit from the residential unit. The bedrooms are connected by a glazed balcony which is also a workspace and allows work from home.

The first row: layouts with a minimum number of vertices; the second row: layouts with the smallest perimeter and area quotient; and the third row: examples with a large number of vertices and a high value perimeter and area quotient.

4.2.2 Scheme 02
This example introduces bedrooms separated from home offices, which have been implemented into the living room and two glazed balconies.

4.2.3 Scheme 03
This example explores the possibility of a larger housing unit, providing six bedrooms with three glazed balconies/home offices and an open concept kitchen (with kitchen island) that forms a singular space with the dining and living area. The glazed balcony has been envisioned to form a small atrium space inside a housing unit.
UP: Fig. 6. The relationship matrix for Scheme 01, the initial graph and a layout from the set of possible layouts.

DOWN: Fig. 7. Displays of some of the generated layouts according to the functional scheme 01.
UP: Fig. 8. The relationship matrix for Scheme 02, the initial graph and a layout from the set of possible layouts.

DOWN: Fig. 9. Displays of some of the generated layouts according to the functional scheme 02. The first row: layouts with a minimum number of vertices; the second row: layouts with the smallest perimeter and area quotient; and the third row: examples with a large number of vertices and a high value perimeter and area quotient. The formed atriums are marked in green.
**UP: Fig. 10.** The relationship matrix for Scheme 03, the initial graph and a layout from the set of possible layouts.

**DOWN: Fig. 11.** Displays of some of the generated layouts according to the functional scheme 03. The first row: layouts with a minimum number of vertices; the second row: layouts with the smallest perimeter and area quotient; and the third row: examples with a large number of vertices and a high value perimeter and area quotient. The formed atriums are marked in green.
5. DISCUSSION OF RESULTS

Although only the selected solutions are presented in the previous chapter, Figure 12 better illustrates the percentage of the generated solutions corresponding to the initially set functional schemes. The “obstacle” that the software faces, similarly to the “analogue” design, is when the given dimensions are too rigid, that is, when the given range is too narrow for potential variations. A more detailed analysis of the generated solutions can demonstrate a large percentage of “expected”, especially in the case when the variations of dimensions are equal to zero. From this we can conclude that the degree of unforeseen solutions depends on the degree of variation, not only in terms of the range of sizes in which the dimensions of individual rooms are, but also in terms of the way in which the diagram itself is created.

Likewise, although the compactness of the base is a criterion from which traditional design usually begins (as a consequence of the fact that the plots are mostly relatively compact in shape), in the case of generating a base from a given functional scheme (graph), this is a property that needs to be additionally achieved. In this research, the “compactness” of the solution is achieved by introducing two additional criteria: the number of vertices (angles) and perimeter and area quotients, where solutions with low values of both parameters (relative to the others in the set) were considered ‘more compact’ than others.

Fig. 12. The output – variations of layouts as can be seen after the software concluded calculations for the initial graph in question. Layouts inside a square meet the given functional criteria. This figure represents the number of “correct” solutions vs. the “incorrect” ones.
The reasons for introducing the category of “compactness” are better illustrated in Figures 13 and 14, which exhibit the possibilities of combining individual housing units into a more complex whole due to, for example, the requirement for a higher numerical value of housing density. As a consequence of introducing glazed balconies in the algorithm as well as double-sided ventilation, a significant number of atrium spaces appear, which consequently due to their dimensions imply a relatively small number of floors that would be possible in such a building. In addition, these spaces reopen the question of the public/private relationship, which, as stated above, is one of the fundamental theoretical questions related to the future of post-pandemic architecture.
The space of the apartment is often viewed as a static system, a spatial container of everyday life where the processes that shape the society in which we live are happening independently or with little impact on its changes. Henri Lefebvre defines public space as a dominant space, the space created through discursive regimes and analyses of spatial planning professions as well as expertise knowledge to create a space. He defines the private sphere, the residence, the dwelling house as a space of appropriation, a space that is produced from daily action, and within the framework of everyday life, as a reflection of the individual. However, the private sphere of the home is not just a mere reflection of the society in which it arises, but a place where new or transformed spatial assemblies and processes in society are in meaningful and complex relationships. The dichotomous nature of the relationship between the public and the private and its understanding is addressed as a central theme in the work of Walter Benjamin, Hannah Arendt, and Jurgen Habermas. Arendt and Habermas make a clear distinction between the area of private, hidden household space and public political space – ‘Space of Appearance’. However, they also argue the constant interdependence of these two domains in the formation and transformation of social values which affect the creation and transformation of spatial systems. Habermas, when describing the emergence and transformation of the public sphere in modern society, argues that it can be understood primarily as a sphere in which private interests appear as public, where the regulation of everyday life is related to the household, although he moves the domain of private to the sphere of public interest.

These theses are largely applicable to pandemic and post-pandemic society, primarily viewed in the context of the interdependence of public and private, where social norms and values ultimately have a decisive influence on the level of spatial delimitation. Thus, the basics presented in Figures 13 and 14, although fluid at first glance, actually demonstrate a new relationship to “public grading” of space, where the “right of access” is seen as a deeply transformable category, more susceptible to individual decision-making rather than the community that comprises the entire multifamily structure.

6. CONCLUSIONS AND FURTHER RESEARCH

The concepts of public and private space, such as with N. John Habaraken, can be viewed as relative and dependent on the direction of movement. Moving outwards towards wider scopes, we always enter the public space, while on the way back, going inwards, we enter the private space, where the feeling of what kind of space we are in depends on the space with which that space is in
relationship with. It is this topic, the correlation of individual spaces within a housing unit and the definition of their largely hybrid purposes that is at the heart of this research. Consequently, methods were selected to place the “relations” of individual spaces and the possibilities of their, even spatial, transformability, in the forefront. Respecting the bottom-up principle set in this way, it is possible to place the relations and conflicts between the private and public spheres at the spatial level of the apartment. Thus, set concept, dominated by the transformable nature of the programme zones, the ability to adapt to the needs of one of the domains, or the ability to accept changes in the situation and nature within the programme zone, forms a spatial framework that becomes a place for communication and mutual adjustment of public and private.

Understanding space as a “personalised” product that is expressed through the multitude and complexity of different needs, actions and procedures allows, on the one hand, its universal applicability, while on the other hand it is deeply rooted in the context in which it operates. This understanding forms the core of the presented research. In this way, the space defined by the strategies, through the process of implementing simple tactics, adapts to newly created situations and functions, creating its own dynamics within the strategies of the generated space.

Moving towards the stated goal, the following shortcomings could be deduced:

1. Data that was the basis of this research has been collected through observations by 94 architectural students in their final year of undergraduate studies and 20 Master’s students, supervised by teaching staff. Since the data collection has been conducted during the course of the pandemic, and since spatial transformation that have been set for students to focus on relied only on previous experience, it can be said that this data pool should be adjusted and expanded when the pandemic conditions pass.

2. There is still not enough medical research data regarding the efficiency of some of the individual spatial patterns stated in the chapter titled ‘Workshop results’ (e.g., Figure 1). When further research is conducted, different spatial patterns (conclusions of the Workshop 1) could gain additional significance factors. This could lead to patterns that are necessary and the ones that are provisional if some other sanitary conditions are met (e.g., different technological solutions like air purifiers or simple social distancing).
3. In this research, data has been sourced by observations from private and public interior spaces alike, but the conclusions deduced from that data have been applied only to private, housing interiors. If public spaces would be examined, there would be, for sure, stronger influence of social distancing that would have to be calculated, as presented in some contemporary research.

4. Design method presented in this research, specifically the algorithm and software used for architectural design, is at this point in time present only in the architectural scientific community and not in architectural faculty curricula. This means that it still cannot be implemented in everyday architectural practice, limiting the public reach of what we called the unforeseen layout solutions.

Nevertheless, it is very important to also note the following:

1. Although the primary pool of data has been gathered only through observing and relying on the experience of the pandemic conditions, it also relies on a long history of architectural and urban transformations that were implemented in order to fight different types of diseases (e.g., black plague, tuberculosis, the Spanish flu, to name a few), and architectural expertise gained through previous professional practice and knowledge in providing sanitary conditions in different types of facilities (e.g., hospitals). Thus, the primary data pool obtained through Workshop 1 can be considered as relevant.

2. Even though not widely disseminated amongst architectural education curricula, the utilisation of the “machine” (computer) in architectural design process can provide better and deeper insight into possible spatial solutions for the problem stated. When used in the right manner and the right phases of design process, this kind of hybrid approach to architectural design can even offer the “unforeseen” solutions.

3. In the context of foregoing, a significant novelty in the method presented is the introduction of qualifying parameters (number of vertices (C) and perimeter and area quotient (P/A)). These parameters enable a targeted selection from a relatively large set of functionally correct architectural layouts, thus providing one step further towards the utilisation of “machine” in the architectural design process. Parameters have been selected in the manner that reflect a common call for more rational constructive solutions, while not putting at risk architectural creation based on immeasurable parameters.
4. This research has been guided by strong conviction that architectural solutions can bring significant, sometimes even dominant influence (e.g., energy efficient buildings) when built environment dilemmas are in question. That is why the possibility of technological solutions for some sanitary conditions have not been considered here.

5. As stated in the previous chapters, the dichotomy of public and private in architectural space is an ever-changing category, even more in times when societal challenges become turbulent, as in a present moment. That is why spatial patterns that illustrate the transformation due to the pandemic have been sourced from both private and public examples and compared to the prominent theoretical thoughts on the subject. Nonetheless, positioning the obtained solutions into the context of progressive architectural practice is a goal set for further research.

Combining individual solutions provided by the software into a single plan of, as presented, multifamily building, is still a process that rests firmly on the expertise of an architect, and here, computers can be of little, if any help, in providing alternative solutions. This is because real-life simulations, with all parameters involved, including the ones that are almost impossible to quantify (as stated before: emotion, atmosphere, reminiscence, the experience of art, amongst others) are still out of reach for modelling that is necessary for creating an algorithm. This leads to the conclusion that the presented results can only be used as a functional basis for further architectural research, as a first layer which can be considered as a matter of course. Regardless, the presented architectural multifamily layouts indicate a future where demarcation between public and private space could be more fluid and subject to frequent fluctuations, while private (in the narrowest sense considered) encompasses hybrid properties with strong reliance on relationship with nature.
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The origins of the approach date back to the beginning of the second half of the 20th century. Some of the important researchers and authors will be mentioned in the chapter “Algorithm and computer software”.


Revet-Dinamao, Rhinoceros-Python script editor; Grasshopper, AtoCad-Atolisp and other.


SYNTACTIC (Designing with Space Syntax) ( plugin for Grasshopper© made by Pirouz Nourian and Samaneh).

This way of expressing “compactness” comes from mathematics, particularly the so-called isoperimetric problem: “isoperimetric problem, in mathematics, the determination of the shape of the closed plane curve having a given length and enclosing the maximum area. (In the absence of any restriction on shape, the curve is a circle)”, “Isometric problem”, Encyclopedia Britannica, accessed 25 November 2021, https://www.britannica.com/science/isoperimetric-problem. A particular case of the isoperimetric theorem says that among all rectangles of a given perimeter, the square has the largest area. (See also: Tom M. Apostol and Mamikon A. Mnatsakanian, “Isoperimetric and Isoparametric Problems”, The Mathematical Association of America Monthly 111 (February 2004): 118-136. https://www.maa.org/sites/default/files/pdf/upload_library/22/Ford/Apostol118-136.pdf.


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NOVA UDOBOST: KA ŽIVOTU NAKON PANDEMIJE

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KLIJUČNE REČI: POSTPANDEMIJSKA ARHITEKTURA, METODA PROJEKTOVANJA, ALGORITAM, SAVREMENA ARHITEKTURA

MALE INTERVENCIJE – METOD ISTRAŽIVANJA ZA REDIZAJN [MALIH] JAVNIH PROSTORA

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Urbani život mora biti lišen nepotrebnih fizičkih propisa, ograničenja i ugrožavanja životne sredine kako bi se omogućila sloboda društvenog angažovanja i delovanja u javnom prostoru. Očigledno, prisutna preterana kontrola i strah u javnim prostorima umanjuju kvalitet društvenih odnosa. COVID-19 je intenzivirao ovu pojavu, nazvavši je Nova normala. Ovo zahteva diskusiju o novim mehanizmima pomoću kojih grad može da prevaziđe društveno-prostornu diskriminaciju na sledeće načine: stvaranje platforme za unapređenje sadašnjeg razumevanja dinamike koja se razvija između pandemije i arhitekture, sinteza postojećeg znanja, diskusija o lekcijama koje treba naučiti i istraživanje transformativnih rešenja ka održivijim i otpornijim strategijama dizajna u post-COVID eri.

Kao odgovor na Novu normalu, Male intervencije su model koji omogućava da se javni prostori postepeno unapređuju nizom malih, pažljivo osmišljenih i strateški odabranih intervencija u javnim prostorima uz međusobnu saradnju gradske uprave, stručnjaka i građana. Predmet Malih intervencija su mali prostori realizovani sa skromnim budžetom, kratkim rokovima i ubrzanim procedurama. Iz perspektive planiranja, Male intervencije su deo dinamičnog, fleksibilnog i prilagodljivog urbanizma koji ide u korak sa promenama društveno-prostornih odnosa izazvanih COVID-19.

KLIJUČNE REČI: JAVA PROSTOR, MALA INTERVENCIJA, DIZAJN, DINAMIČAN, FLEKSIBILAN, PRILAGODLJIV URBANIZAM