



International Conference on Urban Planning



ICUP2020

PROCEEDINGS
Serbia, Niš, November 13, 2020

ICUP2020





International Conference on Urban Planning



ICUP2020

PROCEEDINGS

Serbia, Niš, November 13, 2020

International Conference on Urban Planning

ISSN 2738-0548

3rd International Conference on Urban Planning - **ICUP2020**

Publisher

Faculty of Civil Engineering and Architecture, University of Nis

For Publisher

Dean

Petar Mitkovic, PhD

Editor

Petar Mitkovic, PhD

Co-Editors

Milena Dinic Brankovic, PhD

Milan Tanic, PhD

Aleksandra Miric, PhD

Vuk Milosevic, PhD

Text formatting, prepress and cover

Sanja Jankovic

Vojislav Nikolic

ISBN 978-86-88601-52-8

Circulation

100 copies

Printing

Grafika Galeb Nis

3rd International Conference on Urban Planning - **ICUP2020**

Organized by

Faculty of Civil Engineering and Architecture, University of Nis
Urban Planning Cluster, Nis



Sub-organizers

Serbian Chamber of Engineers



SCIENTIFIC PROGRAM COMMITTEE

Petar Mitkovic, PhD, Chairman, Dean of Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Milan Tanic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Urban Planning Cluster, Serbia
Milena Dinic Brankovic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Vuk Milosevic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Urban Planning Cluster, Serbia
Jasmina Tamburic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Aleksandra Miric, PhD, Urban Planning Cluster, Serbia
Goran Jovanovic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Aleksandar Kekovic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Ljiljana Vasilevska, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Danica Stankovic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Ivana Bogdanovic-Protic, PhD, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Jelena Zivkovic, PhD, Faculty of Architecture, University of Belgrade, Serbia
Aleksandra Djukic, PhD, Faculty of Architecture, University of Belgrade, Serbia
Mila Pucar, PhD, Institute of Architecture and Urban & Spatial Planning of Serbia
Aida Nayer, PhD, Department of Architecture, Effat University, Saudi Arabia
Ali A. Alraouf, PhD, Head of CB, Development, CB and Research Unit-QNMP, Research and Training, Ministry of urban planning, Doha, Qatar
Derya Oktay, PhD, Dean of Faculty of Architecture, Ondokuz Mayıs University, Samsun, Turkey
Karin Hiltgartner, PhD, Department of Spatial Planning, Technische Universität Wien, Austria
Kovács Erzsébet, PhD, ICOMOS, Hungary
Horáček Martin, PhD, University of Technology, Brno, Czech Republic
Carmina Gheorghita, PhD, G.M. Cantacuzino, Faculty of Architecture, Technical University of Iasi, Romania
Michał Chodorowski, PhD, University of Technology, Białystok, Poland
Divna Pencic, PhD, Faculty of Architecture, SS. Cyril and Methodius University in Skopje, North Macedonia
Florian Nepravishta, PhD, Dean of Faculty of Architecture and Urbanism, Polytechnic University of Tirana, Albania
Milena Tasheva-Petrova, PhD, Urban Planning department, Faculty of Architecture, University of Architecture, Civil Engineering and Geodesy Sofia, Bulgaria
Aleksandar D. Slaev, PhD, Department of Architecture and Urbanism, Varna Free University, Varna Bulgaria
Milenko Stankovic, PhD, Faculty of Architecture, Civil Engineering and Geodesy, University of Banja Luka, Bosnia and Herzegovina
Miroslav Malinovic, PhD, Faculty of Architecture, Civil Engineering and Geodesy, University of Banja Luka, Bosnia and Herzegovina
Lorenzo Chelleri, PhD, Chair Urban Resilience Research Network (URNet), Universitat Internacional de Catalunya, Barcelona, Spain

ORGANIZING COMMITTEE

Tanja Obradovic, Chairman, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Slavisa Kondic, Urban Planning Cluster, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Miljana Ignjatovic, Urban Planning Cluster, Serbia
Vojislav Nikolic, Urban Planning Cluster, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Aleksandra Miric, PhD, Urban Planning Cluster
Milica Igic, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Jasmina Tamburic, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Sanja Jankovic, Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Marija Marinkovic, Urban Planning Cluster
Milan Brzakovic, Urban Planning Cluster, Faculty of Civil Engineering and Architecture, University of Nis, Serbia

FOREWORD

It is a great honour and privilege to present to you the Proceedings of the Third International Conference on Urban Planning - ICUP2020, which is taking place online in these uncertain times of coronavirus pandemic. This year's event is scheduled for November 12-13th, 2020 in Niš. The conference is organized for the third time by the Faculty of Civil Engineering and Architecture - University of Niš and Urban Planning Cluster, thus continuing the tradition of being a biennial manifestation of the University of Niš. We believe that the main conference goal is accomplished, since we have once again brought together scholars, researchers, students and professional from all over the world and from the fields of Urban Planning, Urban Design, Architecture, Civil Engineering and related fields.

Having successfully discussed a broad spectrum of planning, design and development issues during the First and the Second ICUP conference, it is now time to focus on the resilience of cities, while trying to shape urban landscape by promoting nature, cultural heritage, technologies and social equity. Topics that ICUP2020 is focusing on this year include, but are not limited to: Nature-based solutions in urban areas, Mitigation strategies for climate change, Cultural heritage in building urban identity, New approaches and concepts in preserving built heritage, New technologies and materials in construction, Social aspects in urban planning and design, Planning, design and development challenges in creating resilient communities, and Links between regulations, urban planning and architectural design.

After the review process, 30 conference papers from various study areas and diverse places in the world are discussed at the ICUP2020 conference. Contributing papers deal with highly topical resilience issues and therefore provide a valuable insight into contemporary urban theory and practice. The presentation of our eminent key-note speaker contributes to an interesting and successful conference, while the scientific contribution from the members of our international Scientific Program Committee guarantees a high quality Book of Proceedings that will inspire future research. I would therefore like to thank all of them, as well as teachers and associates engaged in the technical preparation of these Proceedings.

Given the importance of the topics elaborated at the conference and numerous questions that are raised here, ICUP conference will continue to explore topical issues in urban development for the benefit of our cities. I am pleased to invite all authors from the academic and research community to participate in future ICUP conferences.

See you all at ICUP2022!



Petar Mitkovic, PhD, Full professor
Faculty of Civil Engineering and Architecture, University of Nis
Chairman of the Scientific Program Committee

CONTENTS

THE RESEARCH HISTORY OF SHRINKING CITIES: A CONCEPT OR NOT?	
Branislav Antonić, Aleksandra Djukić	01
URBAN REGENERATION & ARCHITECTURAL RECONVERSION. TWO PROJECTS	
Andrea Zamboni	09
TALL BUILDINGS ARTISTICALLY CONSIDERED? HIGH-RISES AND THE HISTORIC URBAN LANDSCAPE	
Martin Horáček	17
POSSIBILITIES AND BENEFITS OF NATURE-BASED SOLUTIONS IN URBAN REGENERATION OF LARGE HOUSING ESTATES FROM SOCIALIST PAST	
Ljiljana Vasilevska, Magdalena Vasilevska	25
BANJA LUKA URBAN BACKBONE AS THE ARCHITECTURAL STATEMENT OF HISTORICAL DEVELOPMENT	
Miroslav Malinovic	33
THE DEVELOPMENT OF CONTEMPORARY URBAN TRANSPORTATION IN RELATION TO URBAN STREET NETWORK	
Peter Nikolov, Boryana Nozharova	41
SHIFTING FROM SUSTAINABLE TOWARDS REGENERATIVE DESIGN AND DEVELOPMENT IN CREATING URBAN ENVIRONMENTS	
Aleksandra Cvetanovic, Mihailo Mitkovic	49
APPLICABILITY OF POP-UP APPROACH TO FLOATING URBANISM: DEMOCRATISATION OF AQUATORIUMS IN THE CITY OF BELGRADE	
Milica Simovic, Petar Mitkovic	57
POCKET PARKS AS A TYPE OF URBAN GREEN SPACE – BENEFITS AND POSSIBILITIES OF IMPLEMENTATION	
Magdalena Vasilevska	65
RESIDENTIAL SPACE AS CHANGEABLE AND RESILIENT POLYGON FOR FUTURE LIVING	
Borjan Brankov, Marina Nenковиć-Riznić, Mila Pucar	73
SHARING IS CARING: CO-HOUSING AS A MODEL OF STUDENT HOUSING IN SERBIA	
Hristina Krstic, Miomir Vasov, Vladana Petrovic, Mirko Stanimirovic	81
COMMUNICATING BUILT HERITAGE - SEMIOTICS OF INDUSTRIAL HERITAGE IN THE CONTEXT OF URBAN TRANSFORMATION	
Ljiljana Jevremovic, Branko AJ Turnsek Aleksandar Milojkovic, Ana Stanojevic, Marina Jordanovic	91
REGAINING THE CITY - IDEAS AND INTERVENTIONS IN URBAN PUBLIC SPACES	
Constanta Carmina Gheorghita	99
THE WORSHIP SPACE AS AN IN-BETWEEN PLACE	
Constanta Carmina Gheorghita	105
THE POTENTIALS OF WINE REGIONS FOR THE FORMATION OF CULTURAL LANDSCAPES: EUROPEAN EXPERIENCES	
Ana Stanojevic, Branko AJ Turnsek, Ljiljana Jevremovic, Marina Jordanovic, Isidora Djordjevic	113
WHEN DISASTERS AND ERRONEOUS GOVERNMENTAL DECISIONS MEET IN HISTORICAL CENTRE: THE CASE OF THE OLD MARKETS OF THE LEBANESE TRIPOLI	
Antoine Dib, Hristina Krstic	121
CONSEQUENCES OF IMPROPER PLANNING - ARCHITECTURE IN PIROT	
Mirko Stanimirovic, Slavisa Kondic, Tanja Obradovic, Vojislav Nikolic, Hristina Krstic	131
ENVIRONMENTAL BENEFITS OF GREEN ROOFS	
Dušan Ranđelović, Miomir Vasov, Dragana Dimitrijević Jovanović, Jelena Stevanović, Aleksandra Ćurčić	139
KINETIC FACADES AS ELEMENTS OF CONTEMPORARY AND SUSTAINABLE ARCHITECTURE	
Aleksandra Ćurčić, Gordana Topličić Ćurčić, Nataša Matić, Dušan Ranđelović	145
REVEALING NATURE THROUGH PLAY IN URBAN DESIGN EDUCATION	
Jelena Živković, Marija Cvetković, Rajko Korica	153
PROPERTIES AND QUALITIES OF DISPERSED URBAN FABRIC: UNDERSTANDING THE BANJA LUKA URBAN FORM	
Nevena Novaković, Anita Milaković, Dijana Simonović	163

GREEN LIVING ROOFS AS A PART OF GREEN INFRASTRUCTURE	
Dragana Dimitrijević Jovanović, Danka Kostadinović, Predrag Živković, Dušan Randelović	171
SOLAR PARKING CANOPY AS A PART OF ENERGY EFFICIENT URBAN PLANNING	
Aleksandar Pantić, Dragana Dimitrijević Jovanović, Petar Mitković, Mirjana Laković – Paunović, Mihailo Mitković	179
SUSTAINABLE MANAGEMENT OF OPEN PUBLIC SPACE IN A LARGE HOUSING ESTATE IN SOFIA: INTEGRATING PHYSICAL CHARACTERISTICS AND SOCIAL DIMENSIONS	
Milena Tasheva - Petrova	187
COMMON OPEN AREAS AS INTERACTIONAL SPACE IN SOCIAL HOUSING - DESIGN PRINCIPLES AND SPATIAL CHARACTERISTICS	
Nataša Petković, Branislava Stoilković, Vladana Stanković	197
BUILDING RESILIENCE THROUGH CREATIVE STRATEGIES IN SMALL POST-SOCIALIST SHRINKING TOWNS	
Milica Ljubenović, Ivana Bogdanović-Protić, Petar Mitković, Milica Igić, Jelena Đekić	205
PREFABRICATED HOUSING FOR INCREASING RESILIENCE TO FORCED MIGRATIONS	
Vuk Milošević, Michał Chodorowski	213
SMART GREEN PORT ASSESMENT ON PLANNING SOLUTION OF DOCKYARD IN BELGRADE	
Tatjana Mrdjenovic, Miodrag Ralevic	221
FUNCTIONAL AND AMBIENT QUALITIES OF SCHOOL GROUNDS: A CASE STUDY IN NIS	
Milan Tanic, Danica Stankovic, Vojislav Nikolic	229
PLANNING, SCALE OF OWNERSHIP AND THE OPTIMAL NUMBER OF CO-OWNERS	
Aleksandar D. Slaev	237

Disclaimer

The contents of the papers presented in this publication are subject to review, but the authors are responsible for the originality and quality of their papers.



SHARING IS CARING: CO-HOUSING AS A MODEL OF STUDENT HOUSING IN SERBIA

Hristina Krstic

Faculty of Civil Engineering and Architecture, University of Nis, Serbia
PhD., Teaching Assistant, hristina.krstic@gaf.ni.ac.rs

Miomir Vasov

Faculty of Civil Engineering and Architecture, University of Nis, Serbia
PhD., Associate Professor, miomir.vasov@gaf.ni.ac.rs

Vladana Petrovic

Faculty of Civil Engineering and Architecture, University of Nis, Serbia
Teaching Assistant, vladana.stankovic@gaf.ni.ac.rs

Mirko Stanimirovic

Faculty of Civil Engineering and Architecture, University of Nis, Serbia
PhD., Assistant Professor, wireframe22@gmail.com

ABSTRACT

Current economic, social, ecological and other issues that affect urban housing worldwide, started a serious research on new sustainable housing models able to fit the needs of a modern man and his hectic lifestyle. Among all the benefits people enjoy today, digital era has also brought many disadvantages, that especially affect social categories, such as young adults, young families, elderly people and similar vulnerable groups. Whether they are looking for flexibility, affordable life space, or the solution to so called "urban loneliness", in a search for an ideal living arrangement, more and more people are turning to co-housing as a new (although old) way of living. In the last years, a model of housing in community has been rapidly spreading across the globe, and has particularly drawn attention to young people, offering, among other things, an alternative and good solution for student living.

Student housing in Serbia is mainly based on two models: dormitories, which are mostly in public ownership, and private rented accommodation. For an average Serbian student, economically more affordable housing option is dormitory, but the increased number of students and the lack of accommodation units in dormitories cause that not many students can think of that option. Maybe it is time to look for other options and we are wondering if co-housing can be an additional model to student housing in Serbia?

Keywords: *co-housing, student housing, space sharing, toward resilient cities*

1. INTRODUCTION

In the scope of research of the Scientific project "Construction of Student Dormitories in Serbia at the Beginning of the 21st Century" (TR36037), in order to investigate new possible models for student housing in Serbia, this paper connects two, currently quite interesting, topics: *co-housing* and *student housing*. Having in mind the rapid growth of students' number, University modernisation and outdated dormitory models [4], student housing in Serbia has recently become very demanding issue. Hence, the idea of the research is to try to introduce co-housing as a model of student housing in Serbia and this paper will check whether this can be possible. So, let's start with the short insight into: What is co-housing?

2. CO-HOUSING BRIEFLY

Collaborative living, collective housing, mini-communities, *bofælleskab*, *kollektivhus*, *gemeinschaftliches wohnen*, *centraal wonen*, *abitare collaborativo*... There are many different words that describe specific housing type internationally accepted as co-housing.[7] Co-housing is form of housing that combines characteristics of both individual and multifamily living. In spatial and organizational-architectural terms, co-housing cannot be described as a certain housing type, because it varies in its schemes and scales, from small buildings inside the city core to huge residential complexes and villages. Anyway, the main principle of this housing concept is based on the idea of community. The pattern of co-housing living can be compared to traditional living in community that has existed in mankind's history from the very beginnings, and is now interpreted in a modern and contemporary way. Benefits of common life of a group of people in the same space are recognized as socially, economically and ecologically sustainable elements and are set as foundation in creation of this kind of housing.

It is commonly spread the opinion that the pioneer in the development of co-housing is Denmark, which during the 1970s of the 20th century began expansion of so called *bofællesskab - living communities*. Bertil Egerö in the *Introduction to the Conference report* [7], however, claims that there are good reasons to revise this wider accepted opinion, pointing to the fact that the idea of living together in new housing forms could have been spread more or less simultaneously in several European countries, stating that so-called *BIG* group of Swedes (an acronym for *Bo i Gemenskap - "Live in Community"*), which in the late 1970s set themselves the task to formulate a new blueprint for co-housing, gradually discovered similar lines of thought not only in Denmark but also in the Netherlands and Germany. Charles Durrett and Kathryn McCamant, who have been researching and working on co-housing projects for decades, notice that the co-housing trend spreads rapidly throughout Europe, the United States and Canada, with new projects being planned and built in ever-increasing numbers: "In Sweden, Germany, the Netherlands, the United States, Canada, and now New Zealand and Australia, more and more people are finding that co-housing addresses their needs better than "traditional" housing choices"[5].

Although co-housing is quite new housing typology, the rising number of the projects of this kind globally, indicates that its expansion is taking hold. In his research regarding co-housing and ageing population in UK, John Killock explains the popularity of co-housing with this words: "Co-housing has become a popular option within modern society because it allows residents to maintain as high level of privacy and independence as may be desired, but provides many opportunities for residents to interact"[2]. He sees co-housing as "a neighbourhood in which neighbours know each other in a similar way to the notion of a traditional village but in a modern context. It has benefits for childcare, which makes it popular for families, and provides a socially supportive environment which makes it popular for older residents." [2] And this is definitely something that gives advantage to co-housing in comparison to common housing models.

While in, housing, generally speaking, the key element is resident, in co-housing, the most important factor is the social structure of co-housing community. Depending on social characteristics of the inhabitants, co-housing communities can be: multi-generational or of particular age category (older people, young adults etc.). According to [3], contemporary co-housing projects can be divided into three categories: "*Building Together*", which refers to the groups that only share interest in gaining economic and practical benefit through the project in which they join their assets and efforts to produce housing for themselves, without the idea of practicing active social interaction after the project is finished and they have moved in their homes, "*Sharing Everyday Life*", referring to the groups that not only develop their future housing building together, but also plan to share everyday activities while living there, with the aim to facilitate practicalities and without any commitment to religious or ideological beliefs, and "*Serving a Common Ideal*", referring to the groups that not only build and live together, but also share a particular religious commitment, an ideology or a specific lifestyle. From now on, we will focus on the second type of co-housing.

3. ACTIVE CO-HOUSING INITIATIVES

Authors of the paper [6] emphasize that despite the fact that single-family housing is considered higher quality and preferred type of housing in the city, permanent housing crisis in the world, requires adequate housing solutions, which asserts multi-family housing buildings to be considered as a necessity. To make this housing type more attractive and acceptable to the occupants, they draw attention to individualization modalities, which implementation should affect the improvement of housing standard and make housing

qualities much closer to the preferred single-family housing. Followed by this proposal, we came to the opinion that co-housing can be a compromise between single and multi-family living.

For co-housing project to be initiated, developed and realized it is necessary to have serious planning and support. Initiators of co-housing are often self-created groups of people associated in solving their housing issue. They may self-finance and lead the project, but often they need the support from the authorities. Some countries, mostly developed ones (Denmark, as the most advanced country regarding co-housing development, Germany, Scandinavia), have recognized the benefits and sustainability of such projects and have drawn more attention to helping the groups. In that sense, special developing support services are provided and particular models of giving financial backing to co-housing projects are defined (e.g. providing lots to co-housing groups).

Unlike Serbia, where there are no registered co-housing groups, many European countries actively work on the development of this specific way of housing, seeing it as a model of housing for the future. In Sweden there are more than 40 co-housing units, concentrated in the main urban centres of the country, as full members of the association that works on the promotion of collaborative housing and other alternative ways of living (*Kollektivhus NU*) as well as 15 organisations working in favour of collaborative housing [14]. Data from the UK say that there are 21 established co-housing groups, 34 co-housing projects that are in the developing phase and 17 groups that are initially forming its membership [16]. Germany's federal association *FORUM Gemeinschaftliches Wohnen* [9], founded in 1992 with the aim of making the topic of "New Forms of Living", now works with 27 regional offices. The association reaches target groups who are looking for new forms of living, for rent or to own and offers support for those who want to start their own housing project with the motto of "living together, living independently". Similar associations can also be found in Belgium, Czech Republic, Denmark, Netherlands, Poland, Austria, as well as out of Europe, like in the USA, Canada, Australia, New Zealand etc.

4. CASE STUDIES

In order to better understand the mechanism of co-housing concept and investigate its possibilities in more detail, we made short case study of randomly selected co-housing projects, four of which are presented in this section. Presented projects are estimated as good illustrations for the analysis of benefits and disadvantages that co-housing includes.

Table 1: Case studies

project name	PORTO 15	LANGE ENG	MARMALADE LANE	BASECAMP LYNGBY
location	Bologna, Italy	Albertslund (suburb of Copenhagen), Denmark	Cambridge, UK	Kongens Lyngby (suburb of Copenhagen), Denmark
completion date	2016	2009	2018	2020
type of property	building inside the block of the dense urban tissue	housing complex	housing complex	housing complex
status	existing - renovation, conversion, reconstruction	new	new	new
apartment ownership	apartments to rent	apartment owned by residents	apartment owned by residents	apartment to rent
social structure	young people up to 35 (students, young professionals, married couples, single parents)	multigenerational	multigenerational	students, professionals, seniors
spatial form	single compact structure	continuous closed structure - peripheral row of housing units creates inner courtyard	semi closed structure - perforated rows of housing units create courtyards	continuous almost closed structure - peripheral row of housing units creates inner courtyard
openness to public	open to public	open to public	open to public	open to public

4.1. Porto 15

Project named *Porto 15* [13] (Bologna, Italy, 2015, arch. *Diverserighestudio* in collaboration with *Azienda Casa Emilia Romagna* - Bologna) is considered to be a new way of living inside the house and the city. It is an experimentation with new housing models of collaborative living for young people of age up to 35. The project is the first public co-housing in Italy and has been realized through the joint partnership of public and private institutions, who found different interests to participate in the collaboration - the need to support autonomy of young, innovation of models of public spaces use, retraining of public property and creation of spaces of higher social importance.

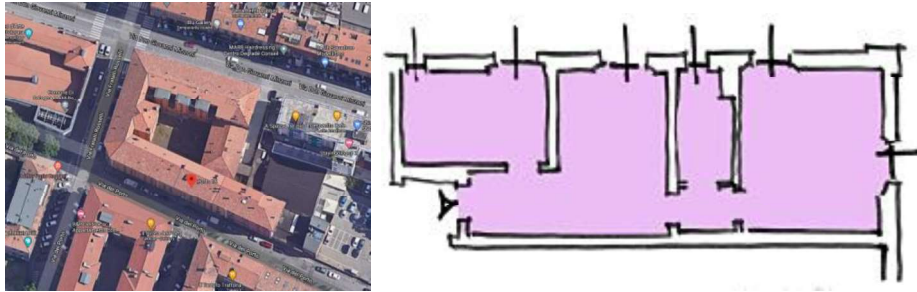


Figure 1: Porto 15 - (a) Building, and (b) Plan of an apartment

Image sources:

<https://www.google.com/maps>, Accessed 17 September 2020

<https://www.porto15.it/index.php/l-edificio/gli-appartamenti>, Accessed 22 September 2020

Porto 15 is revitalisation and conversion of existing building into housing community. The profile of community is heterogeneous. The group consists of different professional and social categories such as students, young professionals, employees, young families with or without children, single parents with children, couples and small co-living groups who want to take care of themselves and of others, as well as to take care of living space, to share their time and socialize through everyday activities. The main idea is to create affordable housing for those who are at the very delicate period of life and whose life plans are exposed to the risk due to difficulties in realization of housing autonomy. Essential aim of the project is to find out new possibilities and solutions to the problems that occur in a certain life age - separation from native family, affirmation of individual independence, share of life experience between coevals, joint living of couples, establishment of new family, maternity and paternity.

Affordability of housing is achieved through the mix of individual and shared spaces and lower rent fees. Potential residents should apply for moving in and, if accepted, sign the contract. The list of applicants is public and can be found on project's website. There are different housing typologies inside the building that are offered to residents. Housing units are not furnished, but are left to be fully designed by residents. When accepted, candidates have deadline of 30 days to move in. Contracts are signed for the period of 6 years with the possibility of 2 years of extension.

The main potential of the project is seen in common spaces, which are allocated across all building levels (dining, kitchen, laundry, leisure activities, atrium, workshops, galleries). Beside of being shared in functional and practical way, they all serve as key points for socialization, artistic and other kind of events. The fact that many of social activities that took place inside the building are not only open for residents, but also for wider community, arguments the higher level of social sustainability.

4.2. Lange Eng Co-housing Community

Lange Eng Collective Living is co-housing complex located in Albertslund in the west part of Copenhagen, Denmark. It was designed by *Dorte Mandrup Arkitekter* [10] and constructed between 2007 and 2009. The spatial scheme of the housing complex copies the pattern of typical Danish urban block. Apartments, 54 in total, are stacked in a continuous row that closes spacious common garden. Garden, placed in the center of the composition, appears to be the main social element and the key meeting point - a shared space for gathering and entertaining.

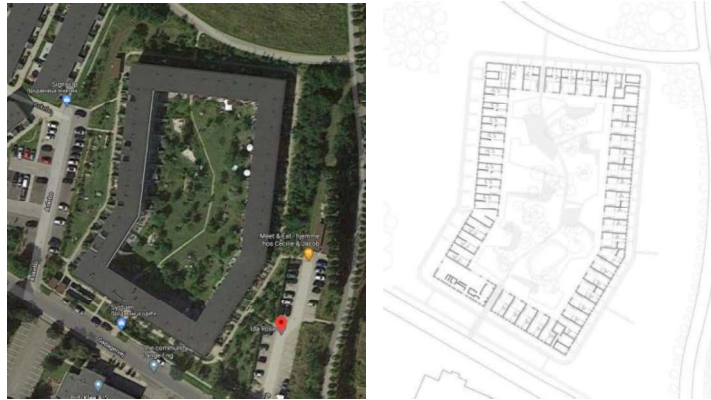


Figure 2: Lange Eng - (a) Complex, and (b) Floor plan

Image sources:

<https://www.google.dk/maps>, Accessed 17 September 2020

<https://arqa.com/en/architecture/lange-eng.html>, Accessed 17 September 2020

Social structure of the *Lange Eng* Community is multigenerational. Currently it is inhabited mostly with young couples with children. Apartments are owned by residents. They are of various size, ranging between 72 and 135 m² [15]. Their spatial organization is based on the open plan concept, with the content that extends through two levels. Main facade is towards the common garden and is highly glassed, visually strengthening the relationship between individual and common spaces. In the south of the building there is a huge common indoor space - communal house with the area of 600 m² equipped with the facilities such as kitchen, dining room for over 100 people, play room, multi-purpose room, music room, computing room, cafe bar, mini football and storage. It is mainly used during winter, while the main activities during summer are held in common yard.

Residents of *Lange Eng* have a high level of privacy, while at the same time, the community offers many possibilities of socializing. And indeed, there is a plenty of activities to be done together with neighbors, the main being gardening or drinking coffee on a long joint terrace. Most of the adult inhabitants of the community are also members of various working groups that organize different social activities and events.

It is also interesting to mention that two main openings that connect inner garden with the surrounding area are not closed, which means that people from the outside of community can enter the garden and use it as a public park. This idea blurs the sense of ghettoisation that can often be present in complexes of this kind.

4.3. Marmalade Lane

Marmalade Lane is the first co-housing development in Cambridge, Great Britain, designed by *Mole Architects* [11] and completed in 2018. The project was realized with the support of government, who recognized importance and potential of K1 co-housing group's idea to create custom made, community oriented sustainable housing settlement. Seeing it as an attractive model for future housing, Cambridge City Council, owner of K1 lot, the site predicted for the realization of the project, agreed to cooperate and prescribed an open developer competition.



Figure 3: Marmalade Lane - (a) Photo of the complex, and (b) Floor plan

Image sources:

<https://marmadelane.co.uk/#cohousing>, Accessed 22 September 2020

<https://www.archdaily.com/918201/marmalade-lane-cohousing-development-mole-architects>, Accessed 22 September 2020

The co-housing settlement is multigenerational and consists of 42 homes in a form of terraced houses and one/two-bedroom apartments, together with common facilities – the common house (with gathering spaces and bedrooms that can be booked for guests on request), garden, waste stores, car parking, placed on periphery, and huge cycle parking. The emphasis is given to custom-built design, meaning that households had a chance to participate in the creation of their future homes. Future tenants could choose between few offered “shell” types of their houses and external materials, with the possibility to configure floor plans together with designers. Housing units are placed with the facades facing existing streets and newly introduced Marmalade Lane. Spatial arrangement of the buildings creates huge inner garden, open towards south and connected with common house, a focal point for social activities and different events and metaphorical membrane between private and public spaces.

Social structure of K1 co-housing is very diverse. Residents come from all ages and professions and include families with young children, retired couples and young professionals. Members of K1 community are also of different nationalities (11), longstanding Cambridge residents and people relocating from elsewhere [12].

4.4. Basecamp Lyngby

Basecamp Lyngby in newly built co-housing complex (2017-2020) in small town Lyngby in the vicinity of Copenhagen, designed by *Larz Gitz Architects* and landscape architect *Kragh & Berglund*. It occupies area of around 41.000 m² and is aimed to be sustainable shared living community for 900 students, PhDs and senior citizens.[8] The location of the campus is very naturally oriented, as is the building itself. In the near of the site there are Lyngby Lake and the UNESCO preserved park Dyrehaven, which create calm and eco-friendly atmosphere, suitable for walking, sailing, biking and many other activities. The building structure draws inspiration from the environment and blends perfectly with it. The composition is very organic and unobtrusive. It seems like it grows up from the earth and waves spontaneously, creating a bunch of interactive spaces. The concept resembles the first Danish co-housing models and the very basic idea of community living, where private homes were clustered around the shared space. The housing units of the campus are placed in a long curvy tape, while in the middle of the closed composition is placed central construction that holds main common social activities, facilitated with amenities such as cafe, gym, workshop, cinema, library etc.

Open green spaces are seen as key social points of the project. Everything is imbued with greenery - inner courtyards for more intimate atmosphere, as well as long green walking roof that stretches along the whole building, rising up and down, for stunning views, gardening, walking and jogging. Sustainability reflects in each segment of the project - social, economic and environmental. The complex is not restricted only to its residents, but is also open to public. It welcomes every visitor and allows him to use all the common content. That enhances social contacts, and at the same time increases economic self-sustainability of the construction. Colorful social structure creates unique and diverse experiences for those who live and gravitate there. It blends different generations under the same roof and draws the best from their mutual coexistence. It offers opportunities of interactions between students, young professionals and seniors which can lead to creative and productive everyday and professional life.



Figure 4: Basecamp Lyngby - (a) 3D view, and (b) Floor plan

Image source:

<https://www.theplan.it/award-2020-housing/basecamp-lyngby-a-socially-interacting-super-structure-lars-gitz-architects>, Accessed 30 September 2020

5. CASE STUDY CONCLUSIONS

Case study analysis of realized architectural co-housing projects, four of which are presented in the previous section, has helped to synthesize specific characteristics of this housing typology and effects which living in co-housing can cause on its residents. Those effects are classified according to four criteria: psychological, economical, comfort, urban and are filtrated through positive and negative categories, which show potential advantages and disadvantages of co-housing approach.

5.1. Advantages

Research has shown that co-housing implies and results with numerous positive elements, which directly or indirectly occur during different phases of architectural design, construction and utilization of the building. The first two phases are more oriented towards economical aspect, while the second is mainly focused on social.

1. Psychological effect

- Stable neighbourhood - "Co-housing helps individuals and families to find and maintain the elements of traditional neighbourhoods - family, community, a sense of belonging - that are so sorely missing our society." [5]
- The interaction between different generations can affect the social development of the people in a positive way. Residents benefit from each other and their mutual support in everyday activities. Young people can learn from the experience of the old and old people can refresh their everyday routine with fresh ideas of young. This may encourage the transmission of positive energy and affect "passive" individuals to move.
- Level of individuality/commonality can be set according to personal preferences. One can enjoy the company of community members or retreat to his privacy upon request. Psychological disorders of today, like depression or anxiety, are less expected to be present in environment deprived from loneliness.
- It is more likely to create closer relationships with other people (easily to make friends).
- Expressed solidarity and willingness to help (in childcare, chores, education).

2. Economical effect

- Possibility to finance the construction by joint forces of particular co-housing group. (Easier way to reach own home.)
- Possibility to be supported by other parties, who have non-profit interests and are willing to support sustainable living models.
- Lower living costs.
- Possibility to afford expensive amenities (swimming pool, gym) with less investment.

3. Comfort effect

- Participation in design process and hence customization of living space according to personal preferences.
- Availability of wide range of contents, usually not accessible in conventional houses/buildings.
- Possibility to balance between privacy and publicity upon personal preferences and current needs and wishes.

4. Urban effect

- Urban renewal.
- Social revivification.

5.2. Disadvantages

It turned out that co-housing is far less characterized by negative features in comparison to positive ones. Disadvantages are mainly based on personal nature and are subordinated to personal attitude of user and his affinities. That means, one can simply love it or not. Potential negative approach towards co-housing is rendered in propensity to living in community. Two major disadvantages would be:

- Co-housing as a collaborative housing and particular alternative way of living is not suitable for every person. It can require higher level of flexibility. One should be able to accept the responsibility of sharing, meaning should be flexible.
- The life in commune can be "hustle and bustle".

5.3. Benefits for students

Among many specific characteristics that describe co-housing, we found those who are particularly important for students. Here is the shortened list of benefits students can gain while co-living:

- Living in a heterogeneous environment can help students to build a different network important for their professional and personal development.
- Living in co-housing creates family-like atmosphere and the sense of belonging to certain community. For students who have to move from their hometown during study period, co-housing can help with the integration process in new environment.
- Co-housing way of living is more adjusted to working people and modern lifestyle. Co-housing offers more comfortable, suitable and equipped accommodation in comparison to rented apartment.
- Although co-housing isn't exactly like a dormitory, it is somewhat similar, so students used to dormitory life will adapt to co-living fast.
- Frequent events offered inside co-housing can enhance social activity of students.
- Community-like living affects development of one's personality. Personal features like responsibility, tolerance, teamwork, humanity, environmental awareness and alike are more likely to be acquired in an environment like this.

6. CONCLUSION

The rising number of co-housing projects intended for students demonstrates the fact that this typology is suitable for student living and is accepted by students. By searching the market, one can find many advertisements that offer students possibility to live in such environment. The number of companies and start-ups running the private holdings which rent rooms, studios or apartments inside the co-housing (e.g. *The Collective*, *Starcity*, *WeLive*, *Common*), states the fact that co-living in general is becoming not only popular among young who search for temporary home, but also among business people who are in search of a profit.

As [1] mention, "the co-operative housing movements at the beginning of the twentieth century was already based on the perception that housing means more than just having a roof over your head, but also includes aspects of community and communal infrastructure". Having in mind all the good and the less good/ bad things that it brings, co-housing can be graded as desirable, affordable and sustainable housing typology for a society. Higher sustainability is obvious in many aspects, primarily in ecological, economic and social.

From the very beginning of its origins in 1960s/1970s of the last century, co-housing has always been followed by environmentally conscious ideas of living and this trend has never stopped. Co-housing projects abound in eco-friendly solutions both in architectural design, maintenance and use of the building, which are also translated to the lifestyle of inhabitants. Living green is often the central motto that coexists in community's philosophy. Elements such green roofs, bike use, reduced motor traffic, reduced energy consumption, water reuse, solar energy, gardening, organic self-made food are some of the key features that circulate through co-housing projects. Economical sustainability is recognized in the reduction of apartment's area, common use of certain equipment, joint meals, self-maintenance and servicing of the building and open spaces, energy savings and social work. All that makes co-housing cheaper for living and affordable to wider population. The facilities that an individual cannot afford when living in "standard" apartment or house, now are reachable, because are shared, which also affects more comfort lifestyle one can benefit from. By using common laundries, household and garden tools or similar equipment, the space in the apartment needed for auxiliary content is reduced, which allows the total area of the apartment to be smaller. Existence of huge common kitchen, dining area or guest rooms, gives the possibility to downsize or drop out such spaces from the apartment. Knowing that larger quantities of food can be bought for the best prices, more or less frequent joint meals prepared weekly by residents in common kitchen, affect the residents' food expenses to be lower. Further, in commune, consisted of people of different ages, interests and occupations, an individual willing to participate in common works of building maintenance can always be found, which means budget savings, since there is no need for professional service to be engaged. Co-housing doesn't only affect the life of its community, but also the life of wider community. Its impact expands beyond micro level and have an effect on macro location, i.e. neighbourhood and the city. In order to enhance the wider interactions and prevent ghetto-oriented environment, co-housing community usually opens some of the common facilities to public, so big part of the content is accessible to neighbours (parks, cafes, restaurants, libraries, cinemas, workshops). By organising different cultural, sport and leisure events, social interactions happen between the residents or between residents and non-residents, which incite the co-housing to occasionally change its main residential function and become public venue. On the other hand, it also affects financial aspect, enhancing the financial self-sustainability of the community.

By analysing co-housing projects around the globe, their architectural concepts, social aspects and economic issues, it can be concluded that this housing typology is seriously becoming model of future housing. Although currently mostly spread across developed countries, it can be a good model for undeveloped countries too, especially when it comes to its economic aspect. Serbia, as a modern country in its developing phase, with its characteristic social framework and context, can definitely be a good candidate to introduce co-housing in its residential network. We started the research on co-housing as a model of student housing, but concluded that co-housing can not only be a model for student housing in Serbia, but for housing in general - for housing of wider social groups. It can rise the quality level of housing, i.e. of people's lifestyle, in this case of student's lifestyle, due to many various additional services, that are for common use.

Government should consider co-housing typology as sustainable housing model and support it. Co-housing is suitable for many social categories, who are in a way specific or vulnerable in relation to general society: young adults (not enough recognized as particular social group in Serbia who needs housing support), among them students and young professionals, and elderly people. Instead of focusing on each group individually, one can consider them together, as a heterogeneous group that can jointly function. Although the interests of each mention category are different, their mutual combination can result in all-round contentment, because co-housing is not only considered as concept of sharing spaces, but also of sharing everyday life.

ACKNOWLEDGEMENTS

We would like to express deep gratitude to the Ministry of Education, Science and Technological Development (Serbia) for the support in the realization of the Scientific project "*Construction of Student Dormitories in Serbia at the Beginning of the 21st Century*" (TR36037), in which framework this research was done.

REFERENCES

1. Ache P., Fedrowitz M., *The Development of Co-Housing Initiatives in Germany*, Built Environment, Vol. 38, No. 3, Co-Housing in the Making, 2012, pp. 395-412
2. Killock J., *Is cohousing a suitable housing typology for an aging population within the UK?*, Royal Institute of British Architects, London, 2014
3. Korpela S., *Casa Malta: A Case Study of a Contemporary Co-Housing Project in Helsinki*, Built Environment, Vol. 38, No. 3, Co-Housing in the Making, 2012, pp. 336-344
4. Krstic H., Randjelovic D., Vasov M., *Urban-architectural analysis of student dormitories in Nis*, 2nd International Conference on Urban Planning - ICUP2018, 14th - 17th November 2018, Nis, Serbia, ICUP Proceedings, Faculty of Civil Engineering and Architecture, University of Nis, pp. 111-148
5. McCamant K., Durrett C., *Creating Cohousing: Building Sustainable Communities*, New Society Publishers, Canada, 2011
6. Stoiljkovic B., Petkovic-Grozdanovic N., Jovanovic G., *Individualization concept in housing architecture*, Facta Universitatis, Series: Architecture and Civil Engineering Vol. 13, No 3, 2015, pp. 207 - 218
7. Vestbro D. U., *Living together - Cohousing Ideas and Realities Around the World*, Proceedings from the International collaborative housing conference in Stockholm 5-9 May 2010, Division of Urban and Regional Studies, Royal Institute of Technology in collaboration with Kollektivhus NU, Stockholm, 2010
8. "Basecamp Lyngby", larsgitz.com, Accessed 30 September 2020
<<https://www.larsgitz.com/project/basecamp/>>
9. "FORUM: Gemeinschaftliches Wohnen e.V. Bundesvereinigung", fgw-ev.de, Accessed 29 September 2020
<<http://www.fgw-ev.de/>>
10. "Lange Eng Cohousing Community", dortemandrup.dk, Accessed 17 September 2020
<<https://www.dortemandrup.dk/work/lange-eng-cohousing-community-denmark>>
11. "Marmalade Lane Cohousing Development / Mole Architects", archdaily.com, Accessed 22 September 2020
<<https://www.archdaily.com/918201/marmalade-lane-cohousing-development-mole-architects>>
12. "Marmalade Lane", marmaladelane.co.uk, Accessed 22 September 2020
<<https://marmaladelane.co.uk/#cohousing>>
13. "Porto 15", porto15.it, Accessed 14 September 2020
<<https://www.porto15.it/index.php/l-edificio/il-progetto-architettonico>>
14. "The Swedish National Association Cohousing NOW", kollektivhus.nu, Accessed 09 September 2020
<http://www.kollektivhus.nu/english/index_eng.html>
15. "Towards new spitalfields - Lange Eng Collective Living", newspitalfields.wordpress.com, Accessed 17 September 2020
<<https://newspitalfields.wordpress.com/2015/11/20/lange-eng-collective-living-2/>>
16. "ukCOHOUSING", cohousing.org.uk, Accessed 09 September 2020
<<https://cohousing.org.uk/information/uk-cohousing-directory/>>