Kaunas University of Technology

Faculty of Civil Engineering and Architecture

Revitalization of Modernist Urban Neighbourhoods Using New Urbanism and Urban Network Models

Master's Final Degree Project

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Kaunas, 2021

Kaunas University of Technology

Faculty of Civil Engineering and Architecture

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Architecture (6211PX026)

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Declaration of Academic Integrity

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KAUNAS UNIVERSITY OF TECHNOLOGY
Faculty of Civil Engineering and Architecture

Topic (thematic) of the Master's Final Degree Project: Revitalizing Modernist Urban Neighbourhoods Using New Urbanism and Urban Network Models

The topic of the Master's Final Degree Project is approved by the Dean's Order: **Revitalization of Modernist Urban Neighbourhoods Using New Urbanism and Urban Network Models**

Master's **Final Degree Project** (study module M000M168)

T A S K

Objective of the work:

To prepare the Master's final degree project based on the previous stages of the research work.

Tasks of the work:

To connect and summarise the data from the literature sources, analytical paper, research in situ report and experimental project, and prepare the Master's thesis – to present the reasoned solutions to theoretical and practical problems.

Structure of the work:

Text. Title page, heading page, declaration of academic integrity, task of the final degree project (FDP) (if needed), summary, santrauka, content, list of figures (if needed), list of tables (if needed), list of abbreviations and terms (if needed). Main part: introduction (relevance and novelty of the work, research problem and the level of its examination, object, objective, tasks, and methodology of the FDP); augmented and summarised data of theoretical research, empirical research and experimental design; conclusions of individual chapters and the entire work. List of references, list of information sources (if needed), appendices, copies of the graphical part (reduced in size).

The volume of the text (main part) is 2 – 3 quires (1 quire is 40 000 characters with spaces), i.e. around 60 – 80 pages of printed text (recommended font is Times New Roman, size 12, line spacing multiple 1.15 (Methodological Guidelines for the Preparation of Written Works)).

Graphical part.

The graphical part of the work is presented in posters (70x100 cm). It should reflect the most important results of the analysis of theoretical material, empirical research and experimental design, as well as general conclusions and proposals. The graphical part of the work should be arranged and exhibited in a way to form a visually unified whole and reflect the content of the work. It should be attractive aesthetically. When preparing the graphical part of the work, it is necessary to exclude the non-essential information, highlight the most important research results and ideas, and unify the notes, graphical expression, and colours.

The most expressive part of the project should be the experimental project, illustrating the conceptual proposals of solutions to problems. The experimental project should make from **3/5** to **4/5** of the graphical part.

The volume of the graphical part is 10 – 16 posters, of 70 x 100 cm size (vertically oriented).

Inscriptions of the graphical part should not be smaller than 5 mm in size.

Model (according to the need and possibilities).

Digital copy of the text and graphical part of the final work.

Timetable of the performance of the tasks:

1. Discussion of the task	03 02 2021
2. Constitution of the writing programme of the final work and the work's structure	10 02 2021
3. Supplementation, structuring, analysis and generalisation of the present data	until 17 03 2021
4. Review and evaluation of the supplemented and generalised data	**17 03 2021**
5. Writing of the FDP text and finishing of the graphical part	until 05 05 2021
6. Review of the first edition of the FDP text	**05 05 2021**
7. Defence of the FDP at the commission of supervisors	**12 05 2021**
8. Public defence of the FDP	**31 05 2021**

Consultation time with supervisor

Weekday	**Faculty of Civil Engineering and Architecture, Room 311, Zoom or other distance learning platform**	**Workplace**
	Time and duration *	**Time and duration ***
Monday		
Tuesday	**19:00, 2 hours**	
Wednesday		
Thursday		
Friday		

* - 2 hours per week

Supervisor of the final degree project Kęstutis Zaleckis
(name, surname, signature)

Student Milda Sutkaitytė
(name, surname, signature)

February 2021

Sutkaitytė Milda. Revitalization of Modernist Urban Neighbourhoods Using New Urbanism and Urban Network Models. Master's Final Degree Project / supervisor prof. Kęstutis Zaleckis, consultant assoc. prof. Johan de Wachter, Faculty of Civil Engineering and Architecture, Kaunas University of Technology.

Study field and area (study field group): Architecture (P09).

Keywords: Modernist urban planning, New Urbanism, urban networks, Space syntax, Sociotope mapping

Kaunas, 2021. 155 pages.

Summary

30 years after the Independence and 96 % of Lithuanian people in the five major cities are living in apartment-buildings, while more than 60 % of all Lithuanian population overall are residing in houses built during *Modernist planning* period. “Airy visions of towers rising out of vast expanses of grass and greenery” borrowed from Le Corbusier theory, proved to be flawed due to a lack of humanity (over-scaled, unidentifiable urban elements, ignorance to natural human life-cycle, psychology and social needs) and fragmented urban structure (segregation of different functions and physical separation of urban elements, such as neighbourhoods and districts), by everyday usage of Modernist urban neighbourhoods. Fast, but low-quality constructions of Soviet period, accompanied with a lack of sophistication and consciousness in later urban planning, and overall national politics of a young independent country after the fall of Soviet Union, stopped Modernist urban neighbourhoods from further development. Urban developers and citizens preferred downtowns or even suburbs, while neglecting these vast middle zones.

This master thesis analyses possibilities of urban developments in these neighbourhoods that would ensure attractiveness of these urban element to nowadays citizens and that would impact them with long-term self-evolution. *New Urbanism* evolved as a direct contraposition to Modernist urban planning, appreciating traditional urban living style and suggesting essential principles of urban development oriented to a human. *Urban networks*, on the other hand, recognize city as a multi-layered system of social, cultural and economic facets, intertwined together in a physical space. These two concepts together are able to convey a fundamental ideological perception, systematisation and complexity for spatial urban solutions, thus, are chosen as leading theories for problem solving.

This thesis consists of three main parts: the theoretical and the empirical researches, and the experimental design project. *The theoretical part* analyses problems of Modernist planning, tries to deconstruct the city to its primal elements and looks for urban design tools in literature and relevant cases, finishing the research with the hypothetical model of a liveable urban neighbourhood. *The empirical part* takes advantage from Sociotope mapping and various Space syntax methods, while looking for the answers, what are the values and flaws of the particular urban places, and why some of these places are liked, while other are forgotten by the residing people. The empirical research is concluded with the conceptual model of the revitalisation of Modernist urban neighbourhoods. *The experimental project* suggests the design strategy and tools for reaching the objective of the thesis, and presents their practical application in the urban fabric.

Finally, the project is *validated* by application of the patterns by Ch. Alexander et al. that were selected in the theoretical research as the practical tools, ensuring the vitality of an urban neighbourhood, and by repeatedly modelled Space syntax analyses for pedestrian movement in the re-developed urban area. Both of these approaches of the evaluation confirm that that the project is successful, as the re-developed area of the Modernist urban neighbourhood gains the complexity of overlaid urban networks and becomes a well-reachable place of pedestrian attraction.

Sutkaitytė Milda. Miesto modernistinių rajonų atgaivinimas naudojant Naujojo Urbanizmo ir urbanistinių tinklų modelius. Magistro baigiamasis projektas / vadovas prof. Kęstutis Zaleckis, konsultantas doc. Johan de Wachter, Kauno technologijos universitetas, Statybos ir architektūros fakultetas.

Studijų kryptis ir sritis (studijų krypčių grupė): Architektūra (P09).

Reikšminiai žodžiai: modernistinis miestų planavimas, Naujasis ubanizamas, urbanistiniai tinklai, erdvės sintaksė, sociotopų žemėlapis.

Kaunas, 2021. 155 p.

Santrauka

Praėjo trisdešimt metų po nepriklausomybės atgavimo, bet 96 % gyventojų penkiuose pagrindiniuose Lietuvos miestuose gyvena daugiabučiuose namuose, o daugiau nei 60 % visų Lietuvos gyventojų gyvena gyvenamuosiuose namuose, kurie buvo pastatyti Modernistiniu miestų planavimo laikotarpiu. Graži bokštų, kyšančių iš begalinės žalumos vizija, pasiskolinta iš Le Corbusier, galiausiai pasirodė turinti trūkumų dėl žmogiškumo stokos (per didelių, neidentifikuojamų urbanistinių elementų ir natūralaus žmogaus gyvenimo ciklo, psichologijos bei socialinių poreikių ignoravimo) ir fragmentiškos urbanistinės struktūros (funkcijų ir atskirų urbanistinių elemento, tokių kaip mikrorajonai ar kaimynystės, atskyrimo). Greita, bet prastos kokybės tarybinė statyba, lydima išmanymo ir sąmoningumo trūkumo vėlesniais urbanistinio planavimo laikais, ir, apskritai, jaunos nepriklausomos valstybės vidaus politika po Sovietų sąjungos griūties, stabdė Modernistinius miesto rajonus nuo tolimesnio vystymosi. Nekilnojamojo turto vystytojai ir gyventojai rinkosi gyvenimą senamiestyje, ar jau geriau priemiesčiuose, nei šiose vidurinėse miesto dalyse.

Šis magistro baigiamasis projektas ieško tokių mieto plėtros galimybių Modernistiniuose rajonuose, kurios suteiktų šiems rajonams patrauklumą šių dienų žmonėms ir kuriuos sugebėtų užtikrinti ilgalaikį teigiamą poveikį jų savarankiškam evoliucionavimui. Naujasis Urbanizmas išsivystė kaip tiesioginė opozicija Modernistiniam miestų planavimui, vertybėmis laikė tradicinį gyvenimo stilių mieste, o jo principai siūlė miesto plėtrą, orientuotą į žmogų. Urbanistiniai tinklai, kita vertus, suvokia miestą kaip daugiasluoksne sistemą, susipynusią iš socialinių, kultūrinių ir ekonominių aspektų fizinėje aplinkoje. Tuo tarpu, šios dvi koncepcijos kartu gali perteikti erdvinių urbanistinių sprendinių fundamentalų ideologinį suvokimą, sisteminimą ir kompleksiškumą, todėl yra pasirinktos kaip pagrindinės teorijos problemos sprendimui.

Šis baigiamasis projektas susideda iš trijų pagrindinių dalių: teorinio ir empirinio mokslinių tyrimų bei eksperimentinio projekto. Teorinis mokslinis tyrimas analizuoja Modernistinio miestų planavimo problemas, bando dekonstruoti miestą į jo pirminius elementus ir ieško urbanistinio dizaino įrankių literatūroje bei aktualiuose architektūriniuose ir urbanistiniuose projektuose. Šis tyrimas yra baigiamas gyvybingo miesto rajono hipotetiniu modeliu. Empirinis mokslinis tyrimas pasitelkia Sociotopų žymėjimo ir skirtingas erdvės sintaksės metodus, ieškodamas atsakymų, kokios yra Modernistinių miesto rajonų vertybės ir kokie yra jų trūkumai, bei kodėl vienos urbanistinės erdvės yra vietos žmonių mylimos, o kitos visiškai apleistos. Šis tyrimas yra baigiamas Modernistinių miesto rajonų atgaivinimo koncepciniu modeliu. Eksperimentinis projektas išvysto urbanistinio planavimo strategiją, pasiūlo konkrečius įrankius, kurie padėtų pasiekti baigiamojo projekto pagrindinį tikslą ir praktiškai parodo, kaip šis tikslas gali būti pasiektas.

Galiausiai, magistro baigiamasis projektas yra įvertinamas, ieškant Ch. Alexanderio ir jo bendražygių sukurtų urbanistinių elementų struktūrų, kurios buvo pasirinktos teorinio mokslinio tyrimo metu kaip įrankiai, užtikrinantys urbanistinio rajono gyvybingumą, ir pakartotinai atliekant erdvės sintaksės analizes pėsčiųjų judėjimui eksperimentiniu projektu perkurtoje urbanistinėje teritorijoje. Abu šie projekto vertinimo būdai patvirtina, kad projektas yra sėkmingas, nes parodo, kad perkurtoje urbanistinėje teritorijoje kompleksiškai persidengia įvairių urbanistinių tinklų elementai, o pati perkurta teritorija tampa aktyviausia ir puikiai pėsčiomis pasiekiama vieta visame Modernistiniame rajone.

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List of abbreviations and terms

Abbreviations:

CNU – Congress for the New Urbanism (n. d.);

GIS – Geographic Information System;

NACTO – National Association of City Transportation Officials (NACTO, 2016);

TOD – Transit Oriented Development (Barnett, 2013).

Terms:

A pattern – certain recurrence of same (or similar) elements, emerging from the whole as some kind of a system or a network.

Agent-based analysis – model, which is also used in *Space syntax*, analysing movement in an open space by implementing simple artificial intelligence (*agent*) into a *Visibility graph* and simulating its movement by simple mathematical rules such as "go all the time straight", "change direction every 10 units" or other. (Penn & Turner, 2001)

Choice – a mathematical value, used in *Space Syntax*, obtained by counting the amount of times the *node* has to be passed through, when moving from one *node* to another in a straightest and shortest way. Higher choice value indicates more active places in a network. (Zaleckis, 2018)

Graph theory – a mathematical theory, analysing simple structures (*graphs*) containing only two elements (*nodes* and *edges*) where edges represent relations between nodes. (Zaleckis, 2018)

Integral Urbanism – theory of urban planning, emerged as an opposition to the *Modern* and *Postmodern* urban planning, concentrating the concept on chaotic nature evolvement and seeking to find *integral* approach to nowadays landscapes. (Ellin, 2006)

Integration – a normalised mathematical value, used in *Space syntax*, obtained by counting how *close* the node is to other *nodes* in the system, compared to a whole network size. Higher integration value indicates better reachable places in a network. (Zaleckis, 2018)

Metric radius type – a parameter in *Space syntax*, (out of metric, segmental-step and angular), best reflecting pedestrian movement in a well-familiar territory (Hillier et al. 2010). It is used in *Segment analysis* in this thesis.

Metric step depth – a parameter in *Space syntax*, counting depth in a network as a metric distance (Zaleckis, 2018). Is used in *Visibility graph* analysis in this thesis.

Modernist urban planning – urban planning movement, influenced by Le Corbusier and his concept of the radiant city, where high-raise apartment-buildings are surrounded by green fields and a city overall is oriented to mono-functional zoning.

New Urbanism – urban planning movement, emerged as an opposition to *Modernist urban planning*, focusing on a human-scale urban design and adapting features of traditional urban development to contemporary practices of city planning.

Pedestrian shed – a concept in New Urbanism, insisting that people choose to walk instead of using a car if their goal can be reached in 5 minutes. (Steuteville, 2018)

Segment analysis – one of the *Space syntax* methods, perceiving a city as a network, where streets or paths are *edges* and their intersections are *nodes* of a graph. (Zaleckis, 2018)

Social control – a concept, insisting that presence of people prevent other people of committing a crime or of breaking other social norms. The term is widely used in Space syntax. (Ness, Lopez & Manuel, 2007)

Sociotope mapping – an urban development method for open public spaces, perceiving them as places of different social interactions *(social values)*. (Stahle, 2006)

Space syntax – an urban analysis theory, started by Bill Hillier in late 1970s, based on perception that city is a network where social, economic and cultural aspects overlay in a physical space. It involves a variety of different methods, most of which are based on a *graph theory*, analysing spatial urban configuration and its relation to other city aspects. (Zaleckis, 2018)

Sustainable development – theory and practice of urban development, the main goal of international institutions nowadays, perceiving city as a combination of *social*, *economic* and *environmental* aspects. (UN, 2015; UN, 2016)

Urban networks – a concept, perceiving city as a *network* of both physical and intangible (social, economic, cultural, etc.) aspects.

Visibility graph analysis – one of the *Space syntax* methods, perceiving space as a network, where a point in an open space is a *node* of a graph and an *edge* is a relation between such nodes. Main idea of this analysis is to evaluate *inter-visibility* between separate objects. (Zaleckis, 2018)

Introduction

Modernist urban planning developed from the concept of radiant city by Le Corbusier (1920) which focused on a beautiful vision of high-raise apartment-buildings that were protruding in the fields of greenery. In addition to its aesthetics in a picture, this vision was grounded on concentrated factory labour, communal resources and social equality, thus, quickly became a symbol of modern urban living. Furthermore, a simple design, influenced by a breakthrough in fast-construction technologies, and the concept of repetitive usage of the same buildings in an urban fabric coincided perfectly with socialist ideology as it ensured equal living conditions and made construction fast and cheap, therefore was widely introduced in Soviet countries.

Master plans of main Lithuanian cities, based on Modernist urban planning, were developed in 1960s and induced immense expansion to surrounding areas, thus, ensuring sufficient housing for a rapidly growing urban population. However, such a vast expansion and a revolutionary bounce to total neglection of a naturally evolved traditional social and spatial structure was promising not for long and flaws started to reveal themselves promptly. Over-scaled, character-absent, low-construction-quality architectural and urban compositions brought individuality and humanity suppression, initially through physical environment, and, thus to psychology of residents, consequently leading to rejection of such urbanism by citizens. Nevertheless, this rejection was only moral as the expanded population had nowhere else to go. Moreover, this rejection only grew with time because of physical wear out and absence of care for already neglected surroundings, resulting in more than 60 % of Lithuanian people residing in lethargic Modernist neighbourhoods nowadays. (Zaleckis et al., 2021; Tasak-Kok, 2015; Popova, 2004; Baltijos tyrimai, 2014)

Vital urban neighbourhoods are socially and economically stable spatial communities, capable of self-reliance and natural progress, thus, their vitality should be the main goal of any prosperous city. Despite that, a lack of vitality is an ingrained problem of Modernist neighbourhoods in present days as these urban areas attract little attention and the implemented improvements most often are minor or egocentric, solving only the “façade” issues and giving only temporary results with disputable value. This situation makes a great stress on a city and surrounding territories as people tend to choose suburbs over these Modernist districts. This results in an inefficient system of infrastructures and loss of natural environments. It could be changed by finding an effective way of how to revitalise these Modernist neighbourhoods and make them attractive to citizens. *New Urbanism*, born as a contradiction to Modernism, suggests coming back to traditional values and respect for humanity overall, while *urban networks* seek to organise a big structure to a complex system of overlaid aspects through uninterrupted relations. Therefore, both of these concepts, when used together, could be able to revive existing urban neighbourhoods in a non-destructive way by giving back humanistic perception, adapted to an untraditional scale.

Objective of the thesis is to proof that the application of urban values, suggested by New Urbanism and a coherent multi-layer structure, provided by urban networks, could induce the long-term positive urban evolution of Modernist urban neighbourhoods.

Tasks of the thesis:

1. To perform *the theoretical research*. To analyse international and Lithuanian documents of urban development with the main attention to possible causes and solutions to the existent

situation in Modernist districts. To analyse the concept of New Urbanism and the possibility to apply its ideas in revitalisation of the existent urban fabric, with the main focus on solutions based on urban networking. To generalise the acquired information and to construct the hypothetical model of a vital urban neighbourhood.

2. To conduct *the empirical research.* To create an empirical research program that would help verifying the hypothetical model. To conduct the selected empirical research methods on the selected Modernist neighbourhoods. To generalise the obtained results and to build the conceptual model of Modernist urban neighbourhoods revitalization.

3. To carry out *the experimental project*. To develop a design strategy that would reveal the essential aspects that should be changed in order to revitalize a Modernist urban neighbourhood. To reveal the potential of the developed design strategy by applying it into the design elaboration of the selected area of the Modernist neighbourhood. To generalise the solutions of the experimental project and to verify the conceptual model of the revitalisation of Modernist urban neighbourhoods.

4. To *evaluate* the overall project. To perform the selected empirical methods on re-designed urban territory once more and to compare the results of existent and proposed urban situation. To draw final conclusions of the entire thesis, to suggest recommendations for applicability of the gotten results and to indicate directions for further possible research for even greater value.

Methodology of the thesis:

I. *The theoretical research* – gathering, analysis, systematization and generalisation of the information, acquired from literature, documents and study of cases, development of the hypothetical model

II. *The empirical research* – conduction of a sociological web survey, partly grounded on Sociotope mapping method, application of Space syntax methods (Segment analysis, Visibility graph analysis and Agent-based analysis), consolidation and analysis of acquired results using ArcGIS platform, development of the conceptual model.

III. *The experimental project* – the pre-design analysis of legal regulation, urban structure and sociological composition, development of the design strategy, application of that strategy to the selected territory by elaboration of the urban project, validation of the overall thesis by application of Space syntax methods (Segment and Agent-based analyses) on the re-designed urban area and comparison of the existent and designed situation.

Novelty of the thesis. The object of this thesis is not new at all, yet the problem is still present. Theories and methods that were selected in the thesis are not recent as well, either the combination of these methods, the analysis of correlation between their results and the recognition of unique features each method is able to reveal best, is not much investigated. The research of intersections of Space syntax methods and Sociotope mapping is especially poor in the existent scientific scene as it is limited to Sweden territory only. In summary, the complexity of methodology applied in the empirical part of this thesis could be considered as a valuable tribute to the pursuit of revitalisation of Modernist neighbourhoods.

Level of examination of the research problem. The problems of lethargic Modernist neighbourhoods are examined a lot, yet the situation have not changed too much from the Independence, thus, it means that the optimal solutions have not been found. This indicates that the different approach to the problem could be found and this thesis suggests that the ideas of New Urbanism and the implementation of urban networks could be that approach. Finding the new patterns and, more importantly, the places of their fragmentation could be essential as these places could suggest minor transformations for major metamorphoses. There is no limitation for the number of patterns, thus, the level of the examination of the research problem is infinite.

Practical applicability of the thesis:

1. As an example and a technical guide for the synergetic usage of Sociotope mapping and various Space syntax methods for urban territory analysis.
2. As a toolbox of scientific methods for the simulation of alternative scenarios in urban structure and the prediction of the probable outcomes of the selected solutions.
3. As a base for the development of an automatized tool, able to perform as both previously suggested applications with minimal human intervention and using machine learning algorithms instead.
4. As a design strategy with the elaborated toolbox for the revitalisation of other Modernist neighbourhoods.

1. Theoretical research of the revitalization of Modernist urban neighbourhoods

Objective of the theoretical research is to find a theoretical way of how Modernist urban neighbourhoods could be revitalised using New Urbanism, with the main focus giving to the methods of urban networks. Revitalisation itself is understood as an urban intervention, acting as a catalyst for further self-dependent urban life and natural evolution.

Methodology of the theoretical research:

I. *Document analysis* – to identify the main urban planning problems in Modernist neighbourhoods.
II. *Literature analysis* – to understand what are the main theoretical features of a vital urban neighbourhood and how they could be implemented in an existent urban structure:
    - to clarify the concept of New Urbanism by systemisation of its principles using Integral Urbanism qualities
    - to supplement the concept of New Urbanism by other theories and to improve its applicability to urban development practice by expanding its principles with the patterns by Alexander et al. (1977) as urban planning tools
III. *Case studies* – to prove that the analysed theories are applicable in practice and to find particular tools, helping to achieve vitality of urban elements.

Tasks and structure of the theoretical research:

1. To perform *a document analysis*:
    1.1. To analyse international urban planning documents for identification of major global goals and strategies.
    1.2. To analyse master plans of the main Lithuanian cities (Vilnius, Kaunas and Klaipėda) for identification of major problems each of the city face and of attitude each of the city take upon revitalisation of Modernist neighbourhoods.
    1.3. To review Lithuanian documents, regulating revitalisation of Modernist urban neighbourhoods, and to find out, how they match the goals of both international and Lithuanian urban planning.
2. To carry out *a literature analysis:*
    2.1. To analyse the principles, concept and critique of New Urbanism, noticing strengths and flaws of its theory and practical usage.
    2.2. To strengthen the concept of New Urbanism by supporting it with additional theories, main focus keeping on urban networking.
3. To conduct *case studies.* To find and analyse relevant cases of how urban elements of different scales and specifics could be revitalised in such a way that they would benefit themselves and would provide an added value to the surrounding area. It is also important to notice the reasons of their successful implementation and further survival.
4. To construct *the hypothetical model* of a vital urban neighbourhood.
5. To generalise the *main findings* of the theoretical research.

1.1. International and Lithuanian perspectives of urban planning

The theoretical research of this thesis starts from the analysis of existing situation in the contemporary urban planning. Initially, the worldwide problems, tasks and goals are analysed, then focus is

narrowed to the Lithuanian context. Architecture and urbanism primarily are viewed as branches of humanitarian science in this thesis, thus, the social aspect is perceived as a central figure when aiming to improve a quality of our environment.

1.1.1. Current tasks and goals of urban development by United Nations

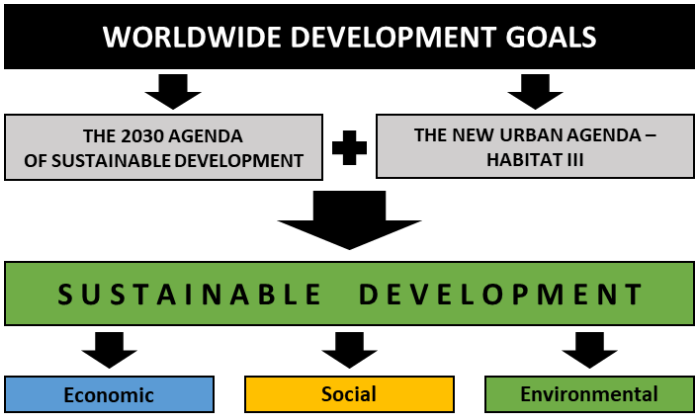


Fig. 1. Scheme of the concept of sustainable development

Opposing to the Modernist urban planning and seeking to resolve the problems it caused, United Nations have founded two main documents: "The 2030 agenda for sustainable development" (2015) and "The new urban agenda – Habitat III" (2016). These two documents highlight that people, planet and prosperity should be perceived as the key aspiration for further progress of humanity, thus *economic*, *social* and *environmental* aspects should be recognised as the main components of *sustainable development* (Fig. 1). Sustainable city, while combining together these three essential aspects, becomes a connecting fabric between people, places, goods, services and economic possibilities (Fig. 2) and could be achieved as described further.

The social aspect consists of social functionality, equity and community involvement. Assurance of social functioning could be achieved by availability of full-fledged housing, qualitative infrastructure, mobility and source of income. Equity could be induced by socially responsible planning, particularly focusing on social diversification and support for the weakest social groups (seniors, women, children and people with special needs). Social involvement should be perceived as a joining element: fostering sense of belonging and responsibility for the surrounding environment and creating an opportunity for different social groups to communicate, thus, nurturing mutual understanding and tolerance. All this could be achieved by developing safe, involving and accessible urban spaces.

Economic growth could be stimulated by promoting value-adding activities, local economic force and conscious usage of resources. Employment should be considered as the essential task, which could be pursued by creating local economic opportunities to small industries and local businesses.

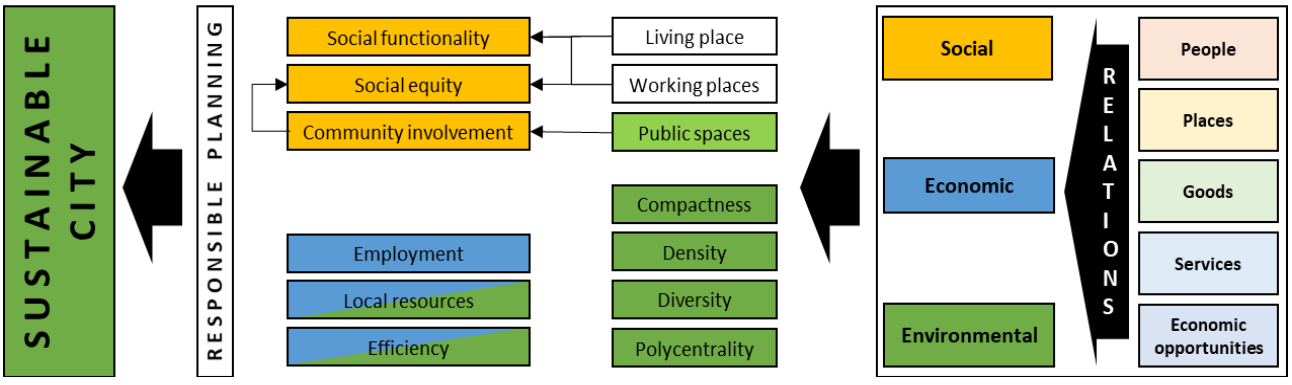


Fig. 2. Scheme of the concept of a sustainable city

Environmental factor should be ensured by effective usage of natural resources that could be achieved by compact, dense, diverse and polycentric city model. Priority in urbanisation should be given to revitalisation of urban structures and integration of weaker neighbourhoods into an urban fabric, as it could decrease segregation and peripheral expansion.

1.1.2. Urban planning development priorities in Lithuanian cities

Vilnius and the other main Lithuanian cities were planned consistently during the last century by developing general and master plans. Despite that, their engineering, transportation and urban structures remained incomplete and dispersive that is typical for Modernist mono-functional planning (Vilniaus miesto savivaldybės bendrasis planas iki 2015 metų, 2007). Independence and chaotic situation of a young country gave an opportunity for rich people to materialise their possibilities, thus, the periphery of the city became popular for private mansions. The majority of the core of the city remained for the lower income generating residents, therefore, the inner development of the cities became stagnant. According to Wachter (2016a), the documents of the territory planning were not of a great use as well as they did not take the responsibility of a complex urban planning.

Vilnius case

The master plan of the municipality of Vilnius city till the year 2015 (Vilniaus miesto savivaldybės bendrasis planas iki 2015 metų, 2007), in essence, was dedicated for the rectification of the damage, done by Modernist mono-functional urban planning and was focused on strengthening the local urban centres. On the other hand, this master plan was promoting development of new local centres in peripheral city territories, determining further Vilnius growth orientation outwards. This master plan was trying to induce the complex renovation and modernisation of Modernist urban neighbourhoods by developing local centres and by encouraging local services and local employment opportunities. There was even provided an exceptional opportunity for new constructions inside Modernist neighbourhoods in order to revive them. This exception was provided for social, commerce or other infrastructure, but was strictly prohibited for residential purpose developments.

The new master plan of the municipality of Vilnius city (Vilniaus miesto savivaldybės teritorijos bendrasis planas, 2019), which development is still in progress, continues to promote strengthening of local urban centres and sticks to the concept of a compact multi-functional structure of the city. On the other hand, the main difference from previous master plan is that the priority now is focused only to the inward urban development: conversion of abandoned, unrealized-potential and garden-community territories, renovation and modernisation of Soviet residential districts. Peripheral developments are, in essence, totally removed from the list of preferences.

To sum up, Vilnius is making efforts to solve the problems of mono-functional Modernist planning by reinforcing local centres for almost two decades already. Insufficiency of the outcomes from minor urban improvements and the need of complex solutions were noted during that time as well. However, it is obvious that the problems of Modernist neighbourhoods remain as these territories are still between the priorities of the new master plan.

Kaunas case

The master plan of the municipality of Kaunas city (Kauno miesto savivaldybės teritorijos bendrasis planas, 2013) is mainly focused on the consolidation of multi-functional and optimal territory

planning, bringing a main attention to social, economic and environmental aspects. Annexation of new territories to the city structure is not planned, as demographic composition of the city is shrinking and the residents still prefer suburbs over the city core. The further urban development is focused inside the city by modernisation, reorganisation and conversion of already urbanised territories. Development of public spaces, soft and hard infrastructures is prioritised in order to improve quality of urban life. Renovation of apartment-buildings is involved into the program of municipality-level developments, where a priority is given to energetically inefficient buildings. Complex renovation is also encouraged in the severely worn-out districts of apartment-buildings.

To sum up, Kaunas sees similar problems of mono-functional Modernist neighbourhoods as Vilnius does. These problems involve underdeveloped networks of public spaces and infrastructures, and physically and morally obsolete apartment-buildings. These issues induce the dissatisfaction of urban life quality in these territories, causing continuous residents' flee to peripheral areas of the cities.

Klaipėda case

The city of Klaipėda faces the population withdrawal to the suburbs as well, as the city core is qualitatively unattractive: social infrastructure is underdeveloped, safety is not ensured, the system of local urban centres is not sufficiently elaborated and the lack of diversified housing and public spaces is felt. The primal goal of the master plan of the municipality of Klaipėda city (Klaipėdos miesto savivaldybės bendrasis planas, 2019), which is under development yet, is the attraction of population back to the city core, thus, the new opportunities for inside developments are looked for and conversion, modernisation and densification of existent urban territories is mainly pursued. The master plan seeks for poly-centric urban structure and multi-functional usage of the territories. The improvement of urban environment quality is perceived as a complex development of the urban territories and optimal usage of social, engineering and transport infrastructures. New development in neighbourhoods, built between 1940's and 1990's, is allowed only if aiming to renew these neighbourhoods by complex and motivated developments of infrastructures of any kind and if the existing spatial situation could benefit from the additional elements.

To sum up, Klaipėda is suffering from weak local centres, similarly as Vilnius and Kaunas does. On the other hand, under-development of social infrastructure and lack of safety are more severe issues there than they were in other two cities. The new master plan focuses on complex planning and the development of urban networks. The possibility to densify Modernist neighbourhoods is provided.

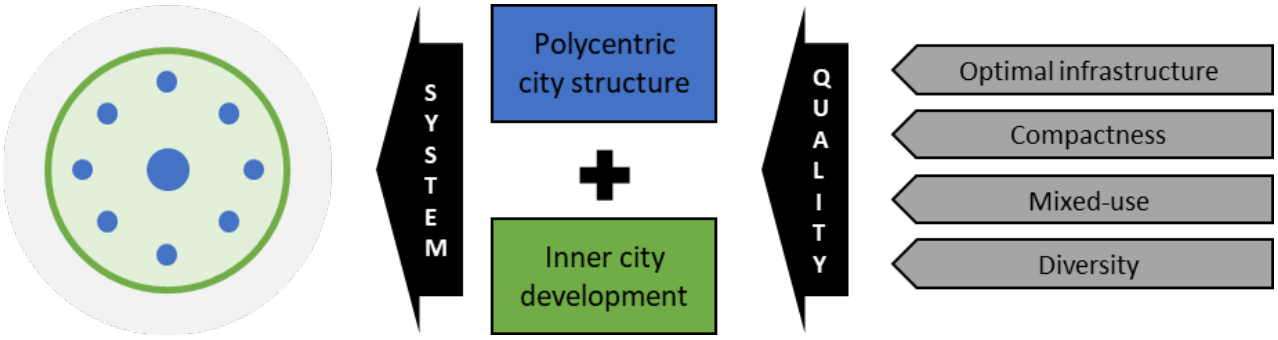


Fig. 3. Scheme of the goals of urban development in the main Lithuanian cities

The analysis of the territory planning documents of the main Lithuanian cities confirms that all three analysed cities face similar urban problems and the biggest of them is uncontrolled expansion to peripheral areas at the expense of quality loss in the inner structure of the cities (Fig. 3). All three cities, by the means of their new master plans, are aiming to block this dispersion and to turn further urban development back into the inner structure. Optimisation of territory usage and infrastructures, compact and multi-layered urban structure and modernisation of already urbanised areas are perceived as the most important means to accomplish that. Quality over quantity should be chosen for further developments as the population in the city cores is shrinking, thus, the need of physical space is decreasing.

1.1.3. Collision between Lithuanian theoretical and practical legislation of urban development

The situation in the legislation is similar to the goals of main territory planning documents from the first sight as well. “Program of the renewal (modernisation) of apartment buildings” (Daugiabučių namų atnaujinimo (modernizavimo) programa, 2004 m. rugsėjo 23 d. Nr. 1213, suvestinė redakcija nuo (2020-02-12)) draws attention to the complex renovation, keeping focus on the neighbourhoods of apartment-buildings, built during Soviet times. However, the incensement of energy efficiency class is the only matter that is discussed in the text of the document: insulation of walls, roof and basement, replacement of doors and windows, glazing of balconies and renewal of heating, hot water, ventilation and recuperation systems (Fig. 4). Moreover, the only criterion for the financial support, planned by the law of the State support for this program (LR valstybinės paramos daugiabučiams namams atnaujinti (modernizuoti) įstatymas, 1992 m. balandžio 30 d. Nr. I-2455, suvestinė redakcija nuo (2020-01-01)), is the reach of energy efficiency class C and there is nothing said about interiors, urban spaces or other infrastructures in these documents, only the technical parameters are discussed.

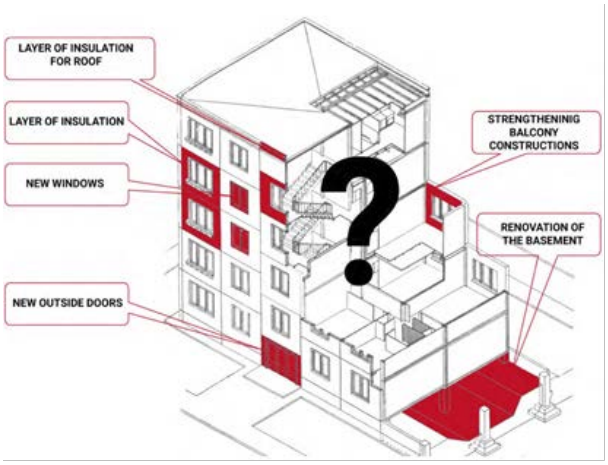


Fig. 4. Scheme of modernization of a Modernist apartment building (Wachter, 2016b)

This legal framework, although named as complex, reveals its complexity only in the concentration of work, performed in a single place focusing only on one very particular aspect. Although the documents talk about the holistic approach, the concept of that holistic approach remains undefined and the methods for complex improvement of living environment stay not presented, thus, the complex modernisation of urban territories remain the matter of municipality-scale and of each separate project, promoted only ideologically as the State does not provide any other support. This kind of an occasional and single-aspect-oriented urban renovation does not solve the problems of mono-functionality, lack of housing diversity and overflow of the parking lots, does not develop networks of social infrastructure and public spaces, is not giving effort to adapt the existing urban structure to different social groups and does not help Modernist urban neighbourhoods to evolve their identity. The chaotic “improvements” developed by local residents are deteriorating the existing situation even more and making the unsolved problems even more evident.

However, looking to the situation from a slightly different point of view, Modernist districts possess a couple of particularly valuable properties, based on Wachter (2016a): the vast areas of physical space between apartment-buildings and that those vast areas are mostly still belonging to a single owner, the State. These two properties should be perceived as the main opportunities for further urban development and revitalisation of Modernist urban neighbourhoods.

1.2. Principles and critique of New Urbanism

New Urbanism, started as the neo-traditional movement of urban planning, arose as an opposition to Modernism (Gindroz, 2002). The first projects of New Urbanism, such as Seaside in Florida, were developed in the suburbs or rural areas, and were some kind of local experiments, aiming to test if village-type urban planning could be relevant in cities nowadays. The project of Seaside (n.d.) drew a lot of attention, thus, the concept of New Urbanism (Congress for the New Urbanism [CNU], n. d. a) was continued to be developed, seeking for new ways of how to adapt traditional planning principles in different stages of urban planning (new development, urban aggregation, replenishment or regeneration), in different contexts (suburbs, urbanised areas, urban centres) and in different scales (single building or public space, block, district, city or even region).

As a result, the congress of New Urbanism was convened in 1993, where a considerable part of architects, engineers and other stakeholders took part. These activists saw that the lack of investments in urban centres, chaotic urban spread to suburbs, increasing social segregation, deterioration of environment and loss of natural and cultural heritage were the main problems of the cities of that time. The congress was followed by the charter of New Urbanism in 1996 (CNU, n. d. b), where 27 principles of urban planning were presented, divided into three parts by the scale of development: region (metropolis, city and town); neighbourhood, district and corridor; block, street and building.

1.2.1. Principles of New Urbanism

This thesis seeks to find the possibilities of how the principles and methods of New Urbanism could help to revitalise Modernist neighbourhoods, thus all 27 principles (CNU, n. d. b) will not be analysed, as the main focus will be kept on the scale of a neighbourhood, district and corridor. The other elements will be discussed only if considered relevant to the topic.

According to Leccese, McCormick and Congress for the New Urbanism (1999) *neighbourhood* is an urban unit, where pedestrian movement is dominant, thus, decreasing usage of automobiles and energy of an internal combustion engines should be encouraged. For this reason an urban neighbourhood has to be compacts, comfortable, pedestrian-friendly and multi-functional. Moreover, relations between different social, cultural and demographic people groups, as well as their involvement into communal activities and creation of surroundings should be promoted. These relations could help creating rich and authentic society. *District* is an urban unit larger than a neighbourhood and often covers a few neighbourhoods with a dominant function, e.g. student campus. The planning principles, oriented to neighbourhood should be applied to a district as long as possible. *Corridor* is a human made (e.g. a street or a railway) or natural (e.g. a river or a park) joining element between neighbourhoods or districts and well-planned transit corridors could contribute to the prosperity of urban centres.

To sum up, New Urbanism, compared to Modernist urban planning, shifts back its attention to a human scale and the needs of a human, living in unnatural environment (city); it seeks to restore nurturing human connection with himself and with surrounding environment.

1.2.2. Critique of New Urbanism

Critique of New Urbanism, in essence, could be divided into three groups, according to C. Ellis (2002): empirical, cultural–ideological and aesthetic. However, all of these three groups are very closely related, thus, should be evaluated altogether.

The aesthetic critique of New Urbanism is mainly related to the repetition of historical forms, thus, New Urbanism is often called a "kitsch". It is claimed that such expression denies both natural historical change and individual inspiration (Huxtable, 1997). Anyhow, C. Ellis (2002) argues that representatives of New Urbanism avoid blind copying and conduct many different analyses of urban, historical and literature contexts in order to find the authentic look and the distinctive feeling of a place. Moreover, New Urbanism is not seeking to become an architectural style. It is an urbanism movement, aiming to improve the spatial structure of a city and this is the main reason why New Urbanism can be implemented by using any architectural styles or forms that best suit the particular context.

The cultural–ideological critique covers discussions about the usage of *traditional urban planning* principles in a contemporary city fabric, differences between authentic and *artificial landscapes* and the influence of public spaces for uplifting human spirit of *community and citizenship*.

According to C. Ellis (2002), the application of *traditional urban planning models* in a modern city could seem like an anomaly from the first glance because contemporary science is based on continuous evolvement, while looking backwards associates with regression. However, urban planning is more complex than that and it combines new technologies together with social phenomena and the fundamental human perception of world (e.g. the concept of beauty), thus, the turn-back by a century should not be considered as a step backwards, but rather as the synthesis of times.

In the press, New Urbanism is often associated with *unnatural communities* that create the illusion of a small-town model, falsely based on idyllic past; recalling a filming-site more than the reality; and contributing to a city expansion in suburbs, instead of promoting its inner development (Ellis, 2002; DeWolf, 2002). As the example of such modern settlement could be the same Seaside project in Florida (Seaside, n. d.), mentioned before, which has become a resort instead of a daily living environment, with the most estate owners living in other cities and coming there only a few times a year, while the streets of Seaside are constantly flooded with the uncontrollable number of tourist cars (Bernstein, 2005). Such and similar communities raise question, whether the principles of New Urbanism are applicable in the revitalisation of inner-cities and are not only merely the representation of the rich life of elite. On the other hand, such projects were created at the dawn of New Urbanism as the experimental models. They are, with no doubt, the part of the history of New Urbanism, yet should not be considered as the whole concept.

New Urbanism, according to Ellis (2002) is also accused of *ignorance to current social and economic situation* as the main idea of its principles is the human interaction in physical urban spaces. This idea is fortified by the claim that urban spaces can create communities and can enhance community spirit. The opposition argues (Lucka, 2018) that a physical space for social interactions is not needed

anymore. The physical contact is not so important nowadays due to the new technologies, thus communities are created easier because of easily accessible possibilities for transportation and communication. Privacy is more important than community and rationality than authenticity for a contemporary human, thus, physical communities and urban places are not relevant anymore.

The empirical critique covers doubts about the benefits of New Urbanism in reduction of social exclusion, car usage and infrastructure costs, as well as when solving environmental and affordable-housing problems. Streets and public spaces in neighbourhoods, designed using the principles of New Urbanism, are well adapted to people, yet only the people living there are using them, thus, finally they become the gated communities of elite, such as Cayala neighbourhood in Guatemala (Butler, 2013; Adventures Guatemala, 2017), which is a beautiful and safe neighbourhood inside the gates, but is not letting anyone in from the outside. Another good example is Civano neighbourhood in the suburbs of Tucson in Arizona (Buntin, 2019), built as a benchmark of sustainable urbanism. Development of this neighbourhood involved usage of ecological materials, solar-batteries and elaboration of social as well as green infrastructures. However, the settlement itself is situated 17 miles away from the edge of Tucson city. That means that the residents have to travel these long distances for any physical interaction with a city, making living in this neighbourhood not so environmentally-friendly anymore. These are the two fair examples of how the principles of New Urbanism can be implemented into a project and ignored at the same time. Cunning developers often disguise themselves under the name of New Urbanism and develop cheap suburb neighbourhoods of "historical" or "village-like" appearance, but do not implement any principles of New Urbanism at all. Such imitations spoil the name of New Urbanism (Butler, 2013), thus, similar critique should be treated carefully and the conclusions should be made only after the deeper analysis of a particular situation.

To conclude, the aesthetical and the ideological–cultural critique of New Urbanism are not indisputable virtues, supported on objective research, and the disputes in these areas do not seem resolvable, yet still worth considering. New Urbanism is the complex system of urban planning and attention to all of its principles have to be paid, in order to acquire its successful implementation. New Urbanism is not a political system, able to forbid disperse urban expansion or usage of automobiles, as examples, yet it suggests a variety of tools of how urban planning could contribute to the change of habits of city-users.

Nonetheless, the biggest problem of New Urbanism is that its principles are not clearly defined, ideas are not systematised and are often overlapping. This is the main reason why the perception of ideas it suggests often becomes distorted in reality (is understood as a general contemporary urban planning, either controversially, is limited to a very narrow part of its ideology). This situation complicates the development of exact strategy, of how the principles of New Urbanism could be implemented in solving particular urban problems. This is why Integral Urbanism and its clear system of five urban qualities will be invoked in the further section of this thesis.

1.3. Theoretical elements of vital urban structures

Charles Darwin: *"It is not the strongest species that will survive, nor the most intelligent, but the one most responsive to change."*

This section is dedicated for deeper understanding of New Urbanism ideas and their application in the context of revitalisation of Modernist neighbourhoods. This is achieved by systemising the

principles of New Urbanism at first and by detailing them using other theories and practices later. The five-value model, developed in Integral Urbanism is used as a base for the systemisation, while the patterns by Alexander et al. (1977), supplemented with other smaller theories, were used for the elaboration. All patterns by Alexander et al. (1977), that were decided to be the most relative and that could be used as practical tools in urban fabric are mentioned in brackets in the text but the full graphical schemes of their assignments can be found as the **Appendix 1**.

It is important to note that the suggested theoretical system of an urban structure is complex and its elements are often overlapping. However, that should be considered as an advantage as the pattern language by Alexander et al. (1977) suggests that such overlap helps to join a complicated city structure where intersections become even more intense, deep and interesting.

1.3.1. Systemisation of New Urbanism by using Integral Urbanism

Integral Urbanism, same as New Urbanism, emerged as an opposition to previous urban practices, criticize Modernism for its aim to introduce pedantic order in cities and was predominantly oriented to functionality. On the contrary, Integral Urbanism draws an attention back to nature and its messy organic vitality by suggesting five most important urban qualities: *hybridity*, *connectivity*, *porosity*, *authenticity* and *vulnerability*. Hybridity and connectivity are based on points of intensity that are defined as places where different people and activities meet, thus, making these places rich. Porosity protects unity within the elements of a group while the semi-permeable membranes allow information exchange with the outside. Authenticity promotes strengthening of social, cultural and natural contexts. Finally, vulnerability highlights need of attention to ever-changing environment and encourages to evaluate a process no less than the result. (Lang, 2012; Ellin, 2006). These qualities will be taken as an essential framework of the entire literature analysis, but their concepts widened with the ideas from New Urbanism and other supplementing theories (Fig. 5).

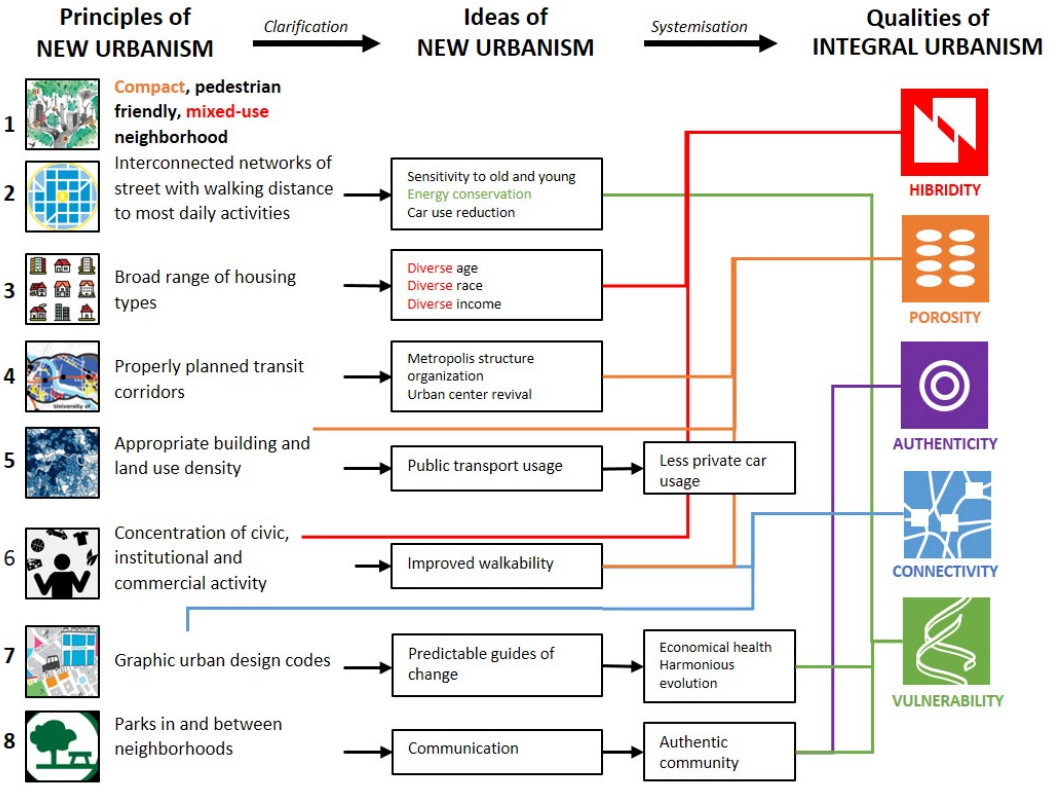


Fig. 5. Scheme of the systemisation of New Urbanism principles

1.3.2. Urban quality: hybridity

First quality, distinguished in Integral Urbanism, is hybridity as it connects different people and activities (Ellin, 2006). Similarly, as the main quality of the city, A. Duany, a representative of New Urbanism, perceives diversity. He proposes that it is diversity that could be the main currency of a city as it is the essential aspect of nature (Steuteville, 2018). It is diversity and variety that enables any organism to survive and to evolve into something better (Costa, D. L. ir Kahn, M. E., 2002). Leccese et al. (1999) states that any just and prosperous society has to be diversified economically, socially and physically, thus the diversity of functions and social groups should be a fundamental goal of any community.

Diversity of functions. Any organism survives only because of continuous metabolic processes, thus, consumption and production are essential principles for its existence, as they proceed continuously and are impossible without each other (Von Bertalanffy, 1968). Therefore a model of a vital city and overall organisation of people life in urban environment should also be based on the cohesion of these principles. Both of these principles will further be elaborated.

Consumption. Modern urbanism induced "mono-functional" society as off-human urban scale gave no other possibility for survival as of becoming a single-field specialist. In contrary to a traditional community, where its members are able to independently support themselves almost without interaction with the outside world, urban world is based on uninterrupted exchange between individuals in order to ensure possibilities for necessary and comfort goods. Therefore, close relationships between separate individuals, recipients and suppliers, should be assured. This could be achieved by developing small shops, coffees, lounges and similar units in nearby environment to the living and working places (Patterns by Alexander et al.: "Individually owned shops", "Street café", "Corner grocery", "Beer hall", "Traveler's inn", "Food stands" (1977)).

Production. Separation of living and working areas, which is essential in Modernist urban planning, is perceived as a flaw in New Urbanism as it does not ensure natural rhythm between life and work, thus should be reorganised (Steuteville, 2018). This position is supported by Alexander et al. (1977) by stating that artificial separation of home and work creates intolerable discrepancy in people private life. The most even possible distribution of working and living spaces throughout the city fabric should be pursued and high concentrations of individual functions should be avoided (Pattern by Alexander et al.: "Scattered work" (1997)). Work should be a natural part of life, rather than the lost, and this could be achieved by creating qualitative living environment, closely connected to other functions of life (Patterns by Alexander et al.: "Work community", "Self-governing workshop and offices" (1977)).

As an addition to New Urbanism ideas of production concept, industry could be brought back to urban fabric as well as it has been a big part of our cities earlier, was reasonably excluded due to pollution later, but with contemporary wisdom and technical abilities can be brought back now. It always has been the strong element and indication of a prosperous city. The development of industrial objects within a city could be beneficial in several aspects: industry itself would have close relations with necessary infrastructure, citizens would be provided with more local job opportunities and city would acquire a self-sufficient urban unit. Industrial facilities in Modernist urban fabric would unequivocally contribute to their diversity and, therefore, their revitalisation (Delvaux, 2016).

Industrial objects could appear as a distinctive either connecting part of the urban fabric, creating value to the surrounding communities (Pattern by Alexander et al.: “Industrial ribbon” (1977)).

Sociological diversity. According to K. Lynch (1984), healthy community has to be homogeneous. Firstly, homogeneous community provides possibility of interaction between people of different social groups, therefore, diverse society promotes equality, mutual understanding and tolerance. In order to ensure this sociological diversification, variation of housing possibilities should be provided within an urban neighbourhood of different price, size and type of ownership (Patterns by Alexander et al.: “Household mix”, “Row houses”, “Housing hill”, “Housing in-between”, “House for a small family”, “House for a couple”, “House for One Person” (1977)) (Leccese et al., 1999). Moreover, design of architecture and urban spaces should be adapted to different demographic groups in order to increase possibility of interaction between resident of different age, gender and special needs (Patterns by Alexander et al.: “Life cycle”, “Old people everywhere”, “Men and women”, “Adventure playground” (1977)). Secondly, diversity induce improvement and growth (Costa and Kahn 2002), while culture and diversity of cultures should be perceived as an inexhaustible source of humanity enrichment (United Nations, 2017). This is why every community should aim to strengthen local cultures and subcultures (Pattern by Alexander et al.: “Mosaic of subcultures” (1977)). To sum up, only a healthy community is able to progress, but the healthiness is achieved only when all individuals feel equal and safe. Social diversity should involve cultural, economic and demographic aspects and all of them could be influenced by urban design and architecture.

1.3.3. Urban quality: porosity

The second quality of a vital city, recognised in Integral Urbanism is porosity. It is described as the structure of grouped elements and semi-permeable membranes, keeping these groups separated, but permitting information exchange between them (Ellen, 2006). This kind of the organisation of elements could be seen in both physical and social structure of a city and is proven why further.

According to Alexander et al. (1977) it would be really hard to find someone who would not like a city and the benefits it provides at all. Yet, as population in cities increases and its territory expands, life close to the downtown becomes too luxurious for the majority, while residence in suburbs has little in common with a real city-life. Poly-centric urban planning, creation of the smaller groups of elements in urban structure, could be a solution for that, as the even distribution of local centres could ensure that all citizens would reside in a comfortable distance from the local urban core (Pattern by Alexander et al.: “Magic of the city” (1977)). Moreover, the voice of a single person becomes insignificant in a community of a population greater than 10,000, thus, planning of larger homogenous urban units should be avoided. In order to be able to make unified decisions, such large communities should be divided into smaller neighbourhoods of 500 to 1,500 residents (Patterns by Alexander et al.: “Community of 7000”, “Identifiable neighbourhood”, “House cluster” (1977)).

Furthermore, the diversification should not be seen as homogeneity: if separate elements become too similar in a large structure, they become a texture (Maki, 1964), while if the borders between separate groups becomes become too rigid, the relations between these groups could be lost (Alexander et al., 1977). The size of groups, the permeability of boundaries between these groups and the internal integrity have all be assessed in order to ensure the working structure. (Patterns by Alexander et al.: “Neighbourhood boundary”, “Mosaic of subcultures” (Fig. 6), “Subculture boundary” (1977)).

Fig. 6. Homogeneity, ghettos and mosaic of subcultures by Alexander et al. (1977)

Porosity, together with *hybridity*, could be perceived as the two essential structural qualities in Integral Urbanism (Ellen, 2006). These urban qualities are important, as proved before, but New Urbanism and some other theories suggest a few other possible assets of composition that could be necessary for even better understanding of an urban fabric. These features are *transition*, *density* and *dispersity* and are analysed further.

Transition. The concept of transition came from the SmartCode model, developed based on New Urbanism and the theory of Smart growth. This model is grounded on perception that the specific forms and elements belong to the specific environment, and the *transect* (Fig. 7) provides smooth transition from one ecosystem to another (from rural environment to the urban, in city case). Urban planning, based on transect, prevents separate ecosystems from mono-functionality and provokes natural growth (Duany, Sorlien and Wright, 2012). Looking from a human point of view, it ensures that all of the needs of different social groups are met in the same urban unit (Patterns by Alexander et al.: “Density rings”, “Degrees of publicises” and “Circulation realms” (1977)).

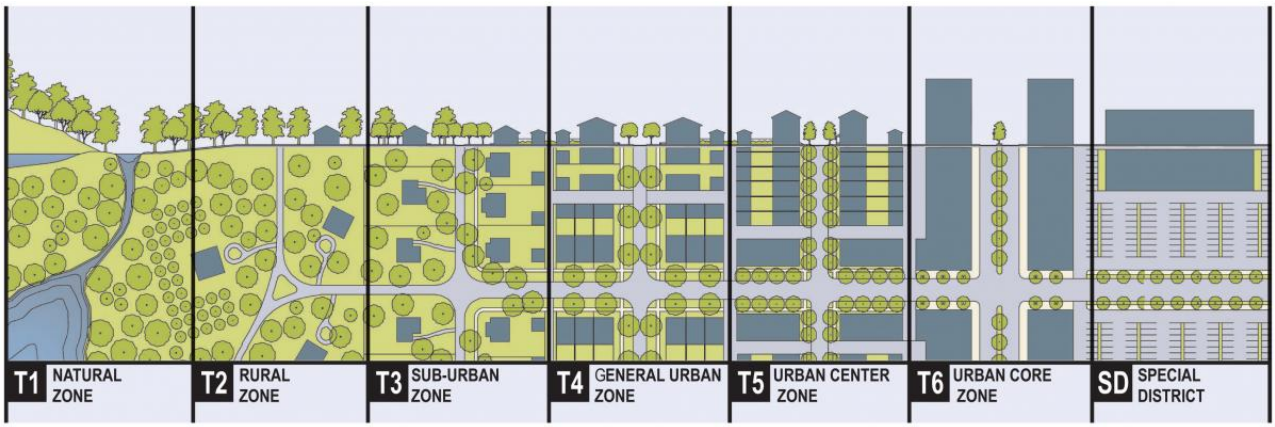


Fig. 7. Transects of the SmartCode by Duany et al. (2012)

Density. K. A. Lynch (1960) wrote: “As the density of the image builds up, it begins to take on the characteristics of a total field, in which interaction is possible in any direction and at any distance”. Thus, it is density that helps us to understand separate elements as a wholeness and could be perceived as an essential asset, helping to better define both *porosity* and *transition*, as elements that are close to each other are perceived as the part of a group, while those that are more segregated are not. The densification of inner city is perceived as one of the essential tools to prevent urban expansion to peripheral areas by New Urbanism (Steuteville, 2018). Moreover, L. Mumford (Leccese et al., 1999) insists that if urban territory is densely surrounded with the objects of daily needs, that are accessible within 5-minutes of walking distance, residents would rather choose walking as their main mean of transportation more often. All in all, density could be perceived as the essential measure of any structure and is able to influence the expression of that structure and the behaviour of its users, while

the reduction of space by the densification, according to Stahle (2006) and his Sociotope theory, can mean the higher value of that space.

Dispersity. Accordingly to S. Sorlien (Leccese et al., 1999), people often misunderstand what diversity really is, believing that "house, café, house, café" will be standing along the diversified street. However, diversity could better be perceived as the proper scattering of elements: the mosaic or the overlay of semi-transparent veils (Alexander et al., 1977). From this point of view, porosity (as the mosaic of elements), transition (as the semi-transparency) and density (as the inner homogeneity of a group) could be considered as essential components, describing a rich urban structure, while dispersity could become a concept, unifying all of them.

1.3.4. Urban quality: authenticity

The third urban quality of Integral Urbanism is authenticity that could be understood as the theoretical asset, ensuring social, cultural and environmental strength of a place. According to M. F. Piazzoni (2018), the word authenticity creates association with identity, truthfulness and originality, thus, could be defined as the exclusiveness of elements or relations between them, when comparing them to other analogues. As the theoretical concept seems well-defined w already, the physical elements that could be most significant in urban authenticity, will be tried to be determined further. According to Alexander et al. (1977), accidental urban development spoil the identity of urban community, while planned structure nurtures it. Three main architectural-urban elements could be distinguished that foster the identity of place and community: a centre (as the main gravitation point), public spaces (as smaller spaces for social interaction) and individual elements (as the characteristic components or their wholeness).

A centre. Every urban community requires a centre – a clear up-scaled urban element of some kind. However, any urban neighbourhood should maintain its inner integrity, therefore, large dividing elements ought to be avoided. Instead, these up-scaled centres could be developed not as nucleus-elements but rather as boundaries, forming neighbourhoods themselves. Moreover, they could be developed on the edge of a neighbourhood, closest to the downtown, as people tend to move towards the city centre, and should be of adequate size, which could be evaluated based on the amount of residents of the neighbourhood (Patterns by Alexander et al.: "Eccentric nucleus" (Fig. 8) and "Pedestrian density" (1977)). This kind of local urban centre could contain self-governing authorities, the major transport nodes and commercial objects that were discussed in the subsection of hybridity. The main building of a local centre should be well planned as well, as it could be able to provide essential identification of a local structure (Patterns by Alexander et al.: "Main building", "Local town hall", "Necklace of community Projects", "Shopping street" and "Bus stop" (1977)).

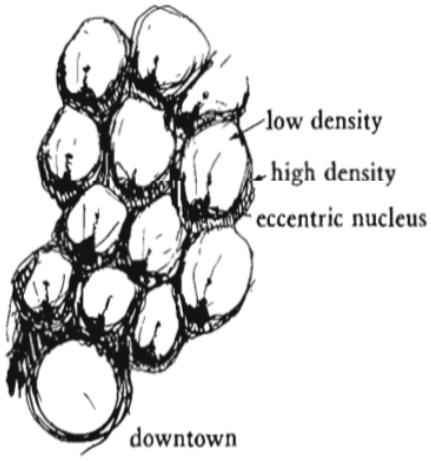


Fig. 8. Eccentric nucleus by Alexander et al. (1977)

Public spaces. No social group (family, work, ethnographic, religious or other) could survive without constant communication within that group. To provide greater possibilities for this inner communication, every social group could be provided with a shared urban space (Patterns by

Alexander et al.: “Common areas at the heart”, “Activity nodes”, “Promenade”, “Pedestrian street” (1977)). In order to use these shared urban spaces most authentically, they should be analysed individually (Patterns by Alexander et al.: “Positive outdoor space”, “Hierarchy of open space” (1977)) and the exact places for urban developments should be chosen with the collaboration of the target user-group. Sociotope mapping (Stahle, 2006, n. d.), based on interviews and discussions with local community about existent urban spaces in their environment and social qualities they possess could be used as one of the methods. Social values and the physical appearance of public spaces could be diversified in such a way, that they meet the needs of each individual, as well as the social group they are targeted to. Small open squares, accompanied with more private pocket-places on their edges, green urban spaces with blue elements and with inventory for different activities (sport, port and relax) could be spread into the structure of any urban community (Patterns by Alexander et al.: “Small public squares”, “Activity pockets”, “Accessible green”, “Pools and streams”, “Still water” and “Local sports” (1977)). New buildings (transport infrastructure as well) should be built only in the places of the least value, while the most valuable spaces should be remained to open urban spaces (Patterns by Alexander et al.: “Site repair”, “Nine percent parking”, “Small parking lots” and “Shielded parking” (1977)).

Individual elements, contributing to the place identity could be divided into two groups: the landmarks of edge or centre and the elements of local spirit. *Boundaries*, as was discussed previously, is the necessary structural aspect of any element, therefore, they could be the essential features, providing identity to an element, thus, their strengthening should be encouraged. This could be done by marking the access points to urban communities or public spaces with symbolic gates. Another important aspect to strengthen identity of an urban space is to mark its centre, similarly as it is important to develop an identifiable local urban centre that was discussed before. People are more likely to enter an urban space if its centre is highlighted. A tower, a fountain, a piece of art or a tree could become such a landmark, to mention a few examples. (Patterns by Alexander et al.: “Main gateway”, “Something roughly in the middle” and “High places” (1977)). However, equally important is to provide community with urban places, where members of that community could feel free and could be able to express, calm or relax themselves. Items or ornaments, belonging to the place or the social group, could be used as elements to enrich identity of local environment. (Patterns by Alexander et al.: “Carnival”, “Dancing in the street”, “Sacred sites”, “Sleeping in public”, “Things from your life” and “Ornament” (1977)).

1.3.5. Urban quality: connectivity

Fourth urban quality, emphasized in Integral Urbanism, is connectivity and it coincides well with the opinion of a representative of New Urbanism W. Marshal (Steuteville, 2018): “If you get the architecture right and the streets wrong, your place doesn’t work. On the other hand, if you get the architecture wrong and the streets right, your place still has a pretty good shot of succeeding.”

The connectivity aspect is especially important to this thesis as it is the basis of *urban networks*, overall. As Gabriel Dupuy (2000), the author of theory of urban networks states, city has to be perceived as a system or a network with three inherent elements: *nodes, links* and *goals*. This perception is crucial to ensure the connectivity in a city and to make these connections meaningful (Dupuy, 2000), thus, will be analysed with a respective depth further.

The concept of urban networks is very broad, suggesting the organisation of both physical and intangible aspects of a city. They can connect humans with places or the presence with the past, they can be visible or not (Hagens, 2005), thus, in general, the perception of a city through the viewpoint of networks provides urban planning with complexity. However, these three theoretical elements of urban networks have eventually to be applied into a physical space, when considering urban planning, thus, all urban elements (buildings, open urban places, urban neighbourhoods, etc.) are considered as nodes, emptiness in-between these urban elements are seen as possibilities to create links between these nodes, while the main purpose of all of the nodes and links is to become the goals of urban networks. It will be better explained further in this subsection.

Links. Since the links of an urban network were defined as a void in-between the urban elements before, this void should be perceived as open urban spaces in a broad sense overall. They should include green and hard-covered, areal (square as an e.g.) and linear (street as an e.g.) public spaces, while involving purposes of logistics, recreation, education and commerce. (Patterns by Alexander et al.: "Local transport area", "Web of public transportation", "Web of shopping", "Network of learning" and "City country fingers" (1977)).

Nodes. According to K. Lynch (1960), nodes are the strategic points that people enter. They can be perceived either as the intersections of links, either as the concentration of specific elements (tangible or not). The concept of transit oriented development (TOD) (Carlton, 2009), developed from the concept of New Urbanism, could be a relevant practical example, of how the theory of urban networks could be applied in urban planning by drawing a main attention to nodes.

The main goal of TOD is to deal with urban problems that occur because of a massive car usage. TOD seeks to decrease traffic-jams, to solve parking issues and to reduce air pollution. This is mainly done by intensifying the main local node of public transport and motivating residents to choose living close to that node. As a result, the complex application of TOD model (Fig. 9) helps to increase the density of urban neighbourhoods around the nodes of transit, to diversify land usage and to provide new work possibilities in the affected area. Transit and land usage are directly proportional to each other, as the densification of an urban neighbourhood enhance the effectiveness of transit system usage, and the effective transit system encourages land usage even more (Carlton, 2009). The most essential condition of TOD is effective corridors of public transport, ensuring fast and comfortable transit (Sahu, 2017). TOD is a strong and proven tool of urban planning, but the development of a transit network as a whole is essential to achieve the expected results. (Pattern by Alexander et al.: "Interchange" (1977)).

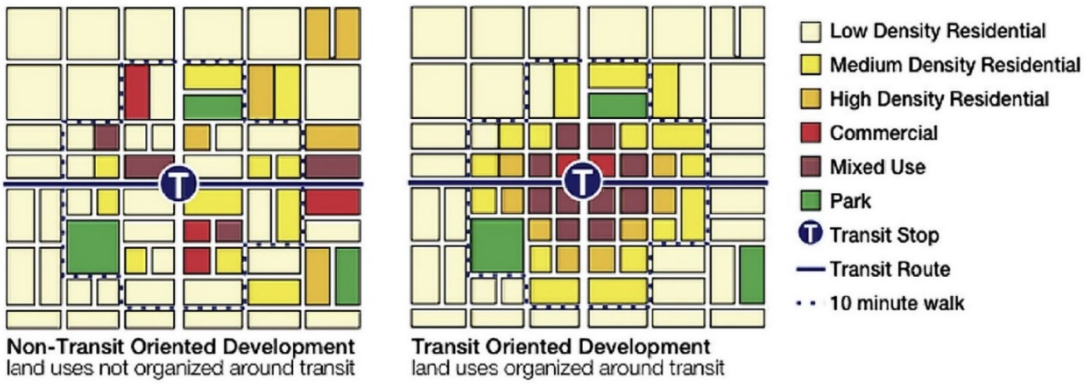


Fig. 9. Scheme of the land usage in a territory with and without TOD by Barnett (2013)

Furthermore, the most visible network of any city is a network of streets. Representatives of New Urbanism suggest that this network could be perceived as the physical system of links for intangible goals, thus, maximum flow should be ensured (Steuteville, 2018; Schaick and Klassen, 2008). This should be created by avoiding the dendroid structure of a networks of streets or paths, as such structure divides urban fabric. On the contrary, the development of a structure of many intersections fosters its unity.

Goals. New Urbanism advocates human oriented urban planning, thus, safe and pleasant environment, as well as encouragement of pedestrian movement, should be perceived as its fundamentals. According to J. Speck (2013), walking has to be useful, comfortable, interesting and safe in order to be chosen by people as a main mean of transportation. For this reason, the distances between objects of daily necessities has to be short (up to 5 minutes), while the design of streets and paths have to be people oriented. Pedestrian paths should be planned not as a mechanical addition to streets, but rather as a separate network, particularly comfortable for pedestrian movement. In the intersection places with streets, pedestrians should feel their priority over cars and this could be ensured with usage of street design tools, such as road narrowing, pedestrian islets and elevated pedestrian crossings. (Patterns by Alexander et al.: “Paths and goals”, “Looped local roads”, “Network of paths and cars”, “Road crossing”, “Raised walk”, “Path shape” and “Short passages” (1977)).

Similar conditions should be developed for bicycles and other non-polluting individual means of transportation that would expand the distance of the comfortable sustainable movement of residents. Moreover, the development of safe network, oriented to children movement, could foster the individuality and the self-dependency of these children. (Patterns by Alexander et al.: “Bike paths and racks”, and “Children in the city” (1977)).

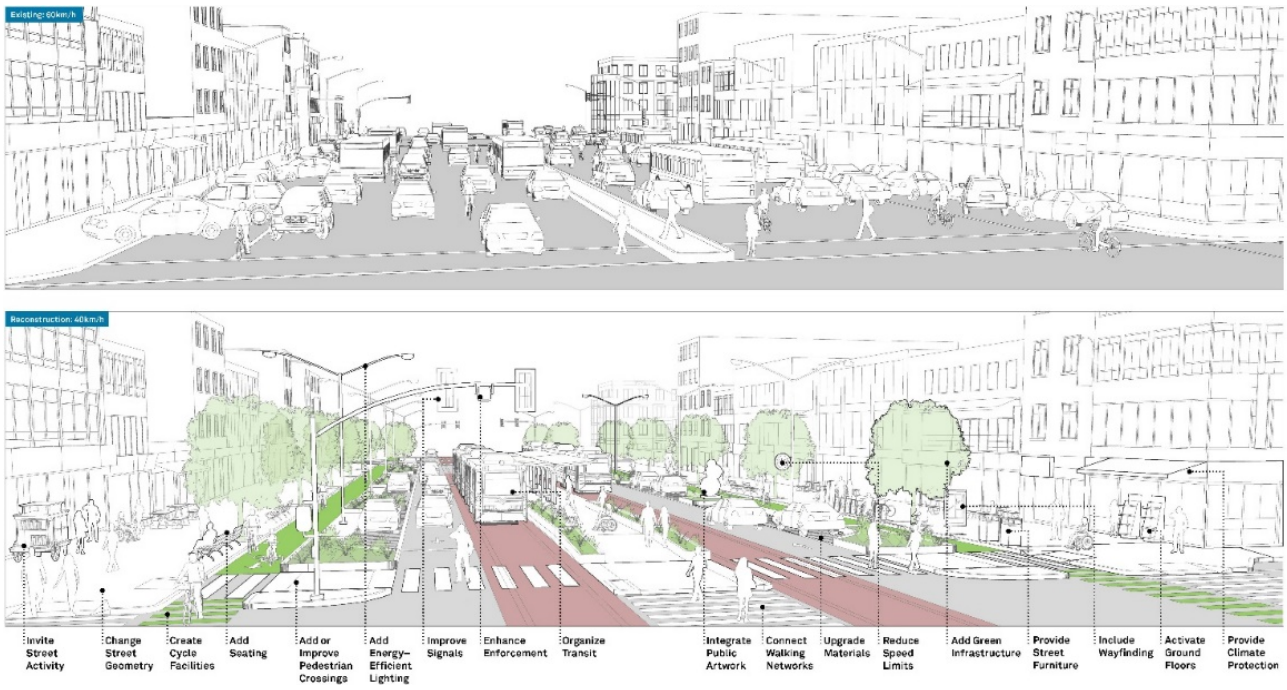


Fig. 10. A street, transformed to a public space by NACTO (2016)

Finally, when residents need to travel somewhere further in a city, they should choose public transport. Only the convenient and effective system of public transport could be able to attract residents to choose it over cars, thus, the duration and the quality of public transition should exceed

advantages that individual car provides, and the nodes of public transport should provide the maximum concentration of intersections. (Patterns by Alexander et al.: “Path shape”, “Short passages” (1977)).

To conclude, according to NACTO (2016), streets should start to be perceived not only as the corridors of movement, but rather as the most important public spaces (Fig. 10), as they stretch between separate urban units, touch their edges on the way, and are capable of becoming either segregating or connecting elements. Streets should be perceived as dynamic ever-changing spaces, constantly adapting to prevailing conditions.

1.3.6. Urban quality: vulnerability

The last urban quality, suggested by Integral Urbanism, is vulnerability and it could be perceived as the ability to notice and evaluate changes of urban environment (Ellin, 2006). Based on further literature analysis, vulnerability could be divided into the sensitivity to environment and its protection (*sustainability*), and the creation of self-monitoring urban organism through social *communication*. Both qualities of sustainability and communication are strongly promoted in New Urbanism, on the other hand, with the respect to their significance, are not elaborated deeply in this thesis as both could be analysed as the completely individual topics, duo to their broadness, yet they would not be completely relevant to the main topic of this thesis, as the main focus here is maintained to spatial urban solutions.

Sustainability. Robert Davis: “Sustainability […] means planning, building, and acting if tomorrow will in fact come, as if we cared about our grandchildren enough to care about the world we leave them” (Leccese et al., 1999). New Urbanisms insists that natural environment has to be protected, as natural resources are finite. Usage of land, air and water has to be smart, abstemious and sustainable. Green energy, means of transportation and usage of local natural materials have to be become the basis of any urban development. (Patterns by Alexander et al.: “Agricultural valleys“, “Access to water”, “Good materials” (1977))

Communication between different stakeholders could be perceived as the second element of sustainability. New Urbanism emphasizes the promotion of active community and its involvement into the processes of environment planning: “They [New Urbanists] form identifiable areas that encourage citizens to take responsibility for their maintenance and evolution.” (Davis R., 2002). According to D. Dixon, New Urbanism is an incredibly powerful tool, helping to gather communities for conversation and for search of the best solutions (Steuteville, 2018). B. Lennertz adds that local residents, as well as the specialists of different fields, all have to be involved to these processes, to ensure complexity of the solutions (Steuteville, 2018). There is a variety of possible forms for communication between different stakeholders, such as discussions, workshops or creation of temporary projects, and the most appealing should be chosen in every particular situation.

Tactical Urbanism is an urban development movement, usually seeking to renew or improve public spaces, using simple temporary means. This kind of application of a propositional design in a real environment works as a testing tool before permanent changes (introduction of new bicycle lanes or pedestrian crossings, as e.g.) (Fig. 11). According to A. Garcia and M. Lydon, these temporary means of Tactical Urbanism could be used as the temporary sketches of urban projects in a real space (Steuteville, 2018). Tactical Urbanism is also a good tool, as it is able to involve local community to

any phase of development: planning, implementation and conclusion drawing, thus, could be particularly engaging.

When going deeper to the specific situation of Modernist urban districts, Johan de Wachter (2016a) suggests the scheme of how to induce never-ending evolvement of an urban neighbourhood. Three main stakeholders appear there (*residents*, *developers* and *government*) and the fluent communication between them is essential (Fig. 12) and is better described further.

Fig. 11. A street before and after application of Tactical Urbanism (Steuteville, 2018)

Firstly, government should provide better possibilities for new urban developments in Modernist urban neighbourhoods, as the current situation of ineffective land usage and its under-densification should be perceived as an opportunity to improve the quality of these neighbourhoods (Fig. 13). The quality could be improved by developing new buildings and open urban spaces of diverse functions (Wachter, 2016a). It would be worth to reconsider the present legislation of urban planning and to re-evaluate, if all obligations (e.g. requirement to keep the three meter distance to the border of a plot from the edge of a building) are beneficial in all cases. It is possible that some exceptions could appear. Moreover, some kind of subsidies could be provided for the urban developments, seeking to revitalise these neighbourhoods and to invoke positive inner growth, similarly as they are provided to the technical renovation of apartment-buildings that was discussed in the first section of the theoretical research. If government would provide these possibilities for urban development, it would be possible to expect that Modernist urban neighbourhoods could become attractive to urban developers, therefore, they would bring their investments back to the inner city.

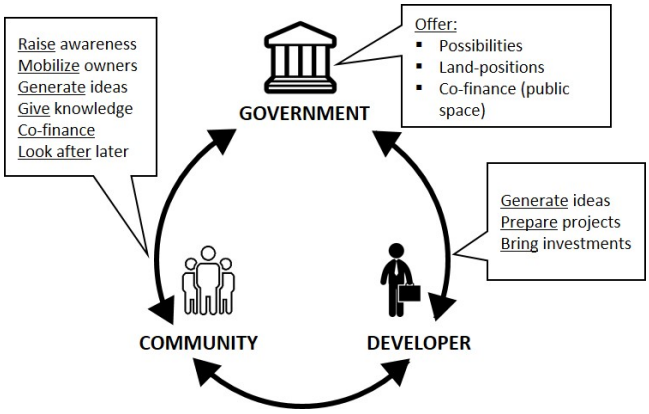


Fig. 12. Scheme of communication between stakeholders for smooth urban development, based on Wachter (2016a)

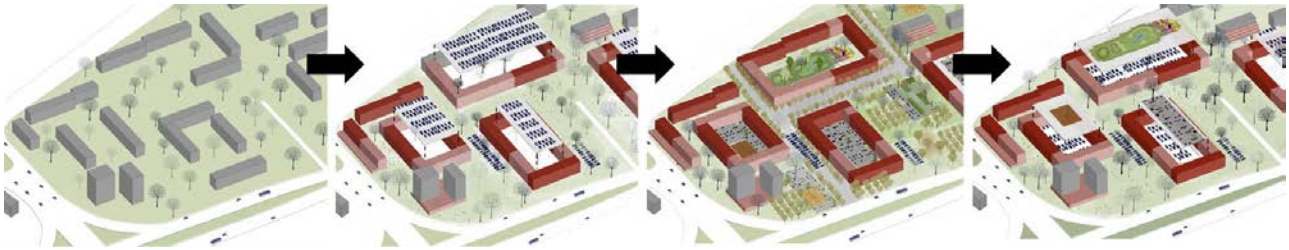


Fig. 13. Revitalization of Modernist urban neighbourhood by Wachter (2016b)

Further, according to Panacevic (2016a), no project would have a possibility to survive, unless it is appreciated by local community and if nobody takes care of its maintenance after the realisation. The

explanation of selected solutions and enablement to act independently are the key reason why community involvement into the processes of urban planning is so important.

To conclude, government should create the attractive conditions for urban developers to develop and for community to participate in urban planning and realisation. The initiation of these processes could provide Modernist urban neighbourhoods with ability to self-monitor and evolve further.

1.4. Case studies of urban revitalisation

Seven projects of different scales and specifics were chosen to be analysed as case studies to find the wide variety of tools that could be used for urban revitalisation. Only the summarised findings (Fig. 14) are presented in this section, but the full analysis can be found as the **Appendix 2**.

The first two cases, Bijlmermeer in Amsterdam (Netherlands) (Klundert, 2014) and Sudstadt in Leinefelde-Worbis (Germany) (ZukunftsWerkStadt, 2008; World Habitat Awards, n. d.), are the examples of the revitalisation of large Modernist districts, while third one, Vastra Hamnen in Malme (Finland) (Neal, 2003; Baltic Urban Lab, n. d.; Austin, 2013), is a brown territory conversion to a residential neighbourhood. All three of these cases are urban development projects, possessing New Urbanism features and presenting the large toolbox of urban development means, which is able to reveal, how large city territories could be revived and could become attractive to citizens. These projects emphasize the importance of *complex urban planning*: starting from the (re)creation of the *networks* of hard and soft infrastructures, due to a better connectivity and multi-functionality; the development of interesting and useful *individual objects*, such as a strong local centre or a specific object, like football stadium or cinema centre, due to a better self-centrality and recognition in a city context; and the reorganisation of an urban *aggregate*, housing and open urban spaces, due to a more diverse urban composition overall.

All of the above presented cases were highlighting the importance of urban networks, with the separate focus on well-developed open urban spaces, thus, the project of Sollentuna city in Sweden, representing application of Sociotope mapping method (Spacescape, 2014), was chosen as the fourth case study. Sociotope mapping method helps to perceive *the network of open urban spaces* and focuses on urban life improvements, by identifying their physical spaces and the social values they possess. Moreover, the acquired information, together with other urban analyses, can be used to understand why particular places are liked by residents, while others are ignored, or which urban territories lack open urban places of particular social values.

The fifth and the sixth case studies are the revitalisations of smaller scale objects: a single street and an apartment-building. The revitalisation of Traugutta Street in Lodze (Poland) (Pancewicz, 2016; Niewiadomski, 2015) represents the idea of a street as the most important public space and suggests the concept of a “shared” street, emphasizing importance to attract all possible different users to these linear urban spaces and to encourage them to stay there, not only to transit through. The renovation of the apartment-building building in Rimavska Sobota (Slovakia) (Plus Jeden Den, 2016; GutGut, n. d.), illustrates how a typical Soviet house could be reorganised in such a way that it becomes the landmark of a place, providing diverse qualitative residential options.

The cases of Bijlmermeer, Sudstadt and Vastra Hamnen, despite their urban scale, together with Rimavska Sobota, address the problem of Modernist apartment-buildings. They insist that these buildings should be renovated together with their surroundings. First of all, smaller neighbourhoods

should be formed and different privacy levels introduced, as it could make the usage of land more effective, while contributing to developing more authentic local identity and responsible community.

The last case study is the experimental project of Metahub Delta in Brussels (Belgium) (Central, 2016; Dudal, 2016b). It represents how a single object could become the joining element of surrounding local territory, while at the same time possessing the scale and function of metropolis. This could be achieved by combining the functions for different users (local and global), ensuring their proper scale (larger for metropolis use, but smaller for residential), and synergy between them (implementation of well-developed public spaces, for e.g.).

The importance of smooth communication between developers, government and community was emphasized in all of the presented cases as revitalisation of existent urban structures requires sensitive, yet complex interventions. The involvement of community to all processes of re-development is crucial for deeper understanding of relevant problems, better solutions, further support and appreciation of the project.

To sum up, all the presented case studies prove that in order to ensure the real revitalisation of urban elements, attracting new users (residents, business, visitors, etc.), not forcing them out, the complex urban re-development strategies should be applied. They should cover the urban solutions of housing and urban open spaces, together with social and economic aspects. Residential urban structure could be divided into three main components of different specifics: *urban networks* (hard and soft infrastructures), *individual objects* (of local and city significance) and *urban aggregate* (residential houses, open urban spaces and streets as public spaces). All three of these components should possess certain values: *connectivity* and *multi-functionality*, *centrality* and *significance*, and *diversity*, respectively. The possession of these urban values could foster the vitality of urban elements themselves, a surrounding area and a city overall.

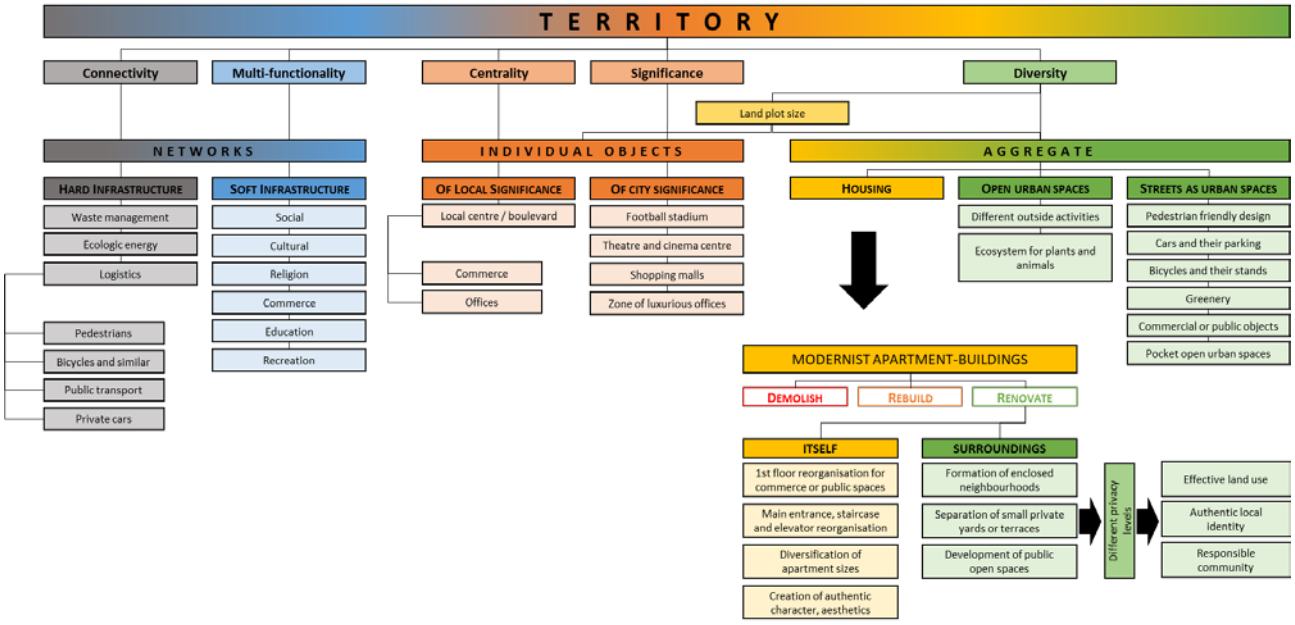


Fig. 14. Scheme of summarised findings of case studies

Template methods are rarely suitable for complicated urban injections, thus, smarter solutions should be pursued. It should involve the introduction of the new combinations of building typologies or urban functions, the strengthening of an urban neighbourhood itself and the provision of added value

to a city overall. Nonetheless, the local community should be involved from the very beginning of urban planning, as it provides the planning perception with a view of an ant-eye, opposing to Modernist planning, based on the top-down approach.

1.5. Hypothetical model of a vital urban neighbourhood

Author of Integral Urbanism, Nan Ellin (2006), notes that she created the five-quality model of Integral Urbanism, based on the four-element concept of a city by K. A. Lynch (1960), where *hybridity* could correspond nodes, *connectivity* – paths, *porosity* – edges, and *authenticity* – landmarks, respectively. Similarly as N. Ellin borrows the concept from K. A. Lynch and expands its perception in the context of an organic city, the urban qualities from Integral Urbanism are borrowed in this thesis and used in an open-manner in order to systemise the concept of New Urbanism and to construct the *hypothetical model of a vital urban neighbourhood*.

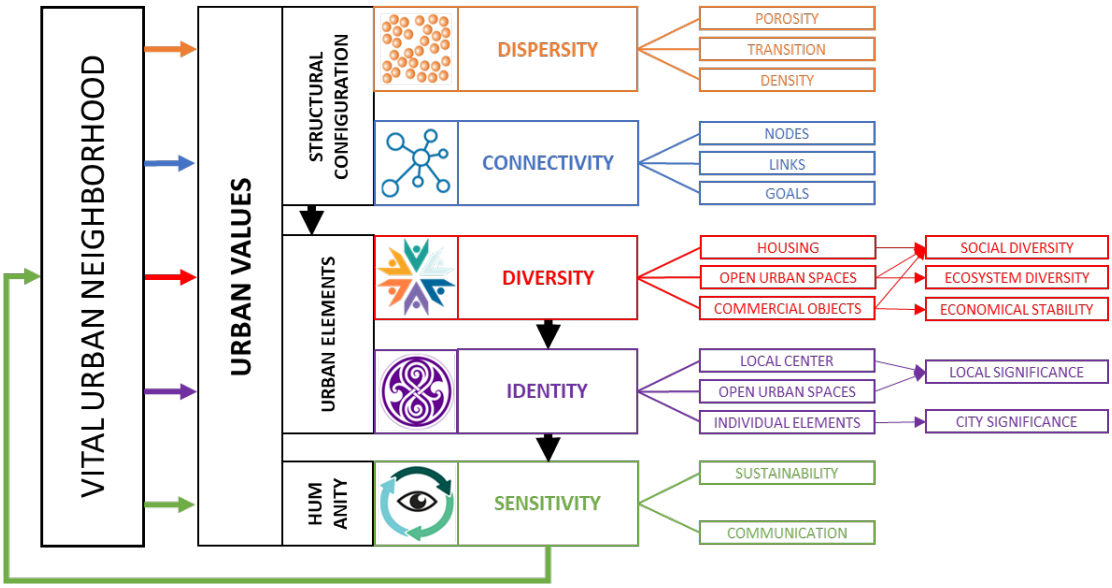


Fig. 15. Hypothetical model of a vital urban neighbourhood

A *vital urban neighbourhood* is perceived as a neighbourhood that is able to ensure the major needs of its residents and possess rich street-life. It works a self-dependent ecosystem, where environment, economic and social aspects intertwine together in such a way that ensures its never-ending evolvement and prosperity. The key task of the hypothetical model is to find the essential aspects of a city that are fundamental for its vitality, thus their strengthening in Modernist urban districts could help to revitalise them.

The developed hypothetical model (Fig. 15) suggests five essential *urban values*: two of a structural configuration (dispersity and connectivity), two of an urban elements (diversity and identity) and the last one of humanity (sensitivity). *Dispersity*, by the analysis of porosity, transitions and density of urban territories, helps to locate fragmented areas. *Connectivity* supplements the perception of structural configuration by implementing urban networking and its main elements (nodes, links and goals). Both of these values of structural configuration contribute to the values of urban elements (diversity and identity). *Diversity* should be pursued in housing, open urban spaces and commercial objects, as it fosters social and nature diversity, and provides economic stability. Diversity, further on, creates *identity*, as the emphasis of local centre and the creation of authentic open urban spaces make urban neighbourhood and its communities identifiable. Moreover, special individual objects

can make a neighbourhood significant even in the city context. Lastly, identity contributes to urban value of humanity (*sensitivity)*, as active local community feels more responsibility for its environment. Sensitivity could be achieved by the involvement of local community into urban planning processes and could ensure sustainability of urban developments, therefore, could work as a catalyst for long-term effect urban prosperity.

1.6. Main findings of the theoretical research

I. **The analysis of international urban planning documents** revealed that the main goal of international urban planning is *sustainability*, fostering relationship between social, economic and environmental aspects. The emphasis is placed on the importance of *poly-centric urban structure* and on priority to *inner-city development.* This should be pursued by *complex urban planning* that could be perceived as a compact and multi-functional city configuration, optimisation of infrastructures, and sensitivity to different social groups and their engagement into urban planning.

II. **The analysis of Lithuanian urban planning documents** confirmed that Lithuania is following the international course of urban planning. The particular focus is drawn to the revitalisation of Modernist urban neighbourhoods, where the lack of strong local centres, sparse urban structure, mono-functionality, morally and physically weary buildings and surroundings, accompanied by underdevelopment of soft and hard infrastructures, are seen as the *main urban problems* and the effective *complex solutions* are expected.

III. **The analysis of Lithuanian legislations** revealed that *the collision between theory and practice* of the legal framework is present, as the main documents of territory planning emphasize *the complex renewal* of urban neighbourhoods, while practical legal acts regulate only *the technical renovation* of individual buildings. Nevertheless, *large open spaces* in-between Modernist apartment-buildings and their *ownership belonging to the State* should be seen as the major potential for the new urban developments and the revitalisation of Modernist neighbourhoods.

IV. **The analysis of New Urbanism concept** confirmed that the main urban values New Urbanism advocates (compactness, comfortability for pedestrians, multi-functionality and community involvement) *coincide well* with the main goals of international and Lithuanian urban planning. On the other hand, the principles themselves are rather broad and face all kinds of *critique* (aesthetic, empirical or cultural–ideological), which usually appears due to a misconception of New Urbanism, while lack of "problem – solution" structure makes the concept *difficult to apply in practice.*

V. **The systemisation of New Urbanism principles and their expansion** helped strengthening the concept of New Urbanism, as the better structure brought clarity to the theoretical base, and the assignation of the particular tools to the issues made its application easier in practice.

VI. **The case studies** confirmed that urban revitalisation methods, possessing features of New Urbanism, are possible to be implemented into urban revitalisation practice, even of the different scales (from individual element, such as a building or a street, to a large urban district), in such a way that the benefits is brought not only to themselves, but to surrounding urban territory as well. They further confirmed, that the intersection of the different urban values could be best achieved by complex urban development and urban networking, and urban implementations could be best maintained later by early involvement of community into urban planning processes.

2. Empirical research of the revitalization of Modernist urban neighbourhoods

Objective of the empirical research is to find a strategy of how Modernist urban neighbourhoods could be revitalized using hypothetical knowledge, acquired in the theoretical research, and implementing practices, focused on urban networking.

In essence, the developed *methodology of the empirical research* could be divided into three stages:

I. *Sociological web survey*: to identify the objects (what?) and the places (where?), which the residents of Modernistic districts are attracted to either oppositely – ignore or even avoid. Sociotope mapping based techniques are used there to acquire information from the residents.
II. *Spatial-social analysis*: to identify the reasons (why?) those objects and places receive such human reactions, based on spatial configuration. Different *Space syntax* analyses (*Segment analysis, Visibility-graph analysis* and *Agent-based analysis*) are performed to get various information, required to check the working hypothesis and to create the predictive model of human behaviour.
III. *Synthesis*: to intersect the information, acquired by *sociological survey* and *spatial-social analysis*, and to find the links between them.

Tasks and structure of the empirical research:

1. To *select an urban territory* in Vilnius city, where the research is going to be performed, by developing criteria for the selection of Modernist urban districts and to decide the scale of the selected territory overall.
2. To *conduct the sociological web survey* of residents of selected urban territory:
   2.1. To analyse *residents movement* inside their living district and the whole city, by uploading the acquired information to ArcGIS.
   2.2. To analyse *the potential* of publicly accessible urban spaces *for further urban development,* using *Sociotope mapping* method and by uploading the acquired information to ArcGIS.
3. To perform *Space syntax analysis* using DepthMapX application:
   3.1. To perform *Segmental analysis of pedestrian paths* in the selected territory to find out, which places are most active and integrated into the territory and which are segregated or avoided in a pedestrians scale.
   3.2. To perform *Segment analysis for streets* in a whole city and to find places in the analysed territory, where the concentration of global and local users movement intersect.
   3.3. To perform *Agent-based analysis*, which is supplementary to *Segment analysis for pedestrian movement*, but is representing pedestrian flow in an open, not restricted by existing paths, space.
   3.4. To perform *Visibility-graph analysis*, representing *social control* intensity, by the means of entrances to buildings, in selected territory and to find places that lack spatially and psychologically based protection.
4. To *coincide the obtained results* by finding relations between spatial urban configurations, (analysed using different *Space syntax* methods) and factual information (acquired from the sociological web survey).
5. To construct *the conceptual model* of the revitalisation of Modernist urban neighbourhoods.
6. To generalise *the main findings* of the empirical research.

2.1. Program of the empirical research and the territory selection

2.1.1. Working hypotheses and program of the research

Seven working hypotheses were raised, based on *the hypothetical model of a vital urban neighbourhood*, constructed in the theoretical research (Fig. 16):

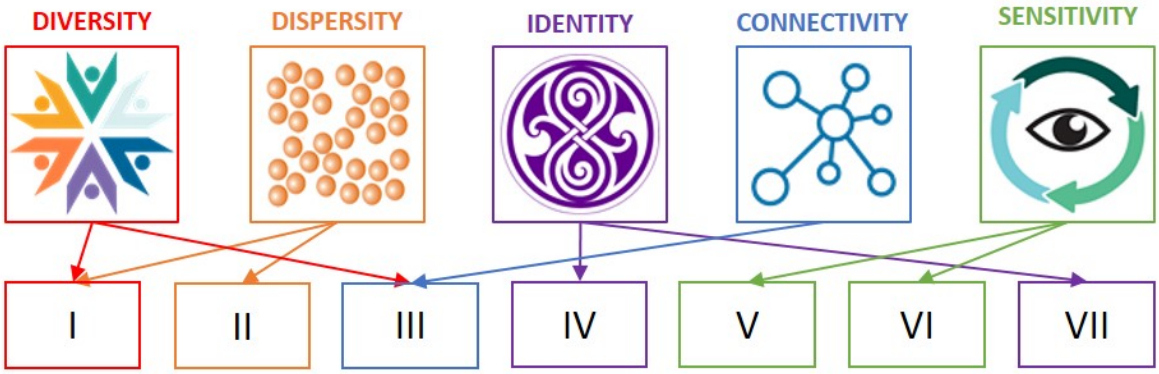


Fig. 16. Scheme of the pretext of working hypotheses

I. Modernistic urban districts possess scattered inner spatial structure and are poorly integrated into a city urban fabric. The detection of fragmented areas could help identifying the potential places for urban development (buildings and open urban spaces).

II. Smooth transition between cityscape and landscape can code the natural growth of a city. As a result, the identification of transition could reveal the areas in urban fabric that have the great potential for urban developments, by identifying optimal density and intensity of a territory.

III. The orientation of the main entrances of buildings in Modernistic districts disrupt urban spaces. Their reorganization could create better interaction between building, residents and environment.

IV. Vibrancy of a place, as the core of authenticity, can be created only by spontaneity, thus, resident's participation in early phases of urban projects is essential in order to enhance the authenticity of urban spaces.

V. Residents' involvement into urban planning processes can help identifying urban spaces with the greatest potential and revealing the flaws of abandoned spaces.

VI. The different publicity levels of urban places enhance the usage of those spaces, therefore, residents' responsibility for them. Moreover, it helps forming communities.

VII. Neighbourhood centre should be developed on the edge of ta neighbourhood to keep uniformity inside it and to help forming its boundary. Furthermore, it should be developed on the edge, which is closest to a downtown, as people are all the time attracted closer to the city centre. (Pattern by Alexander et al. "Eccentric nucleus" (1977))

Further, the research program was developed to test these hypotheses (Fig. 17). In essence, it could be split into two main parts. The first part of the hypotheses could be checked by communication with community through survey, thus, could be defined as a sociological part. The second part of the

hypotheses could be verified by the analysis of spatial configuration, thus, could be defined as a morphological part. Moreover, the first part could be better analysed by mapping (mainly based on Sociotope mapping method and usage of GIS technologies), while the second part could be better understood by applying different Space syntax methods.

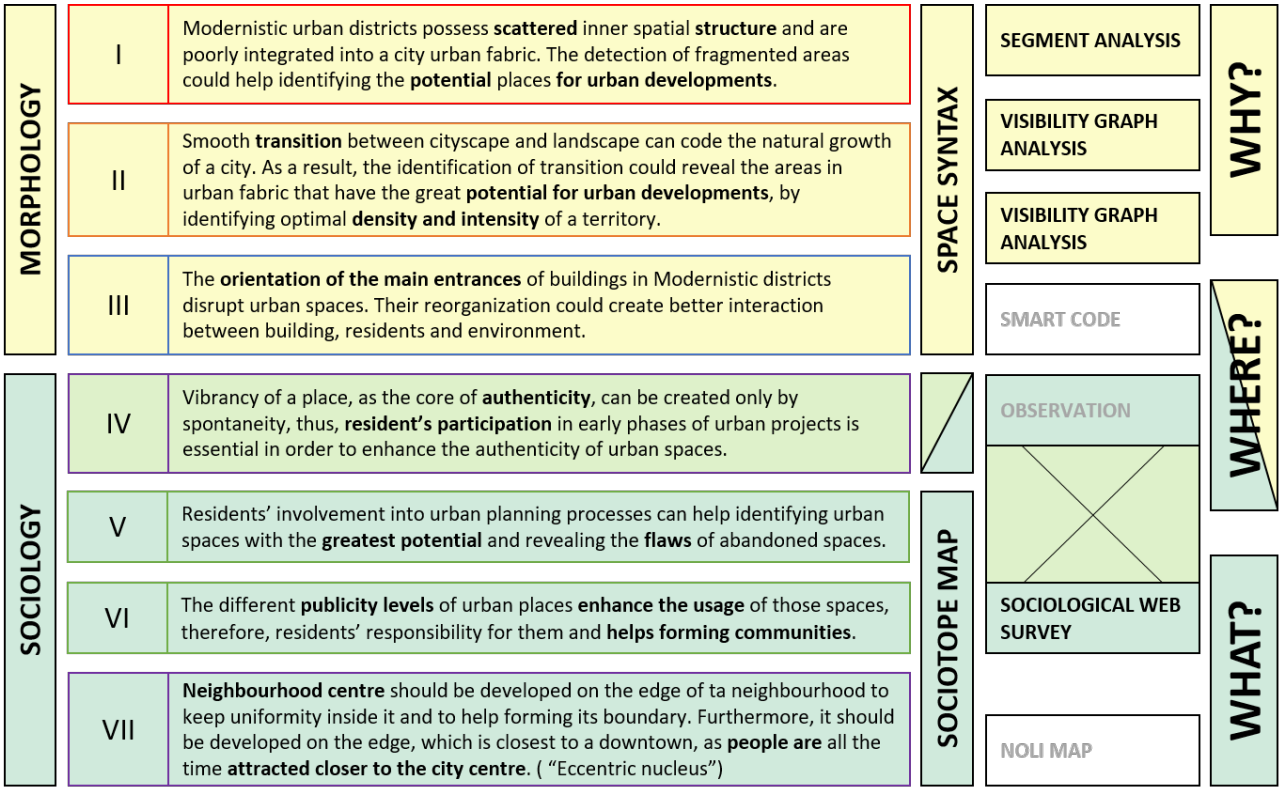


Fig. 17. Scheme of the empirical research program

The method of SmartCode by Duany et al. (2012) could be the answer to some of the morphology hypotheses as well, and would indeed be interesting to try, while the concept of Nolli map could be used as an alternative way to understand the human perception of urban configuration, yet neither of these two methods were applied to this thesis due to the limitation of time. Observation of open urban spaces should have been the part of Sociotope mapping, yet was not performed as well.

2.1.2. Territory selection for the empirical experiment

Before starting any further analysis, the territory for the empirical experiment had to be selected. Vilnius city was chosen from the very beginning, but criteria for the selection of particular districts and the size of a territory overall were considerable. *Diversity* was chosen as a primary objective, as the results of this analysis were expected to help developing *the universal strategy model* of how to revitalize any Modernist neighbourhood. Nonetheless, the concept and the composition of the term of *diversity* itself has changed on the way.

The selection of territory was performed very precisely, step by step adding supplementary criteria, to make the right choices in the very beginning of the empirical research and to acquire the best possible results later. Six criteria were developed during this selection process: *chronology of the development*, *morphotype uniqueness*, *morphotype typicality*, *(inter)national acknowledgement*, *fractal significance* and *integrity of overall experiment territory*, and they helped to choose the territory of four Modernist districts. This territory selection, by its scope and level of details, could

be perceived as a totally separate analysis of Modernist districts in Vilnius, but only the results are presented in the main text and the full process can be found as the **Appendix 3**.

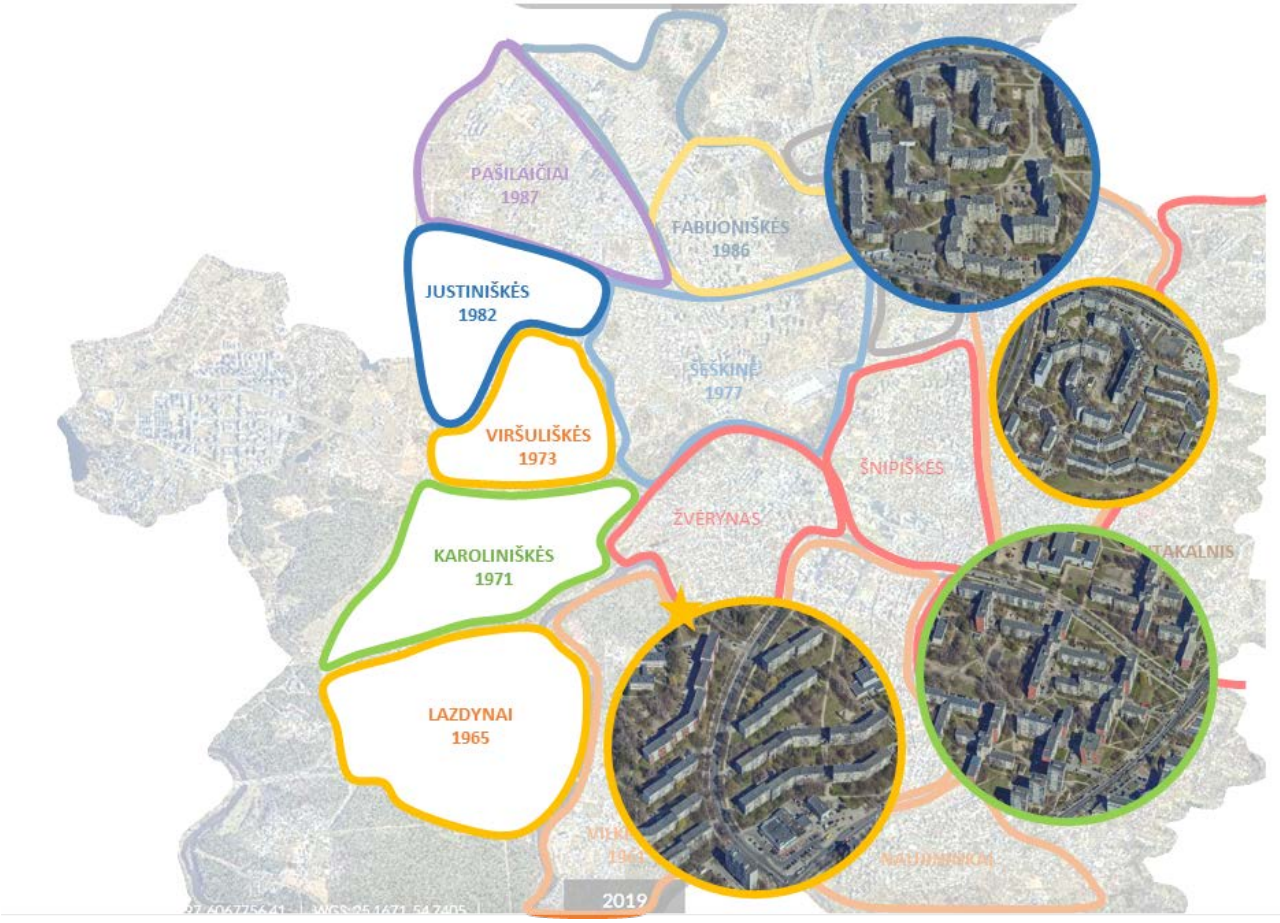


Fig. 18. Selected Modernist districts for the empirical research

In a nutshell, four districts were selected (Fig. 18) as having the priority for possessing such qualities:

- Lazdynai – (inter)national acknowledgement, fractal significance (low in "buildings" (1.455) and high in "streets" (1.546) aspects), chronology (1960s)
- Karoliniškės – morphological uniqueness, fractal significance (high in "buildings" (1.510) and low in "streets" (1.502) aspect), chronology (1970s)
- Justiniškės – morphological typicality, fractal significance (low in both aspects, 1.470 and 1.494 respectively), chronology (1980s)
- Viršuliškės – continuity of the territory for the empirical experiment

2.2. Sociological web survey

Sociological web survey was developed based on the four working hypotheses (Fig. 19). Five groups of 5 to 15 questions were prepared. The first part of the questions contains general information about respondents. The second part is developed to test the hypothesis No VII, which should be considered as the most speculative, as it is trying to check one of the patterns by Alexander et al. (1977), "Eccentric nucleus". The main idea of this pattern is that people all the time move towards the city centre. The third group of the questions is based on *Sociotope mapping* method that was used in Stockholm city (Stockholms Stad, 2002). The questions of the questionnaire are borrowed from the mail and newspaper surveys of that project. The fourth and the fifth groups of the questions are based

on Sociotope mapping method, used in Stockholm case as well, but they are summarized from the survey for children and from the interview guide, and adapted to the working hypotheses (Stockholms Stad, 2002). The complete questionnaire can be found as the **Appendix 4**.

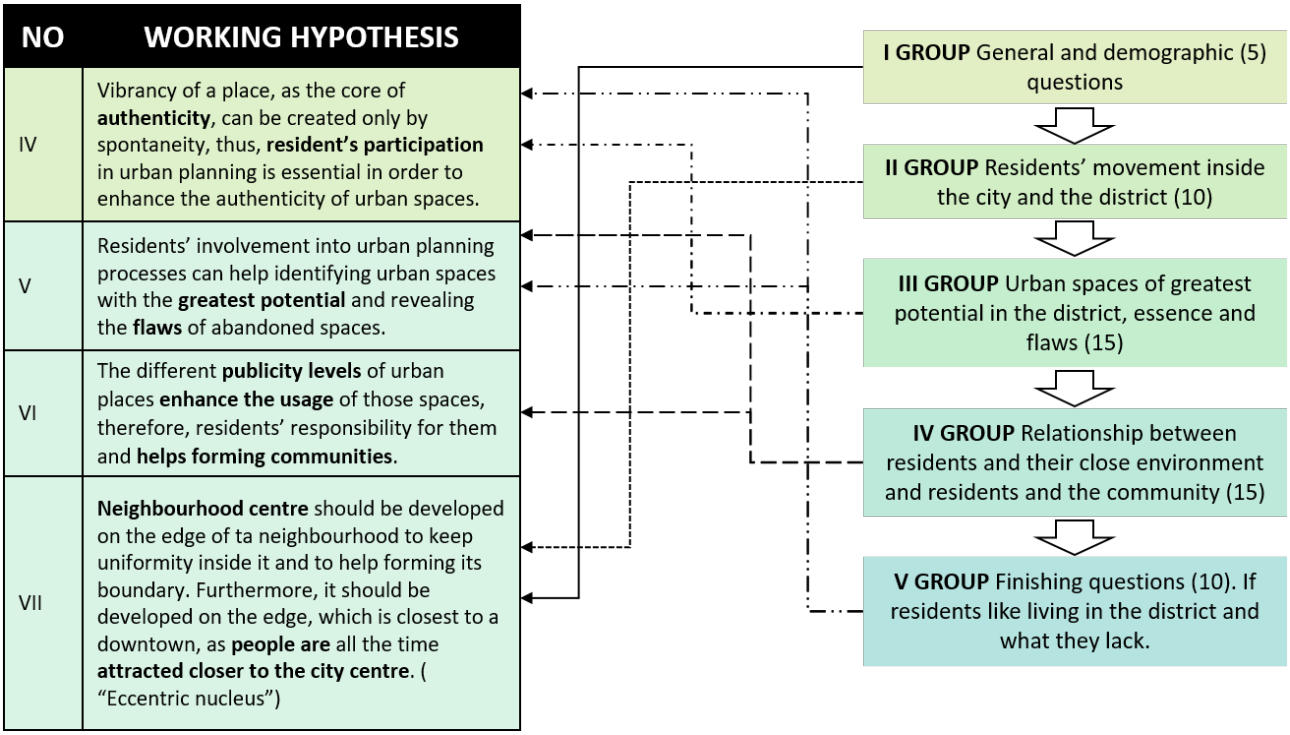


Fig. 19. Scheme of the sociological web survey questionnaire

Separate web surveys were conducted for each of the selected districts (Lazdynai, Karoliniškės, Viršuliškės and Justiniškės) and later analysed. Only the most relevant information and the processed results are presented in the main text, but the general information about the dissemination procedures and the descriptive statistics of respondents can be found in the **Appendix 5**.

2.2.1. Local movement of residents

The most interesting map, based on resident's movement, was generated from the question: "Where do you usually buy your groceries?" Vectors with a starting point at respondents' living place and an ending point at the mentioned groceries store were created. This map (Fig. 20) reveals that all four districts possess different commercial-movement structure and is discussed separately further.

Justiniškės does not have a well-developed local centre. The grocery-stores are scattered all along the main corridor with the strongest concentration in three places "Norfa", "Maxima" and Iki" (Fig. 20: 2, 3 and 1 respectively). Justiniškės is one of the most remote districts from the city-core, but newly constructed western bypass made this district more connected from the west side. It can be noticed, as residents like to shop in the store of "Lidl" that are outside of the district but are nearby the bypass (Fig. 20: 4).

Viršuliškės possess opposite structure. It has a very strong local centre "Maxima" (Fig. 20: 5) and one more important node "Mada" (Fig. 20: 6), which could work as a global centre, due to its location besides the main corridor of entire western Vilnius (Laisvės av.). On the other hand, it does not attract too much attention from locals, if compared with the primarily discussed store. One of the reasons

for that could be that it is segregated from the main districts' body by two large streets (the same Laisvės av. and the main local corridor – Viršuliškių st.).

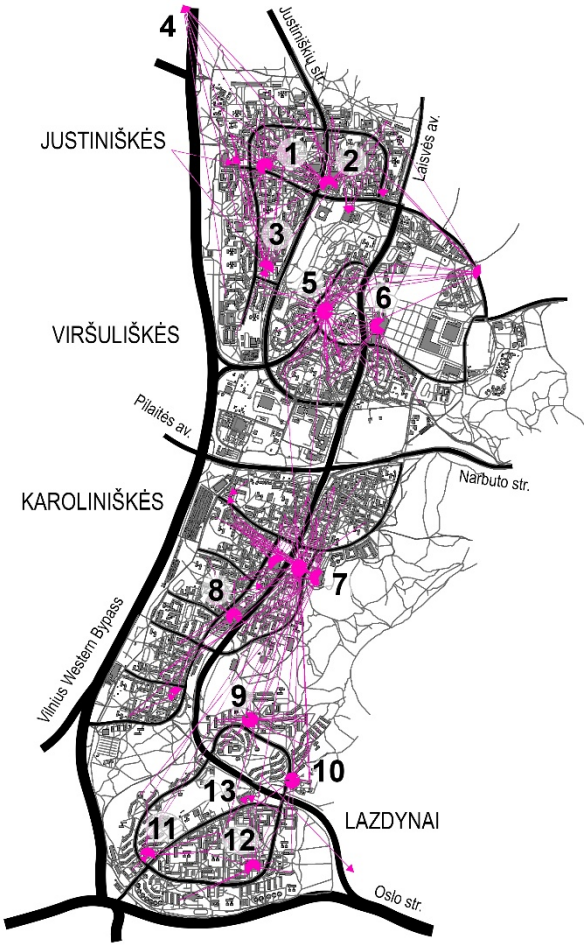


Fig. 20. Map of favourite grocery-stores

Karoliniškės has a very strong cluster of three stores: "Maxima", Norfa" and "Lidl" (Fig. 20: 7), which even resident from the nearby districts like to visit. This location could become a global centre as it is already attractive for both local and global users.

Lazdynai represents under-developed commercial structure overall. There are a few scattered nodes with some attraction (Fig. 20: 9, 10, 11, 12, 13), but respondents usually use them only if they need just a few goods, but decide to go out of the district for any bigger shopping. The commercial cluster in Karoliniškės is the most attractive location for them, but stores in the city centre or anywhere on the way back from work are considered as better options than the local ones.

Another important factor when talking about pedestrian movement is the distance to daily-use locations. It is important to figure out how far resident are willing to walk in a regular basis. The sociological web survey provided distances to two different kinds of locations:

- the favourite local grocery-stores
- the favourite open urban spaces

Analysis of this data revealed that residents are likely to move 200 to 600 meters for daily shopping (Fig. 21) and 5 to 15 minutes (400 to 1.200 meters) to their favourite open urban places (Fig. 22). This statistical information was important to mention in this section, but the real value of the findings will be explained in the subsection of *Space syntax Segment analysis for pedestrian movement*, when used it in practice.

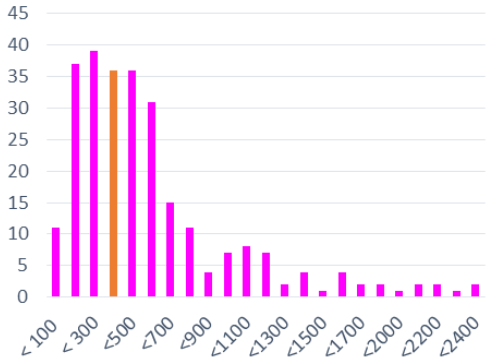


Fig. 21. Chart of the distance to a favourite local grocery-store, in meters

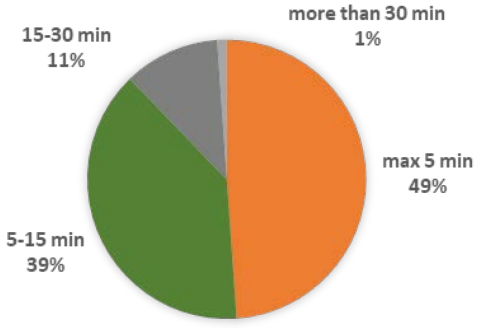


Fig. 22. Chart of the distance to a favourite open urban place, in minutes

2.2.2. Sociotope mapping

The third group of the questions of the sociological web survey was dedicated to Sociotope mapping method. A broad view of this method was explained in the theoretical research, but in essence, it is a bottom-up urban planning approach for open urban space, where residents of the analysed territory are asked to indicate their favourite publicly-accessible place and to answer different kind of questions about that place. Based on those answers and expert evaluation, maps of defined public places and their natural *social values* are generated, giving useful information for later urban development. These urban places, possessing social values are named sociotopes by Stahle (2006).

Types of sociotopes

55 sociotopes were defined based on the residents' answers that could be divided into six main groups: large green areas, zones along Vilnius western bypass, pedestrian bridges over the bypass, pedestrian alleys, streets and school stadiums. In addition, one special sociotope, an old homestead garden, was noted. All these types are discussed further in the text, while the sociotopes, in order by their importance, are presented in the line-chart (Fig. 23).

The most popular sociotopes were the large green areas. They sometimes were not even in the analysed territory but just besides, usually behind the newly developed western bypass. This confirms the statement that people tend to walk longer distances, if their goal is a larger wilderness, and it also reveals that, despite the strongly segregating western bypass, locals still perceive forests and lakes on the other side of that bypass a part of their living territory, as they name them in the answers regardless that were asked to pick a favourite place inside their living district.

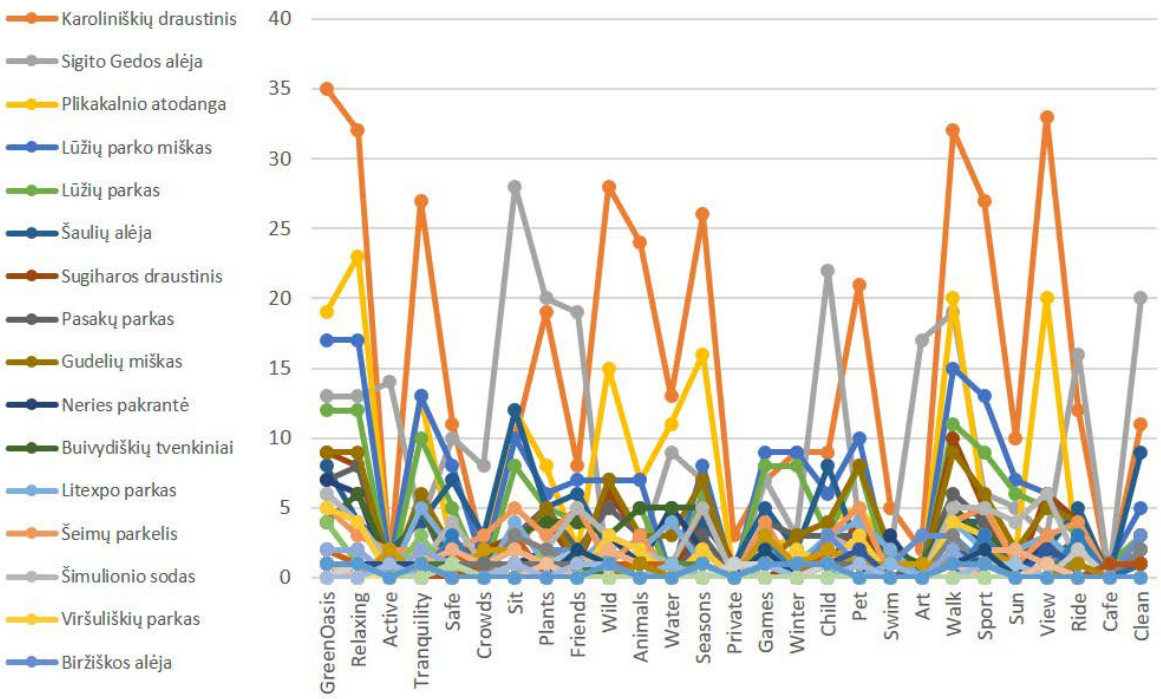


Fig. 23. Line-chart of the social values in the defined sociotopes

Zones along the western bypass and the pedestrian bridges over it were revealed to be important for the residents as sociotopes on their own as well (especially in Justiniškės), confirming once more that the bypass intervened inside the area, which was perceived as a continuous urban territory.

The forth most often chosen group of open urban spaces were pedestrian alleys. They were important components in Modernist urban planning, but often left under-developed or decayed over time. Despite that, they are located inside the neighbourhoods and could be revitalised to become lively pedestrian boulevards. This potential is even confirmed by a few recent qualitative renovations, such as the alley of Sigitas Geda in Justiniškės, as these places, before ignored, started to attract locals straight after their rehabilitation.

Another group of defined sociotopes is streets. This kind of group is not usual for sociotope concept as transport-oriented areas should be excluded, following the regular practice. On the other hand, two important things are worth mentioning. First, residents perceive local street network as a public space itself and this perception coincide with one of the most important conceptions of New Urbanism Second, the residents of the analysed districts tend to spend their free-time in a more elongated manner of movement, rather than in stable position. It would be interesting to find out either this could be the overall conclusion of human behaviour, or the acquired results are influenced by the existing space configuration and quality of analysed districts.

The sixth important type of sociotopes is school stadiums. There were no high concentration of respondents in particular sports ground, but the majority stadiums in the analysed area were mentioned and, if separated into individual map, would be covering it quite evenly.

It is also worth mentioning, that the old apple-garden in Šimulionio st. that is remained from a previously existed homestead, is very popular between the residents. It could be associated with its possessing social values, which Modernist districts lack in general, such as human scale and personality. This kind of small inclusion of home-feeling could contribute amazingly to the authenticity of a particular place, thus, this concept could be used in other developments of urban places.

Social values of sociotopes

Maps, presented in this part of the texts should be comprehended with caution, as the information acquired from the sociological web survey does not have the validation from experts (as it is usual to the method of Sociotope mapping) and lacks some kind of normalization or outlier detection. The intensiveness of a colour represents, for example, the amount of different social values the particular sociotope possess (Fig. 25), but the information could have been acquired only from a single respondent. Such situation is due to a limited data amount and it could be that the overall population is not presented accurately. Nevertheless, the performed analysis could be considered as a pilot version and a couple of the most important trends could have been noticed:

- Information in the map of the intensity of respondents in sociotopes (Fig. 24) often positively correlates with the map of the intensity of different social values in sociotopes (Fig. 25), showing that places, favorited by a lot of respondents, possess a large set of different social values.
- Map of the intensity of different social values (Fig. 25) confirms the concept, discovered in Sollentuna case (Spacescape, 2014) during the theoretical research, that the amount of social values in a sociotope does not positively correlate with the size of that sociotope, as small urban spaces often acquire the same or even larger amount of different social values, because more diverse users approach those places.

Another insight worth mentioning is that the open areas along the western bypass lack qualitative maintenance and are under-developed, if evaluating them as open urban spaces. On the other hand, they are often polluted with metal garages or their remains, if evaluating them as natural green areas. Despite that the bypass is negatively impacting the surrounding area with emission, noise and visual pollution, it grants them quite a large set of social values. The respondents name such values as green-oasis, relaxation, tranquillity, interesting plants, wilderness, wild animals, view and some other there. It would be interesting to find out, if these zones possessed the same social values, and if they had the same popularity before the appearance of the bypass, or if the bypass increased social usage of these zones. In essence, it could be assumed, that such an intensive street has a couple similarities to a river: it works as a barrier (segregating, but also protecting from the outside) and it flows (giving a visual effect and sound, which can be both calming and relaxing).

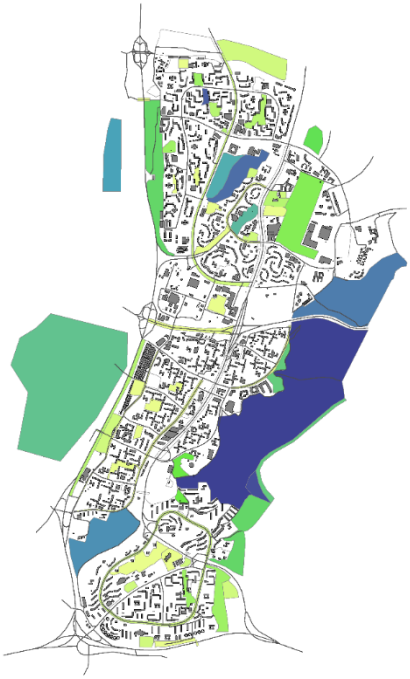


Fig. 24. Map of the intensity of respondents in sociotopes

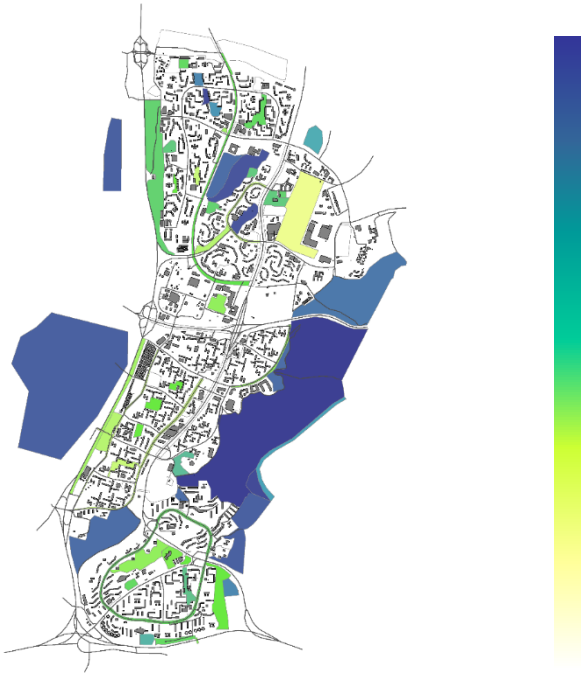


Fig. 25. Map of the intensity of different social values in sociotopes

The column-chart of the frequency of social values (Fig. 26) reveals the combination of two aspects: what social values are the most often in the analysed territory and which social values are the most important for the respondents. *Green-oasis*, *relaxation* and *walk* were the most often chosen social values, while *café*, *privacy*, *swimming* and *art* were the least popular. On the other hand, it is hard to evaluate, which one of those two factors, mentioned before, plays a bigger role in this data-section.

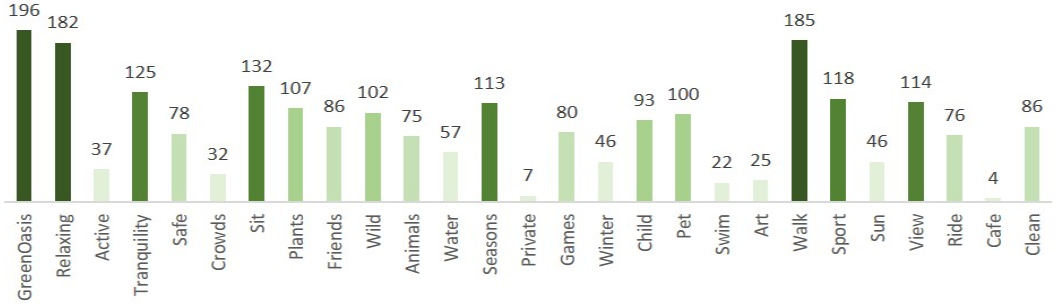


Fig. 26. Column-chart of the frequency of social values

Another data-section is useful to understand, what social values possessing places residents would like to have more in their close environment (Fig. 27). Some of the social values, like *green-oasis*, *relaxation* and *view* overlap with the previous data-section and stay on the top, yet a variety of new social values, like *nice plants*, *water*, *sun* and *café*, come up to the foreground as well. *Wild animals*, *wilderness* and *ride* seem to be less aspirational to the respondents and are probably more imposed by the existent situation than is required naturally.

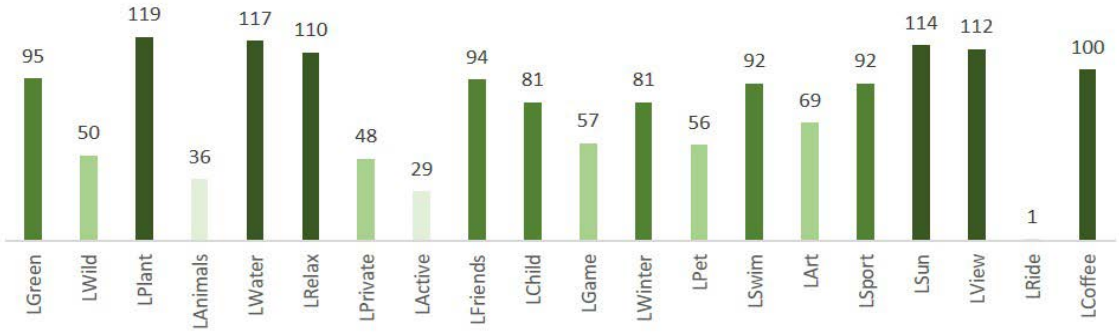


Fig. 27. Column-chart of the frequency of missing social values

A view point can be shifted, if analysing each of the social value independently as well, thus, 27 maps were generated, representing each of the social value individually and can be found in the **Appendix 6**.

Each of these 27 maps of the individual social values could be analysed in a higher detail level, but only the generalised trends are described here:

- *green-oasis* is mostly assigned to forests, forest-like parks, river banks and the areas along the western bypass
- *relaxation* and *walk*, with some exceptions, strongly correlates with each other, and most often appear in forests, parks and pedestrian-alleys
- *wilderness* and *view* are strongest in large forests and some forest-like parks
- *tranquillity* and *safety* are collated with each other as well, and are most intensive in some forests, areas along the bypass and cemeteries
- *place to sit* and *games* mostly appear in pedestrian alleys, stadiums and other smaller urban places
- *meeting friends* is more often in unique, but well integrated small places, such as pedestrian alleys or gardens, either in more active places, such as stadiums
- *sport activities* are popular both in natural areas and in sports-grounds
- *sun* is appreciated in unique places, or places with a nice view
- interestingly, the respondents do not consciously associate fountains with *water*, but places that have them are very attractive to them

Proposed improvements for sociotopes

Respondents were asked to suggest, what improvements could make their favourite open urban place even better and 13 maps were generated for each of the suggested improvement separately. Additional single map was generated for places that are already perfect according to the respondents. All of these 14 maps can be found in the **Appendix 6**.

General trends that were noticed:

- *cleanliness* is mostly demanded in pedestrian-alleys, church territories, local streets, and a little less in parks and forests
- *cafes, nice plants, water* and *art* would be mostly appreciated in small urban places, streets and parks
- acts of *vandalism* and *safety* are harsh in the majority of urban sociotopes and most favourite places, nevertheless, they correlate with *lack of light* and a user number overall
- *reach* and *accessibility* could be improved in some local streets, wilder places, such as areas along the bypass, forest-like parks and sports-grounds of the Press Palace (that occupy a large area, but are almost abandoned)
- *protection from rain* would be appreciated in pedestrian alleys, church territories, pedestrian bridges and local gardens
- *noise* does not look like a big problem in the analysed territory overall
- it would never be enough of *benches*

Avoided places

Further, the respondents were asked to mention the places they avoided the most in their districts. The map was generated from the acquired information (Fig. 28) and the categories of the most avoided places is presented in the bar-chart (Fig. 29).

The most interesting noticed correlation was that places, avoided by the most users, are the same places that were designed as local centres during Modernist planning period, and the same that the respondents most often choose as their favourite grocery-stores nowadays: “Norfa” and its market in Justiniškės, “Maxima” in Viršuliškės, „Saturnas“ in Karoliniškės and „Maxima“ in Lazdynai. The avoidance of *shops* and *bars* skyrockets, compared to the places of other categories.

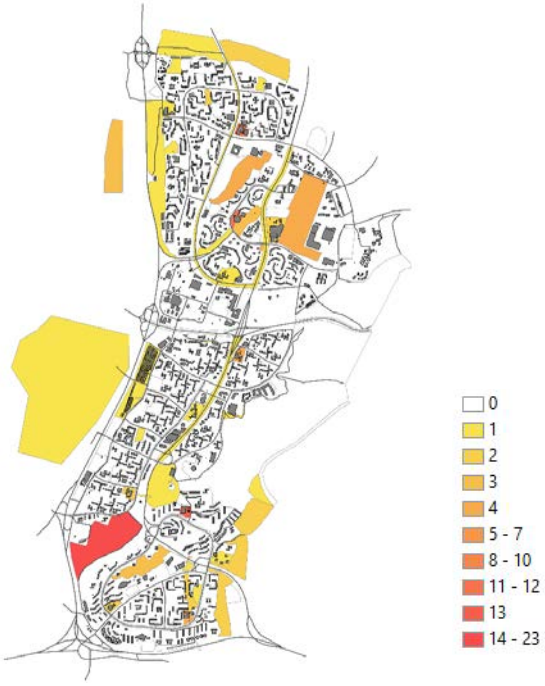


Fig. 29. Map of avoided places

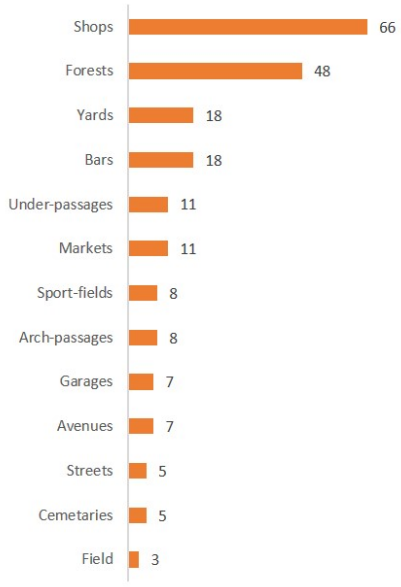


Fig. 28. Bar-chart of categorized avoided places

Park or Fairy-tales is the most concerning natural *forest-like park* as it has a very bad reputation because of high crime rates (especially in previous times) and residents do not feel cozy there overall. *Small forests* and *parks* inside the districts cause a lot of concern to the residents as well.

The bigger the *street* is, the more unsafe it is perceived and the main axis of western Vilnius, Laisvės avenue, together with its *underground passages*, stands out as a particularly insecure example.

Problems inside the neighbourhoods are evident and the most concerning elements are *yards*, *arches* and *narrow passages* between apartment-buildings and garages. Moreover, the desolated *sports-grounds* and *stadiums* are welcoming places for unengaged teenagers.

2.3. Space syntax analyses

The main idea of Space syntax analysis is that any spatial configuration has inherent relationship with social, economic and cultural aspects and cannot be fully perceived without understanding of these aspects (Zaleckis, 2018). Thus, the first three working hypotheses were decided to be checked using different Space syntax methods (and supplementary techniques, if needed and resources allowed) (Fig. 30).

Hypotheses No I and No II are similar in essence, as both of them are trying to identify the potential places for urban development. The main difference between them is that the hypothesis No I is more general and could involve all kind of developments (building, public open spaces and connections between them), while the hypothesis No II is oriented on particular method, SmartCode by Duany et al. (2012), developed from New Urbanism. Testing of the hypothesis No I was started using Space syntax analysis. Firstly, Segment analysis was used and later it was supplemented with Agent-based analysis. Those two analyses helped identifying places that are *better reachable* and more often *chosen* as transit spaces by different users of the neighbourhoods, therefore, different kind of activities could be developed in these urban spaces. Due to the receivement of valuable results from Space syntax methods and time limitation, SmartCode method was finally left aside.

Hypothesis No III was decided to be checked using Visibility-graph analysis of Space syntax.

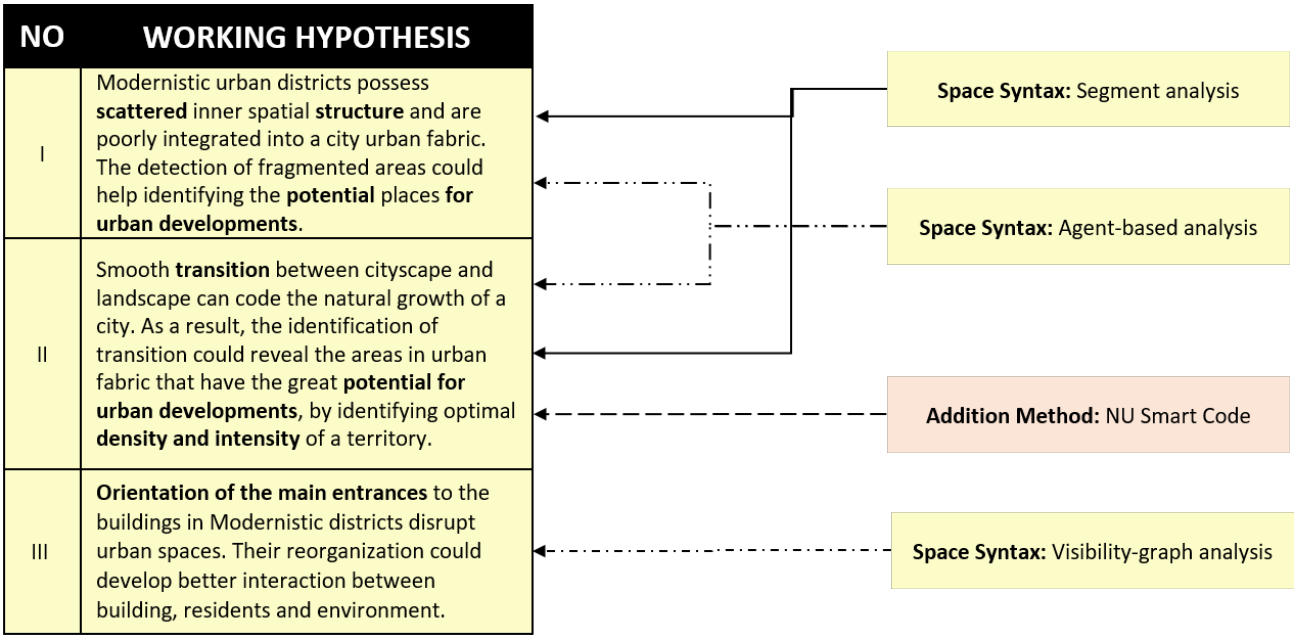


Fig. 30. Scheme of space perception methods chosen for the working hypotheses

2.3.1. Segment analysis: movement in a network

Urban structure in urban Segment analysis is perceived as a *network*, consisting of *the segments* of paths or streets, and it is based on graph theory, studying simple mathematical structures that contain only two different kinds of elements (*nodes* and *edges)*, where edges represent *relationship* between the nodes (Zaleckis, 2018). Movement of different objects can be analysed in urban Segment analysis by assigning different elements as nodes in a graph. Two different objects were studied in these analyses (pedestrians and vehicles), by using two different kind of networks (pedestrian paths and city streets, respectively).

The technical preparation of networks for Segment analysis is not described in this text, but the essential data preparation can be found in the **Appendix 7**.

Settings and parameters. Segment analysis is based on simple mathematical calculations and does not have a lot of settings, but those that exist are essentially important and can change later interpretations completely. *Radius type* and *size* are such.

Metric radius type (out of *metric*, *segment-step* and *angular*) was used to represent local pedestrian movement as a human perception of distances in territories that they are well-familiar with is essentially grounded on physical distances (Hillier et al. 2010). Different radius sizes were used for different goals and will be presented in respective subsections.

Two different Segment analysis parameters were used:

- *Choice* – mathematical value is obtained by counting, how many times the node is chosen, as an intermediate, while traveling from one node to another in the straightest and shortest way. Higher choice values indicate more active places in the network.

- *Integration* – mathematical value is obtained by counting how close the analysed node is to other nodes in the network. Higher integration values indicate better reachable places in the network.

2.3.2. Segment analysis: local pedestrian paths

Network of local pedestrian paths became the main object of the urban Segment analysis in this research as New Urbanism states that Modernist urban planning lack human perception of urban spaces and the main idea, developed in the theoretical research, was to infuse this lacking humanity to the Modernist urban neighbourhoods. Thus, understanding of human scale movement could reveal advantages and flaws of existing spatial configurations.

Radius sizes. In the introduction of Segment analysis it was mentioned that different radius sizes can reveal information of spatial usage by different users. This research is oriented to a human scale and pedestrian movement, therefore three different radiuses were decided to be analysed, representing different local users:

- *200 meters* – could be perceived as radius of “here” zone (Cullen, 1961) and based on HUD International brief, it is a maximum distance which people agree to park their car from their destination point, therefore, it could be perceived as a distance which humans understand as

"already here" (U.S. Department of Housing and Urban Development, 1972). This radius will further be called as radius of *instant users*.

- *400 meters* – pedestrian shed, as based on New Urbanism principles, 5 minute walk is considered as a distance which people choose to travel on foot instead of riding a car (Steuteville, 2018). This radius will further be called as radius of *local users*.
- *1000 meters* – maximum comfortable distance for a pedestrian. Based on TOD it is a maximum distance of regional transit services or a distance which pedestrians accept to walk to larger green areas (Calthorpe Associates, 2012), especially if that distance is interesting and useful (e.g. a person can make some shopping on the way) (Fang, 2015). This radius will further be called as radius of *global users*.

Analysis of instant users: choice with radius of 200 meters (Ch R200) (Fig.31: map 1):

- All highest values, as expected, appear inside the neighbourhoods.
- Two large clusters of high values appear in Justiniškės district. Both of them are in the existing pedestrian alleys or very close to them. A few yards appeared in Viršuliškės as well.
- Long standing-out line appears along Laisvės avenue in Justiniškės district. There are later built apartment-houses with dense entrances, oriented to the street. This kind of planning is not representing Modernist principles, but this example confirms that such orientation of entrances could bring local-users activity to a street.
- Situation in Karoliniškės is completely different from Justiniškės and Viršuliškės. Almost entire district is carved with very bright segments (most intensively in the north). On the other hand, no larger standing out clusters can be noticed at all. This could be due to overall high density of the apartment-buildings. More private small spaces could be created in this district but it would be hard to find a place for common activities in the neighbourhoods.

Fig. 31. Segment analysis of pedestrian paths: Ch R200, R400, R1000, colour-corrected

- Lazdynai has a few clusters as well. Two of them are partly covering existing pedestrian alleys: one is on the opposite side of the street from a supposed-to-be local centre, which is dying nowadays. Third is situated beside one of the schools which was developed as an exclusive Modernist building and which is registered as a cultural value today.

Analysis of local users: choice with radius of 400 meters (Ch R400) (Fig. 31: map 2):

- Parts of main local transport corridors, some of the street-crossings and main pedestrian alleys inside the neighbourhoods start to stand out, while the inner-yard structure dissolves to the background.
- Viršuliškės seems to have quite a concentrated core while other three districts have multiple intensive spots.

Analysis of global users: choice with radius of 1000 meters (Ch R1000) (Fig. 31: map 3):

- Even the bigger parts of local transport corridors come forward, entire inner structure stays behind.
- Justiniškės and Karoliniškės dominate in the map, while Viršuliškės and Lazdynai seems to have more concentrated and less active overall structure. Residents in Viršuliškės and Lazdynai seem to scatter more, when they go for longer walks, compared to other two districts.

Fig. 32. Segment analysis of pedestrian paths, Int R200, R400, R1000, colour-corrected

Analysis of instant users: integration with radius of 200 meters (Int R200) (Fig. 32: map 1):

- The dispersity of values is quite low and there are no exclusively integrated areas overall.

- The main living areas of Justiniškės, Viršuliškės and Karoliniškės are quite evenly integrated, while it looks like Lazdynai lack symmetrical relationship overall, as only three areas stand out in this district, and north part remains completely segregated.
- Places with the highest values of integration and choice parameters of the same (R200) radius almost identically overlay.

Analysis of local users: integration with radius of 400 meters (Int R400) (Fig. 32: map 2):

- Integration map with this radius looks completely different from the previous maps, revealing very bright large zones in each of the district. These places could be developed as local centres.
- This map obviously confirms that Modernist districts are very segregated from one another by large streets and large green areas, the city structure does not have smooth transition.

Analysis of global users: integration with radius of 1000 meters (Int R1000) (Fig. 32: map 3):

- Only two intensive areas remain in this map. One, more elongated by the main streets, in Justiniškės, and another one in Karoliniškės. These zones nicely overlap with the choice map of the same radius (Ch R1000) and have a great potential to become the points of interest in entire western Vilnius side.
- Almost the entire living territory of Viršuliškės is an evenly well integrated, while Lazdynai district lack this value, and it looks under-developed, compared to the other three districts.

Fig. 33. Segment analysis of pedestrian paths, Int*Ch R200, R400, R1000, colour-corrected

Analysis of integration multiplied by choice (Int*Ch) of the same radius (Fig. 33):

- The highest values present places, where local and global users meet.

- Higher values of integration and choice synergy could be used to identify local centres (when analysing maps of smaller radius) and urban corridors (when analysing maps of grater radius).
- Higher segment values show the potential to become a final destination, as well as on the way stop for a subject.

Fig. 34. Segment analysis of pedestrian paths, Int R200*Ch R1000, colour-corrected

Analysis of integration multiplied by choice (Int*Ch) of different size radius:

- Map of integration (R200) multiplied by choice (R1000) (Fig. 34) reveal places that are very easily accessed by local users (people living there), who mostly stay in a stable position in a place, but are often passed by users, whose activity is more dynamic (are going for longer walks or have a goal destination). This kind of places could be beneficial for commercial objects, as they attract variety of different users.
- The idea of the map of integration (R1000) multiplied by choice (R200) was that it supposed to reveal places that are often passed by locals, but are also easy to reach for global users. Such kind of places could be used for some kind of specialized function that does not require to be easily noticed, but is easy to find if needed. Nevertheless, the generated map did not seem to give useful information, as it was almost the same as the choice map (R200), thus, is not presented.

To conclude, the maps of integration and choice of the same radius coincide in the most cases in the analysed territory. This overlap show some kind of *synergetic logic between the well reachable places and the pedestrian movement*. On the other hand, important decision was made in the data preparation stage and all kind of pedestrian paths were included to the analysis (and even were supplemented with missing ones, sketched from high resolution photos), starting from wide hard-covered alleys and finishing with trampled paths. This could mean that the data represents natural pedestrian movement in an open space more, than movement on planned pathways. In such case, while the influence for the analyses with a greater radius should not have been high (or could even improve their quality by infusing such natural course of movement), it could have changed the results of R200 maps by assimilating all of the places together. This could be the reason why the maps with this radius lack dispersity of numeric values. Nevertheless, all of the presented maps are interpretable and give useful information, therefore, the issue discussed above, should not be considered as a mistake, rather as a different point of view.

2.3.3. Segment analysis: global street transit

The analysed territory is basically framed within large streets: Vilnius western bypass in the west and Oslo street in the south. Laisvės avenue, with all of its advantages and flaws, is crossing the territory lengthwise, while Vilnius northern bypass is already being started to be developed in the north.

A revitalized urban area has to be spatially working well together with a city, in order to be lively, comfortable and active. It should be comfortable for its residents and it has to attract visitors from other parts of a city. Segment analysis of city streets with metric radius of 3600 (Int*Ch R3600) (Fig. 35) is able to show urban movement by cars and public transport. Streets that are the most intensive in the map could be perceived as the main local axes and could be used to develop smooth networks of public transportation and social infrastructure. Places, where this map overlaps with the integration map of pedestrian movement of radius 400 (Int R400) could be especially appreciated for *transit oriented development* (TOD).

Fig. 35. Segment analysis of Vilnius city streets, Int*Ch R3600, colour-corrected

Segment analysis of streets with metric radius of 7200 (Int*Ch R7200) (Fig. 36) presents the main logistic corridors and could be used to identify the best places for *objects of city significance*. The part of Pilaitės avenue, between Laisvės avenue and the western bypass could become such a place in the analysed territory, as its integration value is one of the highest in the entire city.

Fig. 36. Segment analysis of Vilnius city streets, Int*Ch R7200, colour-corrected

Another interesting thing to notice is that, probably because of the newly constructed western bypass, formerly essential axis of western Vilnius, Laisvės avenue, has lost its strength in the south. The part, crossing Lazdynai district diagonally, is not chosen often by long-distance users. On the other hand, it could help Lazdynai district to regain its spatial unity that, due to not fully realized initial urban project, was disrupted. These insights suggest, that this part of Laisvės avenue could become even a smaller street and the segment, going through Park of Fairy-tales might help overtaking even more traffic-load from it (that mainly consists of traffic, going out of the city). Such solutions could foster, now fragmented, integrity of Lazdynai district. This is a speculative idea and should be analysed in a higher detail level, but the fact that such insight emerged from Segment analysis, proves its great potential for urban planning.

To sum up, Segment analysis is a very powerful tool, when analysing urban spatial structure. Preparation of data takes some time at the beginning of the work but it is totally worth it, as different kind of spatial relations can be simulated later in an easy and quick manner, providing visual perception of the data. As expected, Segment analysis revealed a great deal of possible directions for future urban developments in the analysed territory and the general trends of spatial configuration in Modernist districts. This information could be useful to revitalize other areas, suffering from similar problems.

2.3.4. Visibility-graph analysis: social spatial control

The main idea of Visibility-graph is to evaluate inter-visibility between objects, by estimating obstacles (Zaleckis, 2018). As mention in the introduction to Segment analysis, the concept of graph consists of two elements: nodes and edges. The only difference from Segment analysis here is that, instead of a segment, a *point* is considered to be as a node here, while inter-visual connections between these points are taken as edges. Visibility-graph analysis, based on metric step depth (metric depth in a network), gives an opportunity to find direct relations between objects in an open area and to evaluate spatial configuration, when taking into account not only transit usage (as in Segment analysis), but stable usage (staying in a place), as well. Visibility-graph analysis works as a great supplement to Segment analysis, providing greater detail level, estimating not only axes of movement, but also the configuration of surroundings, such as shape, and the curves of buildings or streets.

According to A. van Ness and M. J. J. Lopez (2007), these inter-visual relations between entrances to buildings are essentially important to ensure *social spatial control* in the surrounding area. It is proved that spaces that are faced by more doors, are perceived as safer and are protected from vandalism and other crime acts more, therefore, bringing more human activities and vitality there. In essence, social control works as a catalyst to urban vitality as presence of habitants brings other people to the place, while more people in that place attract even more people there (Gehl and Svarre, 2013), thus, it enforces social control even stronger. This is why balanced structure of privacy levels in urban spaces could create the different types of natural space usages. The only obstacle, when bringing this theory to reality, is a clear evaluation of social control intensity in a particular area and Visibility-graph method (using metric step depth) makes it possible. The smaller value of the metric step depth in a Visibility-graph is, the higher social spatial control it represents.

Information, important to the conceptual decisions is presented further, while the technical information of the data preparation, workflow and parameters can be found in the **Appendix 7**.

A couple distances had to be comprehended and determined to be able to interpret the acquired map:

- the maximum distance that human psychologically perceives that can control
- the maximum distance that human perceives as “here”, but not “there” yet (Cullen, 2015)

The first distance of *10 meters* (rounded-up from 7.5 meters) was borrowed from proxemics field (study of relationship between human behaviour and space). Psychologist E. Hall (1966) describes it as the edge, where the public zone (out of intimate, personal, social and public, presented in sequence) starts. This distance could be perceived as the spatial margin, where private zone finish in an urban structure.

The second distance of *137 meters* is based on the city planner H. Blumenfeld (1967). It is a maximum distance, where space is perceived as a place, but not a field yet. Everything what is further should be considered as space with no social control at all, while everything in-between 10 meters (visualized with blue colour) and 137 meters (red colour) could be understood as semi-private zones.

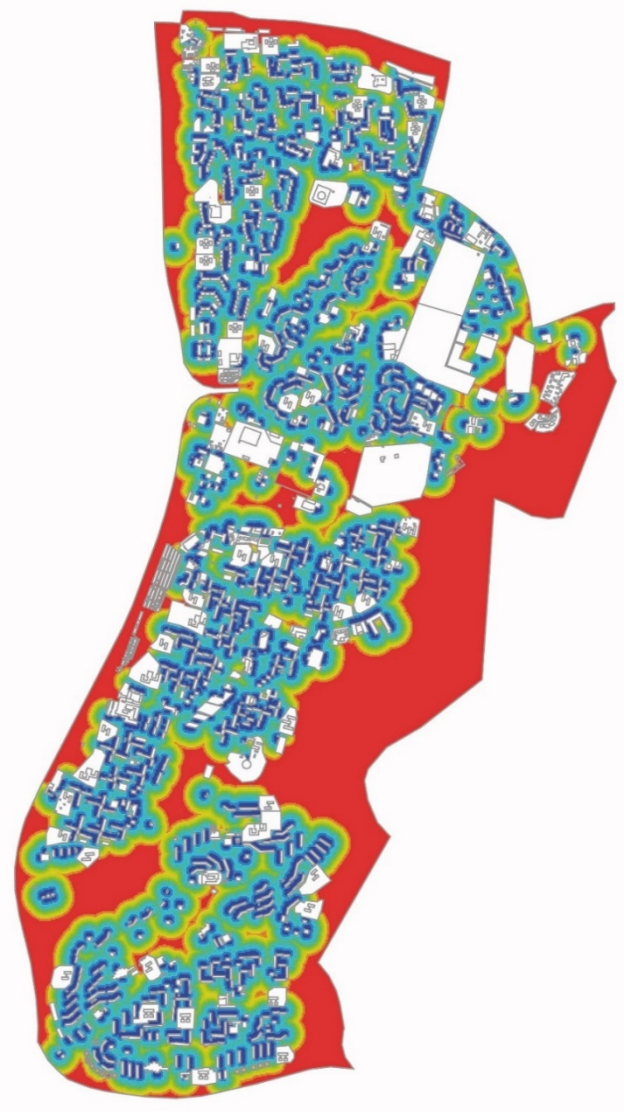


Fig. 37. Visibility-graph analysis of social spatial control

The acquired map of social control (Fig. 37) accurately represents typical Modernist urban planning, where the main streets lack human interaction and building principles do not create system of “places”, as described by Castells (2004), but rather produce vast empty “spaces”.

Large bright *red* areas, mostly appear in green forest-like like zones or vast fields and does not provide information that would be hard to acquire without this map. However, the main attention should be paid to smaller zones, as they often indicate the parts of bigger streets and territories that are partly-fenced or hidden in some other way, and lack social control, thus, should be redeemed.

Yellow and *green* areas often indicate smaller streets, squares, yards and garage territories inside the neighbourhoods.

Cyan is the most common colour in the inner structure, while the wider *blue* areas are very rare. This is because *most of the entrances to buildings are oriented to the same direction* and are not creating inter-visibility with one another.

This map is worth analysing together with the map of avoided places (Fig. 29), as it helps to explain some particular situations. For example, pedestrian alley by the Riflemen union, in Viršuliškės, is one of the favourite residents’ places, but is avoided by a lot of people as well,

because it attracts suspicious persons. The map of social control reveals, that a lack of symmetrical relationship between public and private space could be the reason why. Similar conclusions could be made about some grocery-stores areas, market-places or other avoided sociotopes.

The windows of buildings, according to Ness and Lopez (2007), have similar effect to social control as doors have, and could be taken into account as well, but this would be another, even more complicated analysis, thus, is not proceeded in this research. Nevertheless, Visibility-graph analysis, based on windows, could be kept in mind, when looking for solutions of how to improve symmetry in places that are avoided due to real insecurity or insecurity-feeling. Large showcase-type windows in ground floor levels is one of the possibilities for such improvements.

To sum up, creating symmetrical relationships between private and public urban places, by the means of smooth transition or transparency, could be essential to restoring users' trust in urban places.

2.3.5. Agent-based analysis: movement in an open space

Agent-based analysis is one more method, suggesting simulation of movement. The main difference from Segment analysis is, that, while Segment analysis is simulating object's movement in an existent network (paths or streets in urban analysis), Agent-based analysis gives an opportunity to model it in an open space. This is done, according to Penn and Turner (2001), by implementing moving object with simple artificial intelligence (*agent*) into a Visibility-graph. Agent's movement is simulated by simple mathematical rules, such as "go all the time straight", "change direction every 10 units" or other.

Agent-based analysis was performed for each of four districts separately, due to technical possibilities that are described in the **Appendix 7**, and the acquired separate maps were later joined together to a single image. Moreover, the analysis was run twice in order to acquire maps of the different types of users, *instant* (200 meters: M200) and *local* (400 meters: M400), same as it was done in Segment analysis for pedestrian paths, as it had to enable to better compare the results of the both analyses. Agents were released from the entrances to buildings, similarly as the level of social control was evaluated in Visibility-graph analysis for social control, based on these entrances.

The first thing to mention is that the results, acquired from individual districts cannot be compared with one another directly, as some caution has to be kept in mind. This is due to the different sizes of the districts, as the settings were used the same for all of them. The unevenness of the results is mostly visible when comparing Lazdynai with other districts. It looks like Lazdynai has more intensive spaces than other district, but this semblance is misleading, because the same amount of agents were just wondering in a smaller space (Lazdynai is the smallest district). Some kind of normalization could be useful, but criteria should be carefully selected (physical space, amount of residents, etc.) and this was out of this project limits, thus, was not pursued. Nevertheless, this analysis works as a supplement to Segment analysis nicely and the result it provides are useful.

The second thing to mention is that the presentation of more natural, fluid-like movement flow is evident in these maps, compared to Segment analysis. Agent-based analysis reveal natural orientation, centrality and size of open space, instead of showing zones or main axes of existent pedestrian paths, as Segment analysis did.

Going deeper, the results of M400 map (Fig. 38: map 1) are a little similar to the results in Segment analysis Int R200, as the majority of movement is happening inside the neighbourhoods, while only some parts along the streets are intensive as well. On the other hand, the clustering of flows is much more noticeable in these maps, creating organic spaces of diverse size and configuration. The pedestrian alley of Riga (Fig 38: 1) could be one example, where Segment analysis indicates the important axis itself, but Agent-based analysis supplement this knowledge by revealing the exact place on the pedestrian axis and shows its natural spatial configuration, thus, revealing its suitability to become the central square of the neighbourhood. Other open spaces, such as Asanavičiūtės square (Fig 38: 2) or Jankausko zone (Fig. 38: 3) in Karoliniškės are poorly identified in Segment analysis at all. The entire western part in Karoliniškės shows great integration, but the exact centres are not clear. Agent-based analysis is capable to recognize such small spatial differences and to find the most naturally magnetizing centres, even in such a minor scale. Similar cases could be noticed in most of the neighbourhoods. Moreover, all of these most active centres are interconnected in a spider-network-like manner, with usually a few active joins. This is not evident in Segment analysis, but becomes obvious in Agent-based analysis as well.

Fig. 38. Agent-based analysis of the movement in open space, M400, M200, colour-corrected

The M200 map (Fig. 38: map 2) suggests similar places as the most active in most of the cases, but their direction of configuration is not all the time the same, and sometimes is completely different, visually presenting, that different types of users have different movement needs. For example, a strong elongated axis is indicated in the M400 map, while the more northern place of a clustered character is highlighted in the M200 map in the neighbourhood between Justiniškių, Rygos, Taikos and Lūžių streets (Fig. 38: 4). Furthermore, some quite large areas in the M400 map are so intense that it looks like they are flowing to all possible directions and this information could be useful to identify places for large area consuming functions (like squares, ect.), but M200 map can supplement this information by identifying the most magnetizing axes in those large areas. This is critical analysing Lazdynai district, as the M400 map looks too intense.

The congruence of Segment analysis of small radius and Agent-based analysis confirms that the network of pedestrian paths, used in Segment analysis, is representing natural pedestrian flow quite well. On the other hand, it is lacking some specificity and the performed Agent-based analysis, indisputably provides that. It could be said, that Agent-based analysis combines choice and integration characteristics of Segment analysis, but supplement them with some details from surrounding urban elements (obstacles for movement).

Agent-based analysis could be useful supplement for Sociotope mapping as well. Recognition of natural pedestrian flows can help defining the boundaries of sociotopes and creating the integral public spaces of natural orientation, size and configuration.

2.4. Validation of the working hypotheses

Hypotheses, presented here, are abbreviated, as the full version can be found in the first section of the empirical research.

I. Detection of fragmented spatial-structure areas could help identifying potential places for urban development. *The hypothesis is confirmed:*

- Segment analysis confirmed that Modernist districts are segregated from one another and some of such neglected spaces could be used for new urban developments. Abandoned spaces, possessing high reach and activity by global city users, are a great potential for the objects of city significance, while linear spaces could be used for commercial units or networks of public transportation.
- Segment analysis was also able to identify the most fitting spaces for local users, while Agent-based analysis improved those findings, by adding natural pedestrian flow aspect, helping to perceive the orientation and the size of spatial configurations, and their connectivity with each another.

II. Identification of areas with smooth transition shortage could help finding under-developed places. *The hypothesis remains untested:*

- The hypothesis was formulated based SmartCode method, which was not proceeded finally in this research, due to deeper usage of different Space syntax methods, high quality of their results and time limitation.

III. The orientation of entrances to buildings influence interaction between them, residents and the surrounding area. *The hypothesis is confirmed:*

- Visibility-graph analysis confirmed that inner yards and the main streets in Modernist urban neighbourhoods lack social control due to a lack of inter-visibility between the entrances to buildings, and symmetric relations between public and private space.
- Agent-based analysis shows that the orientation of entrances is essential when forming spatial communities and diversifying publicity levels of urban spaces.

IV. Residents' participation in early project phases is essential when seeking to enhance authenticity of places. *The hypothesis is partly confirmed*:

- *The sociological survey* revealed places that are most valued, and the *social values* that are most appreciated, by residents. While these revelations are of a great importance locally, they can be used to grant identity to other places with similar users as well.
  - The hypothesis is not fully confirmed as a site observation have not been proceeded in this research due to a size of the analysed territory and time limitations.

V. Residents' involvement into early processes of urban planning can help identifying urban spaces with greatest potential. *The hypothesis is confirmed:*

- Sociotope mapping confirmed that residents can help identifying the places of intensive natural social values and the spaces that are neglected. Both of these types of places should be considered as a potential for further urban development: social values of favourite places should be intensified, while avoided places should be seen as opportunities for more radical changes.

VI. Different publicity levels of urban places enhance residents' responsibility for those places and help forming communities. *The hypothesis is partly confirmed:*

- The hypothesis No III partly covers this hypothesis and Agent-based analysis confirms that the orientation of entrances are essential for the development of spatial communities.
  - The hypothesis is considered not fully confirmed, because relation between spatial and social community was not analysed due to time limitations.

VII. A local centre should be developed on the edge of a neighbourhood, closer to a city centre, in order to keep uniformity inside that local centre and to magnetize residents. *The hypothesis is not confirmed:*

  - The analysed territory is segregated from the city core by a large forest-park and a river. Now it is even connected to the city core from the opposite side by newly constructed Vilnius western bypass. This kind of structure makes the analysed territory centralized to itself more than to a city core, as residents' movement towards city centre is outweighed by the movement completely out of the city and inside the district. This hypothesis could be true in other situation, but does not work in the analysed area.

2.5. Conceptual model of the revitalization of Modernist urban neighbourhoods

In essence, the developed concept (Fig. 39) suggests that urban design could be a catalyst, able to impact the possibility of any urban space becoming a favourite place. Based on this concept, all urban spaces by their usage intensity could be divided into three categories: *favourite*, *avoided* and *abandoned*. If doubted, lower interference should be prioritized.

Favorited places are urban aspirations. Such places possess strong social values and their further development should be based on the existent natural usage and its *intensification*. The intensification could be performed in tree directions: by promoting existing social values, by shifting their spatial configuration, according to their natural flow (the orientation and size of pedestrian alleys, squares or pockets), or by strengthening their integration and activity type, according to the relevant target user groups. Places, that possess strong social values, are well integrated in a local structure and are often passed by different types of users, have a great potential becoming *local centres*.

Places often stay abandoned due to a lack of social values or because their spatial configuration is disrupted. Such places could be a great potential for bigger *changes*: they could be provided with buildings or open urban spaces with completely different usages. Abandoned places that possess high values of spatial configuration in a city context, could become *objects of city significance*.

Avoided places are somewhere in between the favourite and the abandoned. They should be *repaired*. Social control and publicity levels should be revised firstly, as the recreation of symmetrical relationship might be enough to them.

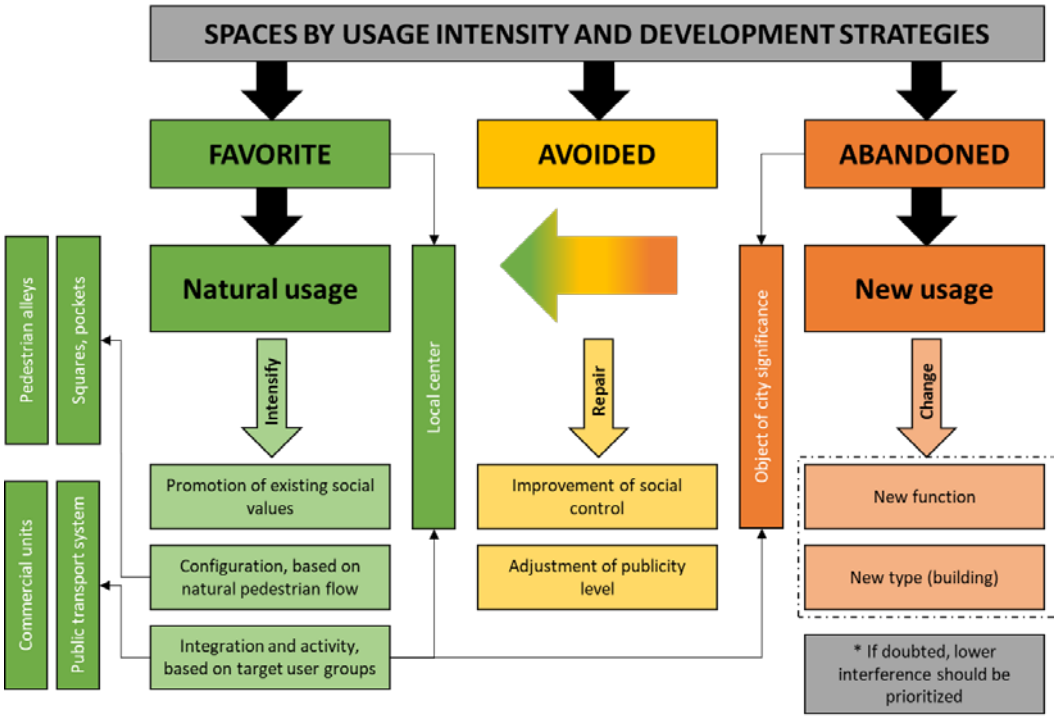


Fig. 39. Conceptual model of the revitalisation of Modernist urban neighbourhoods

2.6. Main findings of the empirical research

I. **A careful territory selection** for the empirical experiment provided a great starting point in understanding the main historical and morphological aspects of the analysed territory, and essentially, answered the purpose to have a wide range of different situations, as each of four

selected districts, after the performed analyses, were proved to be unique and providing complimentary information. Sociotope mapping was able to identify the most often and the missing social values in the defined sociotopes, while Space syntax methods revealed different character of centrality, connectivity and privacy of the selected districts.

II. **The sociological web survey** worked perfectly as a foundation for the cognition of local social community, as a base in mapping socially valuable places and as a validation of Space syntax results. Questionnaire, while partly-borrowed from the Swedish practice, was, most importantly, adapted to a local situation. The obtained map of favourite grocery-stores become the most obvious confirmation of Space syntax methodology, assisting to explain different pedestrian movement tendencies in each district. To sum up, combination of these practices was essential in finding the general trends between appreciated places and their spatial configuration, thus, making possible to predict the outcomes of potential developments.

III. **Sociotope mapping** confirmed that Modernist urban planning lack qualitative open urban places inside neighbourhoods, as residents tend to find the most social values in none-urbanized areas. On the other hand, the newly recovered pedestrian alleys are highly appreciated by residents, confirming that inner-districts improvements could play a huge role in fostering their vitality. It was also confirmed that the identity of places can be better understood through residents' involvement into planning processes, by revealing such specific places in an urban fabric, as the remains of an old garden or the pedestrian bridges that are appreciated by multiple respondents. Furthermore, the identification of avoided places helps finding places that need revision and might need greater changes. Interestingly, places that are visited by a lot of people, tend also to be perceived as unsafe.

IV. **Segmental analysis of pedestrian paths** revealed places that are best reachable and most often passed by different kind of users: instant (staying in the yard), local (going for daily needs) and global (going for rarer needs or pleasure). Identification of such places can help choosing the most suitable functions for them or the nearby objects. A lack of user-activity can explain avoidance or abandonment of urban spaces. The high overlap of integration and choice values indicates synergetic logic between pedestrian movement and existing space configuration in the analysed territory. Places that possess high values of both, choice and integration, show a great potential becoming final destination as well as on-the-way stop.

V. **Segment Analysis of city streets** identify the main city corridors of transportation and logistics. Parts of streets that are not active, could be reconsidered becoming more pedestrian-friendly. Places that coincide with intensive local pedestrian movement, could become the centres of transit oriented development.

VI. **Agent-based analysis** revealed the natural flow of pedestrian movement inside the districts, helping to identify the most active places, as well as their size and configuration. It was confirmed, that clustering of movement in the yards of Modernist urban neighbourhoods is not strong, thus, leading these spaces of being more transit-oriented than inviting to stay.

VII. **Visibility-graph analysis for social control** revealed that yards and streets of Modernist districts lack social control due to a deficiency of inter-visibility between the entrances to building and symmetric relations between private and public spaces.

VIII. **The combination of all these methods** provided the research with a very complex view. All of the selected methods were suggesting similar result, but synergistically supplementing one another, providing even more detailed perspective. The abandonment of any of these methods would negatively influence the overall perception and would reduce suggestions for possible solutions.

3. Experimental design of the revitalization of Lazdynai district in Vilnius city

The objective of the experimental project is to develop a design strategy and to choose urban planning tools, able to revitalize the selected territory of Modernist urban planning; to verify the design strategy by elaborating urban design in the selected territory.

Methodology of the experimental project:

I. *Theoretical research:*
   - document and empirical data analysis: to familiarise with the existent situation in the selected territory
   - literature analysis: to find out the urban development needs of different social groups, relevant to the selected territory

II. *Empirical research:* to analyse the existent social composition of the selected territory using GIS technologies.

III. *Experimental project:* to develop an urban design project, representing developed proposals of how Modernist urban neighbourhoods could be revitalised, using the constructed hypothetical and conceptual models.

IV. *Space syntax analysis (Segment and Agent-based):* to compare the results of the existent and the proposed urban design of the selected territory and to make the final conclusions of the thesis.

In essence, *the program of the experimental project* could be divided into three major tasks with further subtasks as followed:

1. To perform *the pre-projects analysis*:
   1.1. To *select an urban territory* for the experimental project.
   1.2. To *familiarize with urban development documents,* relevant to the selected territory.
   1.3. To create *a full-composition sociological profile* of the selected territory, by finding dominant and missing social groups, using open demographic data and GIS technologies.
   1.4. To *find out the needs* for urban design of all social groups, defined by the full-composition sociological profile, and to develop a strategy of how these needs could be satisfied in order to improve life quality of the dominant social groups and to attract the missing.
2. To *develop an experimental project*:
   2.1. To *perform an urban analysis* of the selected territory.
   2.2. To *develop a design strategy* for the revitalization of the selected territory.
   2.3. To *elaborate the design* of the selected urban territory, based on the developed design strategy.
3. To *evaluate the experimental project* by:
   3.1. Attempting to apply *the patterns of Alexander et al.* (1977) to the design elaboration.
   3.2. Performing *Segment and Agent-based analyses* for the re-developed urban area and comparing the results of the existent and the proposed situations.

3.1. Pre-project analysis

Pre-project analysis was initiated with the territory selection. It was started by summarising the results of Sociotope mapping and Space syntax analyses, acquired in the empirical research, and by generating the overlaid map of the ideas for possible urban developments (Fig. 40). This map helped

to decide, which districts out of four, analysed in the empirical research, could be the most (interestingly) re-developed, as they have a lot of urban problems, their problems are diverse and the possible solutions could suggest a variety of different tools for the revitalisation. Karoliniškės and Lazdynai appeared to be the most adaptive for transformation, as possess features, described further.

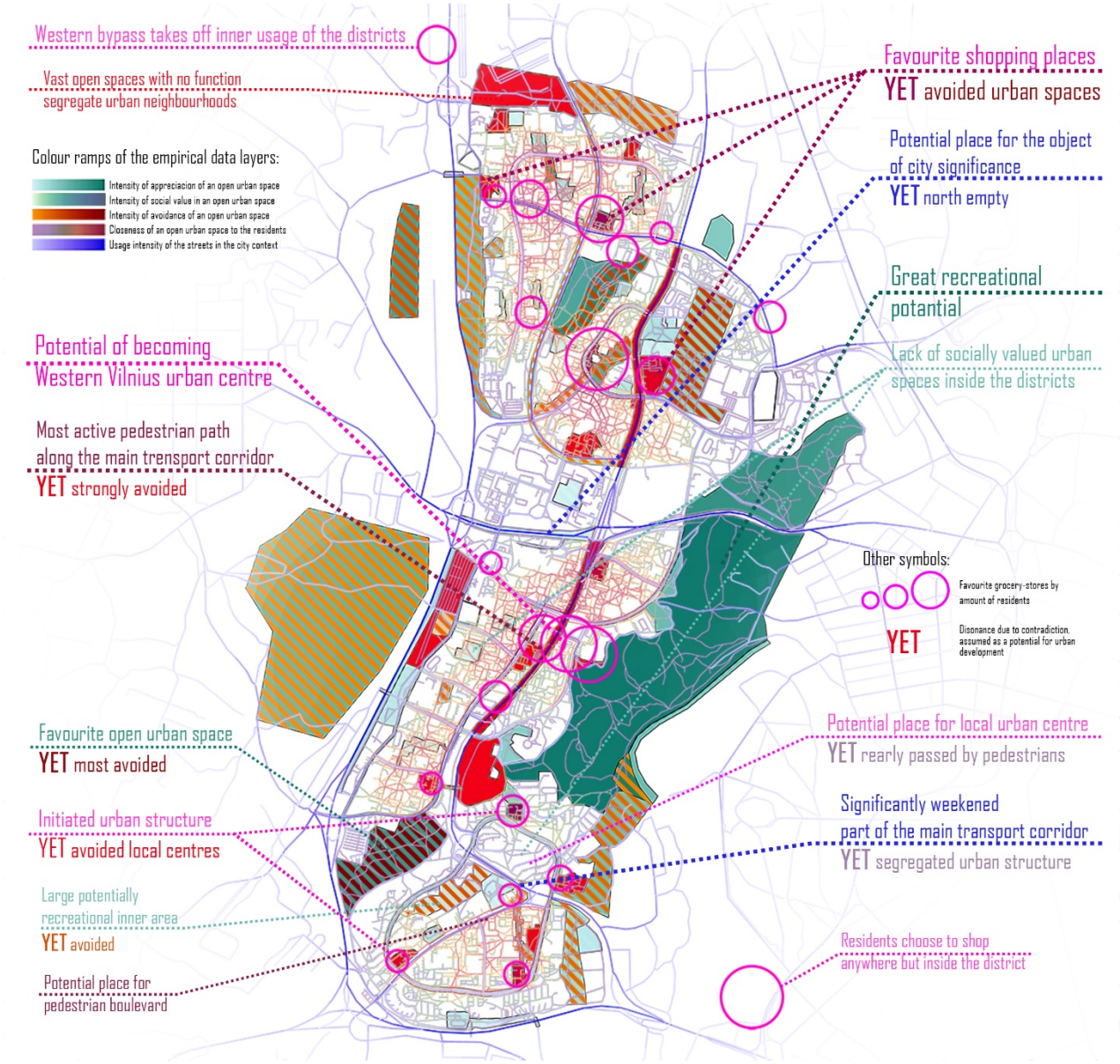


Fig. 40. Scheme of the summarised empirical research

Lazdynai has:

- the overall loose and under-developed urban structure
- fragmented spatial structure, rarely chosen by both, local and global, types of users
- large inner areas, lacking social control
- a weakened part of the western Vilnius transportation axis (Laisvės avenue)
- a socially valued street, perceived as a public space by residents (Architektų street)

Karoliniškės has:

- a potential to be develop as a strong global western Vilnius centre
- the strongest part of western Vilnius transportation axis (Laisvės avenue)

Both Lazdynai and Karoliniškės have:

- avoided local urban (commercial) centres
- a lack of socially valued open urban spaces in the inner urban structure
- an avoided large green area on the side (Park of Fairy-tales)
- a large green socially valued recreational area on the side (Park of Karoliniškės)

After the summary of the empirical research was made and the territory of two districts selected, the pre-project analyses of relevant urban development documents and social composition could be pursued.

3.1.1. Review of the urban development strategies of the selected territory

Vilnius city municipality is currently in the process of developing a new master plan, therefore, its documentation is still being constantly replenished. This is why the analysis, performed in the theoretical research of the thesis, had to be revised and supplemented with the updated information.

In the strategical scheme of Vilnius city (Vilniaus miesto savivaldybės bendrasis planas, 2020) (Fig. 41), a few important aspect coincide with the conclusions made in the empirical research:

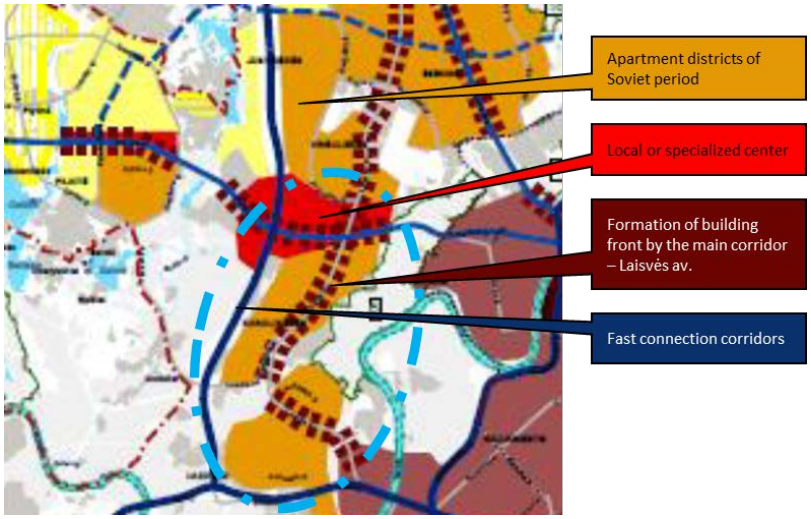


Fig. 41. Strategical scheme of Vilnius city by Vilniaus miesto savivaldybės bendrasis planas (2020)

- Territory around Press Palace is planned to be developed as a specialized centre.
- Vilnius western bypass became the most important fast-travelling corridor and overtakes heavy transportation flow from Laisvės avenue. Laisvės avenue, on the other hand, is expected to be further developed as a façade street with a clear building front.
- Territory around Vilnius western bypass and Pilaitės avenue is decided to be further encouraged as a zone of office buildings. It is decided so, as such development processes have already been started there naturally.
- Park of Fairy-tales is emphasized as one of the six most important parks in the sleeping-districts and the strengthening of its recreational function should be pursued. This should be done by developing a balanced structure between densely afforested and open leisure spaces.

Comparing the solutions of the main drawings of function zones in Vilnius city master plan of 2007 (Vilniaus miesto savivaldybės bendrasis planas iki 2015 metų, 2007) and of 2020 (Vilniaus miesto savivaldybės bendrasis planas, 2020), it is obvious that the new master plan is a continuity of the previous, but the elaboration level is much higher. The most outstanding aspect in the analysed territory is that the new master plan suggests the connection between northern and southern parts of Lazdynai district by developing a local centre (Fig. 42: 1) and a green corridor (Fig. 42: 2), crossing Laisvės avenue.

Fig. 42. Cut-outs of Vilnius city municipality master plans of 2007 and 2020

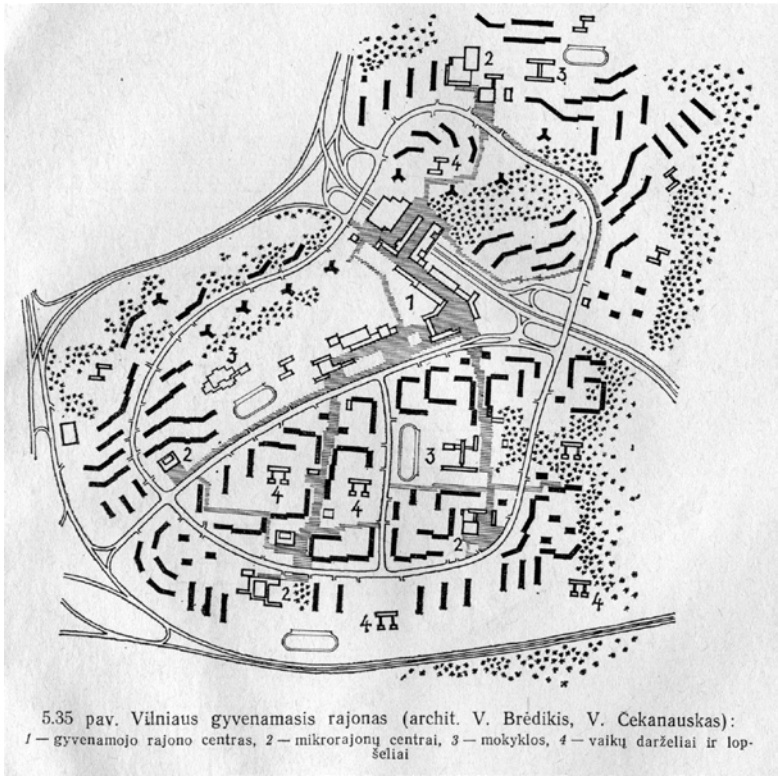

5.35 pav. Vilniaus gyvenamasis rajonas (archit. V. Brėdikis, V. Čekanauskas): *1* — gyvenamojo rajono centras, *2* — mikrorajonų centrai, *3* — mokyklos, *4* — vaikų darželiai ir lopšeliai

Fig. 43. Master plan of Lazdynai residential district, 1969

This new strategy of the local centre led to the review of the original master plan of Lazdynai, developed by architects V. Čekanauskas and V. Brėdikis (Fig. 43). The original project has never been fully realized and the main missing element is a local urban centre that had to be developed above Laisvės avenue as a main connector between north and south parts of Lazdynai. Nonetheless, a huge transportation corridor was supposed to be developed in the north-west, where Park of Fairy-tales is now. It had to lead Laisvės avenue to Vilnius western bypass from the north, and to leave Lazdynai district even less transit-oriented. Without these developments, urban structure of Lazdynai district lost its centrality and remained scattered, as it was also confirmed in the empirical research of the thesis.

To sum up, both old and new master plans of Vilnius city perceive under-development and fragmentation of Lazdynai urban structure and are trying to initiate the processes of its further progress. It looks like the concept by V. Čekanauskas and V. Brėdikis is still appreciated and further analysed, their urban solutions are being tried to be implemented, only with the correspondence to

the nowadays situation: the connecting urban centre is planned to be developed, while Park of Fairy-tales is remained as a huge recreational green area instead of becoming a highway.

3.1.2. Analysis of the social composition of the selected territory

One of the most important differences between Modernist urban planning and New Urbanism is that New Urbanism seeks to develop spatial structures from a level of a human eye, instead of looking to the territory only from a bird's flight. This ground view perception was implemented in the empirical research of the thesis through direct communication with residents (sociological web survey), thus, the natural further step before the design of the experimental project seemed to get familiar with these local people. This is why the analysis of the existent social composition, through the comparison of the selected territory and the rest of the city, was decided to be performed. It was done by using official geospatial data, acquired from the general population and housing census results (https://osp.stat.gov.lt/gis-duomenys) and by visualising these results using GIS technologies. The grid of all the maps is 100 x 100 meters. Only the summarised results of the analysis will be presented further in the text, but the full analysis can be found as the **Appendix 8**.

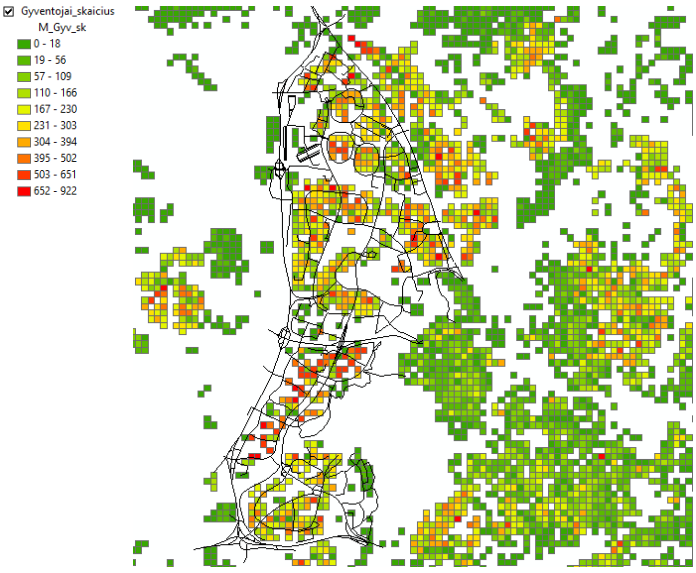


Fig. 44. Map of the residents' distribution, 100x100 meters grid

The analysis of social composition revealed, that both finally selected districts (Karoliniškės and Lazdynai) are dominated by weaker social groups, compared to the entire city, but their social composition is fundamentally different. It could be easily explained by their different spatial structures, noted in the empirical research and the different distribution of residents (Fig. 44). Because of these differences, completely different strategies should be used in order to strengthen local communities and to revive these districts. The conceptual model, developed in the empirical research, could be helpful in order to choose the essential approach of the further urban developments.

Karoliniškės has a very dense population and should not be densified anymore. Nevertheless, the living conditions of existent residents should be improved. The existent open urban spaces should be *intensified* and overlapped by different social values, in order to compensate a lack of physical space and density of residents. Such solutions should lead to a stronger community.

Lazdynai, due to under-developed urban structure, has a sparse population overall. This physical space could be used to *change* the existent social composition by attracting the new residents of missing social groups. This could be done by developing different housing opportunities and urban facilities, attractive to those social groups.

Summarised strategy of social development for both districts is presented in the scheme below (Fig. 45).

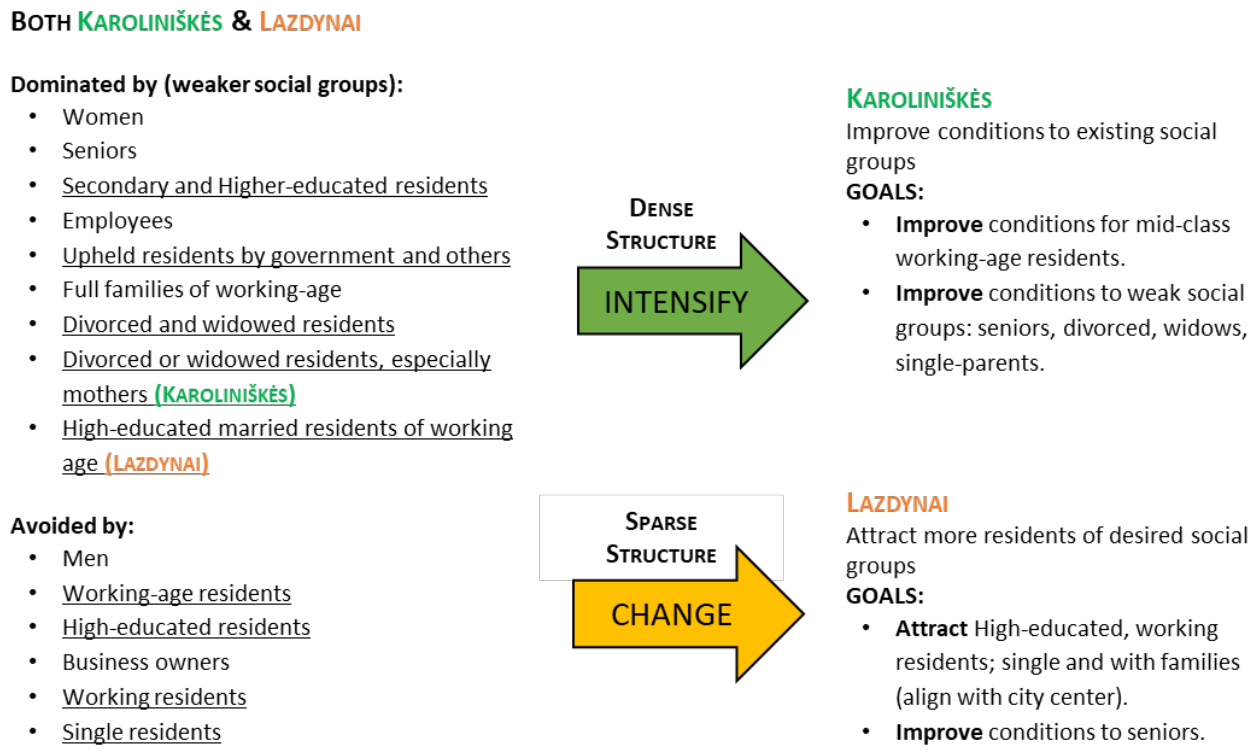


Fig. 45. Scheme of social development of Karoliniškės and Lazdynai

As the analysis revealed that both of the districts are fundamentally unlike, the completely different strategies for social, therefore and urban, development should be pursued in each case, thus, only the one district had to be selected for the experimental design. Lazdynai was chosen as the one for its untapped potential of becoming attractive living district for stronger social groups and the physical amount of empty space, providing the ability to pursue such goal.

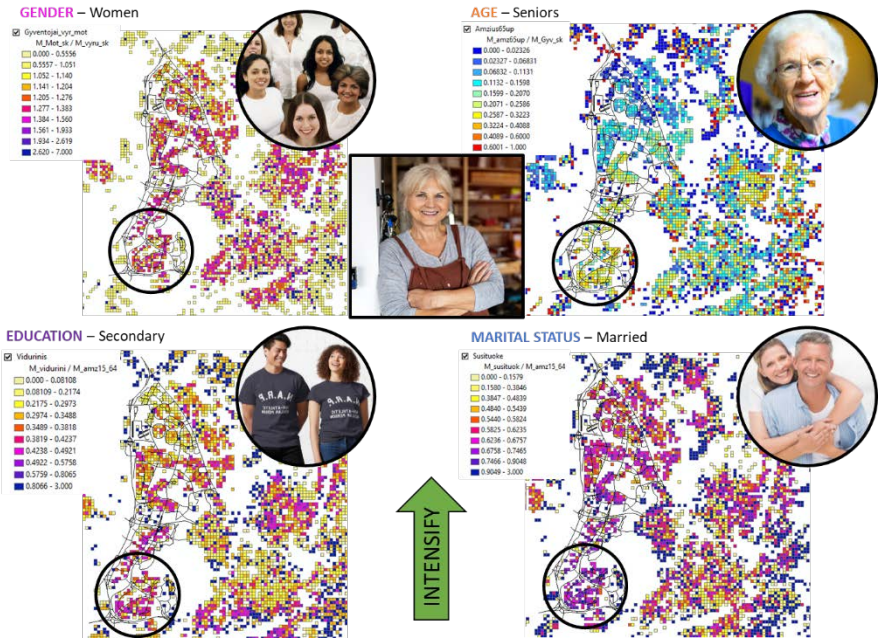
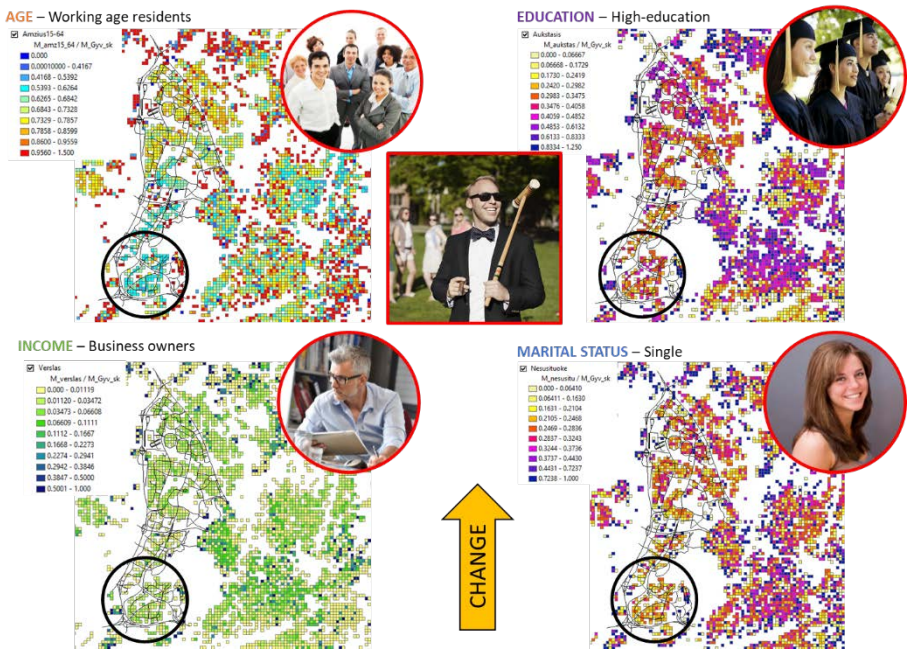


Fig. 46. Existent social profile of Lazdynai

After a single district was selected for the experimental design, full-composition social profile could be developed, consisting of existent and missing social profiles. These profiles had to be determined to develop the strategy of how to attract missing social groups, while strengthening the existent at the same time. In order to accomplish this task, four most relevant determinants were selected for each social profile. Gender, age, education and marital status were chosen for the existent social profile, while age, education, income and marital status for the missing one. Finally, these determinants were used to define archetypes for each of the social profiles:



- older-aged married lady with a mid-education level in the existent social profile (Fig. 46)

- working-age single self-employed man with a high-education level in the missing social profile (Fig. 47)

Fig. 47. Missing social profile of Lazdynai

3.1.3. Analysis of human needs in urban spaces

Any urban space has to fulfil natural needs of its users in order to be attractive. Natural human needs, according to Čiupailaitė (2015), in essence, could be divided into three categories: *sensational* (to see, to hear, to touch and to taste), *essential* (to play, to create, to exercise, to learn, to gather and to experience) and *changing* (contradiction or complementarity, safety or openness, guarantees or adventures, work or play, expected or unpredictable, similarities or differences, isolation or encounter, exchange or investment, independence (even loneliness) or communication, long or short time plans and store or spend (even waste) energy).

A couple more fundamental ideas, borrowed from Čiupailaitė (2015) could be helpful, when thinking of previously presented human needs. First of all, humans tend to gather on edges as borders creates back-protection and provides position in the space, thus, giving psychological control of that space. Usage of this pattern could be helpful when coding intuitive human gathering, either scatter in any urban space. The second important notice is that when people start spending time in any place, they begin to recreate it by filling it with subjective meanings. This interaction between a space and its users could be strengthened by providing more opportunities to make simple physical changes in urban design (to move a chair, to plant some flowers, to play an urban instrument, etc.). This kind of changes naturally make that space more personal, authentic and even resistant to time. To sum up, *edge* and *change* could be the essential keywords in order to develop an attractive urban space.

After natural human needs in urban spaces are defined, social values of the urban places in the selected territory, oriented to specified target groups (full-composition social profile) could be determined. Analysis of the favourite leisure activities, based on different sociological determinants and including a hundred of different activities, performed in United States (Settle, Alreck and Belch, 1979) suggested a wide variety of useful insights (Fig. 48). The age and location of the research could seem not relevant in the nowadays Lithuanian context from the first glance, but the diversity of activities and factors it suggests, makes the data obviously applicable.

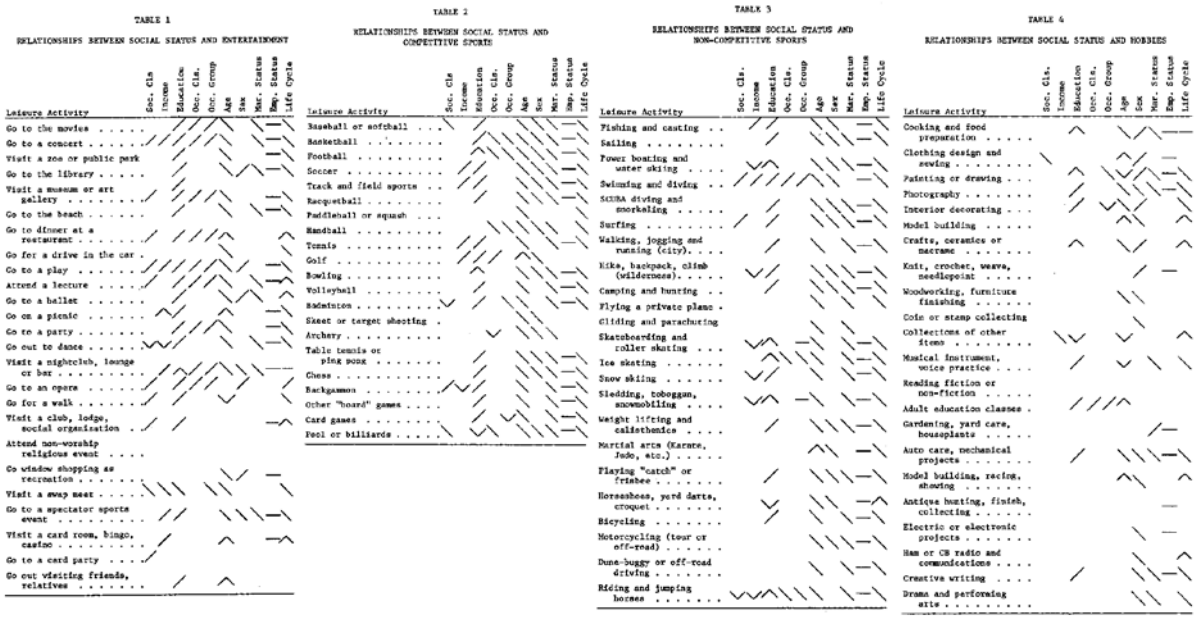


Fig. 48. Relations between different social groups and their leisure choices by Settle, Alreck and Belch (1979)

All analysed activities were classified into four groups (entertainment, competitive sports, non-competitive sports and hobbies) and later evaluated as two or three level factors with either present or absent significance of dependency to different determinants (e.g. two-level factor: married positive or negative; three-level factor: age, income). Considering only those independent variables associated with social status, the *educational level* of the respondent was by far the most effective determinant of leisure activity. The research delivers results (* - higher-educated people do not like, ** - mid-educated people do not like), presented below.

Higher-educated people prefer:

- most of *entertainment* (movie, concert, zoo or public park, library, museum or art gallery, beach, dinner at a restaurant, play, lecture, ballet, picnic, party, dance, opera, walk, social org., spectator sports event, friends)
- most of *competitive sports* (basketball, soccer, track and field sports, racquetball, tennis, golf, volleyball, badminton, table tennis, chess, backgammon, “board” games, card games, pool or billiards)
- half of *non-competitive sports* (fishing, sailing, swimming and diving, snorkelling, walking and running (city), hiking and backpacking and climbing (wilderness), camping and hunting, snow skiing, weight lifting and calisthenics, frisbee, bicycling, horseshoes yard darts and cricket**)
- *hobbies* (photography, instruments and vocal, adult education classes, auto care, creative writing)

Mid-educated people prefer:

- *entertainment* (night clubs, lounge, bar*, swap meet*)
- *competitive sports* (football*, bowling*)
- *non-competitive sports* (power boating and water skiing*, rolling-skates and boards*, ice-skates*, sledging*, riding and jumping horses*)
- *hobbies* (cooking and food*, painting*, crafts*)

Lower-educated people prefer:

- *entertainment* (swap meet*, pool an billiards**)

- *non-competitive sports* (horseshoes yard darts and cricket**, power boating and water skiing*)

The overall influence of determinants on the different groups of activities are as followed:

- *entertainment* is mostly based on education level and age determinants, while gender is only partially influential
- *sports* are mostly based on age, sex and marital status
- *hobbies* are mostly influenced by sex and life cycle determinants

In addition, the research reveals that lower *income* and older *age* does not enhance interest in any special activities, all of the interests are only dropping down, based on the analysed determinants. *Marital status* enforce only gardening and yard care, while *life cycle* correlates with the whole group of entertainment activities (dinner in restaurant, lectures, ballet, clubs, lodges, social organizations, card rooms and casinos are peaking in mid-term age groups; opera only in the last-term). *Men* prefer bars, night-clubs and spectator sports from entertainment activities group, enjoy all kinds of sports, and choose a variety of hobbies (photography, model building, woodworking, auto care, racing, electric or electronic projects, creative writing, drama and performing arts).

After natural human needs and possible leisure activities are analysed, general conclusions for urban developments, oriented to full-composition social profile, can be made and are described further.

Age determinant:

- *Seniors* is the most insecure social group in our society and are very often forgotten. This should be changed in the selected territory, as seniors make up a big part of its community. Their basic needs for urban spaces consist of proximity, safety, security and comfort (Sarkissian and Stenberg, 2013). These needs should be supplemented by possibility for new social encounters, life circle (possibility to positively interact with other age groups), encouragement for activities and hobbies and connection with the past (as most of them have grew up in none-urban surroundings and usually miss them).
- *Working-age residents*, could be said, that are spoiled and require the highest quality of their living environment. On the other hand, they are the biggest consumers and upholders of our economy. Usually, the key aspects for their living environment are qualitative housing and surroundings, and good connectivity. Commercial and recreational objects in a reach of hand could be beneficially delivered as extra virtues as well.

Education determinant:

- Lazdynai is already valued by *the higher educated people*, thus, it suggests that even higher-educated residents could be attracted here, as there still a gap form the old town and other central areas. The performed analysis reveal that higher educated people are more active overall and all four presented groups of leisure activities are interesting to them. This is why it could be expected, that more opportunities for diverse leisure opportunities could become a great attracting aspect for this social group to choose residing in the analysed territory. Moreover, education and income rarely correlate together, thus, possibility to easily and affordably access qualitative open urban space activities could be especially appreciated by this group as well.

Income source determinant:

- The selected territory does not have residing *entrepreneurs* almost at all. It is a huge drawback, concerning its possibilities to be a self-sustaining district, as strong independent inhabitants tend to improve their surroundings (for their own pleasure and for the attraction of their commercial targets), while absence of them influence stagnation. This is why the attraction of entrepreneurs should be considered as one of the priorities. These businessmen could be divided into two smaller groups, whose needs are different as well: local business owners and freelancers. In order to attract *local business owners* to the selected territory, spatial opportunities for their business and customers' intensity should be mostly enforced, while comfortable combination between work, home and social public spaces could be attractive for *freelancers*.

Marital status determinant:

- The majority of residents, living in Lazdynai, are *married*, thus, better spatial solutions could be introduced to strengthen the position of families. Bigger living places, privacy, safety, security and decent parking should be considered as the basic needs, while proximity, social infrastructure, diverse shopping, entertainment possibilities and active local community as advanced needs for them.
- Despite the majority of married residents in Lazdynai nowadays, *single citizens* could infuse more life to the district and to close the full circle of life in there. Single people tend to appreciate connectivity probably the most and especially enjoy active places, with a possibility to easy social encounters, thus, these values should be well-developed.

3.2. Development of the design strategy

3.2.1. Urban analysis of Lazdynai district

Fig. 49. Scheme of essential present urban structure

In general, all the urban structure of Lazdynai district could be divided into three main elements: streets, buildings and nature elements (Fig. 49: black, grey, and green and blue).

The whole district is wrapped by Vilnius western bypass in west and south, and there are three main streets in the inner district structure: Laisvės av. (the main western Vilnius axis), Architektų str. (the main circle-street around entire district) and Erfurto st. (the main inner-structure street). All these streets are mono-functional, designed only for car transit and parking. They work as barriers for pedestrians (this is especially true to Laisvės av.) and are of almost the same boring section profile, consisting of four cars-lanes.

The building aspect of Lazdynai district is of typical Modernist urban planning scheme and is basically mono-functional as well: the majority of

buildings are of living purpose, necessary educational infrastructure is developed in between and a few locations of public (administration and commercial) objects are introduced as well.

All this urban structure is situated in the close finger-like connection with the large green areas that are the parts of big structures, belonging to the main natural framework of Vilnius city. It has an important connection to the main Vilnius River Neris as well.

These three main elements of the structure of Lazdynai district creates a unique natural circulation of the open urban spaces and dictate the natural flow of pedestrians (Fig. 50), thus, should be primarily taken into account, when developing the design strategy.

Fig. 50. Scheme of the urban structure from the pedestrian point of view

Fig. 51. Scheme of the influence zone of the possible local centre

The main local centre. As it has been discussed in the previous sections of this chapter, Lazdynai district was not fully developed by the original project, thus, it lacks a strong local centre. On the other hand, Lazdynai are within a reach of a few important objects outside the district: TV tower, Plikakalnis escarpment, Litexpo exhibition palace, Vingis park (the connection will be stronger as a new pedestrian bridge from Litexpo to the park is planned), newly developed Business Park, the main traumatology hospital in Vilnius and Park of Fairy-tales (which is abandoned nowadays but has a great potential) (Fig. 51). To sum up, the development of a new local centre could be a great influence to the district itself and could help to develop strong inter-relations with the surrounding territory.

Network of commercial objects. Despite the under-developed main local centre, Lazdynai has four small local centres, situated along the ring-street and their influence zones of 400 meters radius (represents local users) cover the most of the district (Fig. 52). However, the north-western part of the district remains commercially unprovided, thus, a new local centre could be developed there. This could ensure even circulation of local pedestrians. The main local centre could be developed in such location, that its influence zone could cover the entire district within maximum walking distance of 1000 meters (represents global users). The location of the current shop “Aibė”, on the side of Laisvės avenue seems to be such a spot, as it is reachable from every point of the district.

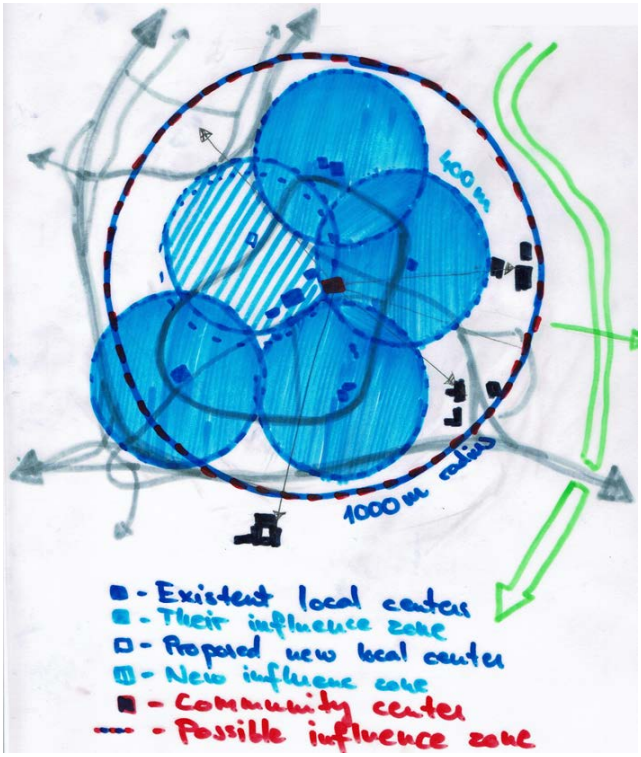


Fig. 52. Scheme of the local centres and their influence zones

Fig. 53. Scheme of the existent and potential places for further developments

One of the conclusions in the theoretical research of the thesis was, that the only limitation for new developments in an existent urban structures is physical space, thus, this space is the only way to attract capital to these areas and to initiate their revitalization. This is why it is important to locate physical places for possible new developments (Fig. 53). The main local centre could be a joining element of all public and commercial objects, clustered along Erfurto str., thus, it could be expanded to a wider territory of both sides of Laisvės av., and by this, to connect the north and south parts of Lazdynai. Nevertheless, the network of commercial and public services could be strengthened by enforcing existent objects and connections between them. This is especially valid for the existent pedestrian alleys. New developments could appear out of the central zone of the district as well. The empty spaces along the ring-street could be used for new buildings or public spaces, while the north side of Vilnius western bypass could be especially convenient for logistic and global commercial objects and, additionally, could work as noise barriers form the bypass.

Privacy levels. Modernist urban districts, and Lazdynai as one of them, lack diversity of privacy levels, as everything is evenly public or communal. In the empirical research of the thesis was discussed, that this uniformity make open spaces between buildings just vacuum spaces with no function. This lack of functioning suppress residents' responsibility of those urban spaces. Creation of the diverse publicity levels (Fig. 54) of urban spaces could help to provide these places with different functions. This could result in more active usage of those places and to foster residents' physical ability to become, as Jacobs (1993) says, "eyes" of a neighbourhood: all the time watching and being attentive to the urban spaces they psychologically and (or) physically possess.

Defining the neighbourhoods. Defining the boundaries of the neighbourhoods, according to Donnelly (2010), is the essential aspect, enabling to develop the system of publicity levels. Analysis of the relations between the existent buildings and the terrain could help defining these boundaries in the

most natural manner (Fig. 55), as enclosed courtyards, terraces of different levels and strengthened corners are the main means that could be used for territorial demarcation.

Fig. 54. Scheme of the possible privacy zones

Fig. 55. Scheme of the buildings' response to the terrain

Six different types of such relations were found in the analysed territory that could help dividing it into separate human-scale neighbourhoods:

- buildings, organically following the terrain
- buildings, contradicting the terrain
- high-raise buildings, emphasizing the top of a hill
- high-raise buildings, emphasizing important urban corners
- buildings, creating their own circulation in the lower valley
- building, creating a swirl in the upper plateau

Local and global users of urban environment. Based on Janet Jacobs (1993), urban spaces become safe if they are constantly used. For this reason variety of users, naturally controlling their surroundings throughout most times of the day (and night) should be ensured. Seniors and mothers with children control urban spaces during day, but runners, bicyclists, dog-walkers, pub-visitor could guarantee the surveillance during night. The main users of any district are local residents, thus, their diversity should be wide. This could be ensured by creating a full-composition social structure of the territory, as described in the previous section of the thesis. Nevertheless, global users could play equally important role in contributing to social control. This is why attraction of outside-district employees, tourists and other tress-passers should be encouraged.

After the full-composition sociological profile of residents and visitors was created, the most attractive zones of the territory for every type of users had to be found. Four aspects (proximity to nature, noise or calmness, privacy or transition and proximity to action) were chosen as the most

important factors, and all of the defined users were assigned to the most suitable areas of Lazdynai (Fig. 56). It is important to mention, that this assignment should not be followed straightforward as the diversity of users is necessary in all urban neighbourhoods. Moreover, design is not the tool of a dictation, rather a coded suggestions to the expected urban scenario.

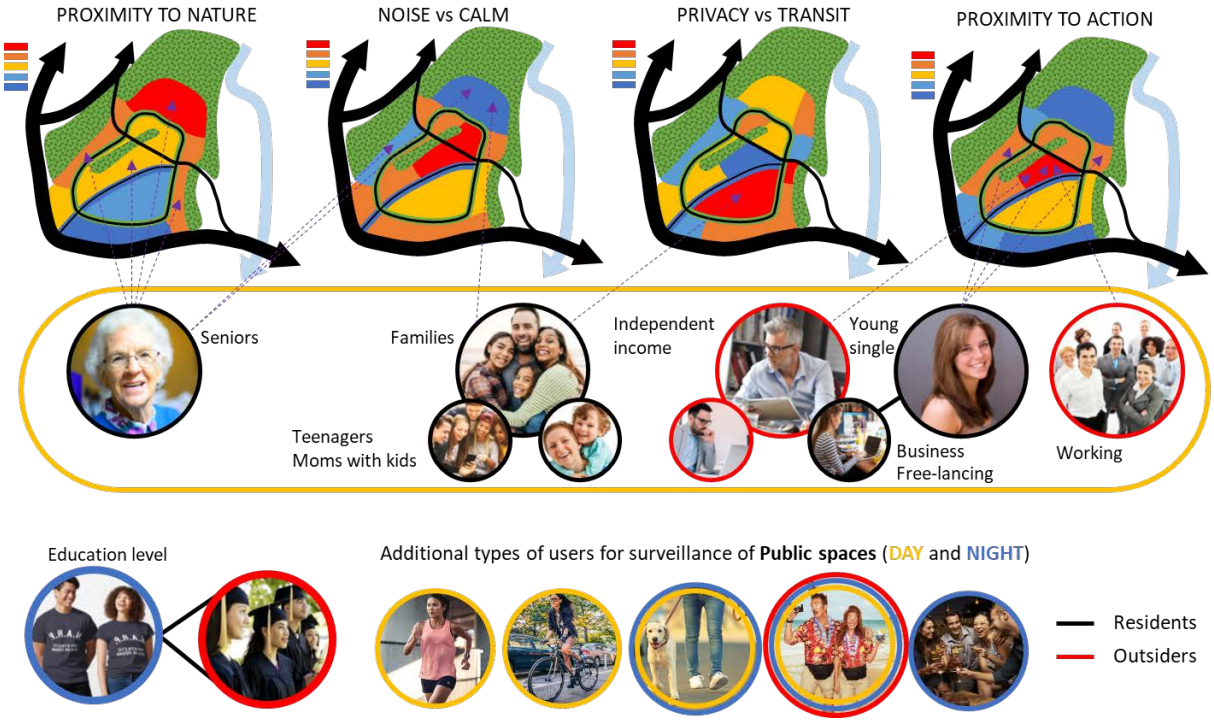


Fig. 56. Scheme of the different types of local and global users

3.2.2. Design strategy of the revitalization of Lazdynai district

After the pre-project and urban territory analyses were conducted, a variety of urban problems, as well as possibilities for improvements, were uncovered. Nevertheless, the findings remained rather chaotic and a clear design strategy had to be developed. It was obvious that it is not enough to concentrate only on buildings, either on public spaces, as in both cases the revitalisation of the selected district would be incomplete. It would oppose the essential results of the theoretical research of the thesis, stating that only the complex urban developments could be able to breathe life to those dormant districts. Besides that, referring to Alexander et al. (1977), the goal of such project should be to develop the fluid system of an urban structure, which inherit its diversity through the overlay of different urban networks.

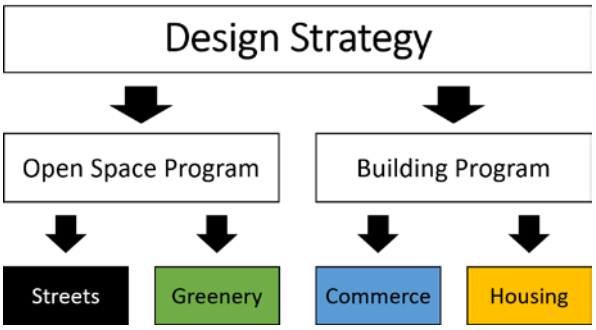


Fig. 57. Scheme of the design strategy

This is why both of these programs (open space and building) were decided to be involved into the design strategy (Fig. 57). Further, the open space program was divided into the aspects of streets and greenery, while the building program became consisted of commerce and housing aspects. It was evident that the existent urban structure has the strong, but fragmented basis of all mentioned aspects, yet it lacks coherence and diversity, thus these facets could be used as a potential.

Open space program: aspect of streets

Street is the most important public space in the city, according to Jane Jacobs (1993). This is a place where all public social life happens, where strangers are encountered and where new relationship are opened. The intense human usage of streets makes them safe and street-life lively. Only in Modernist districts everything was planned oppositely: streets were oriented not for humans, but exclusively only for cars. Streets, due to Modernist planning, become barriers for pedestrians and humans overall: becoming the main elements of urban structures, but breaking down the coherent fabric of a territory. This segregation firstly came physically, but finally resulted socially and even ecologically.

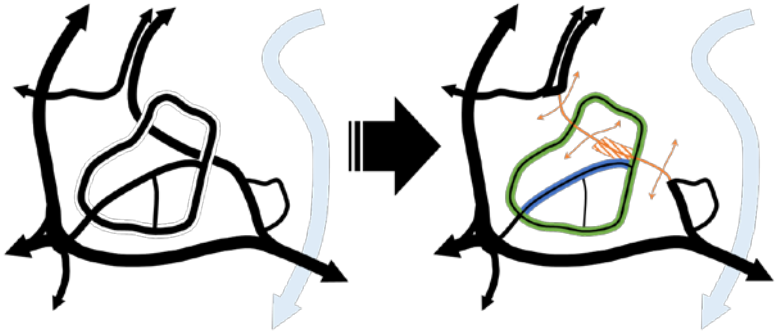


Fig. 58. Schemes of the existent and proposed structure of streets

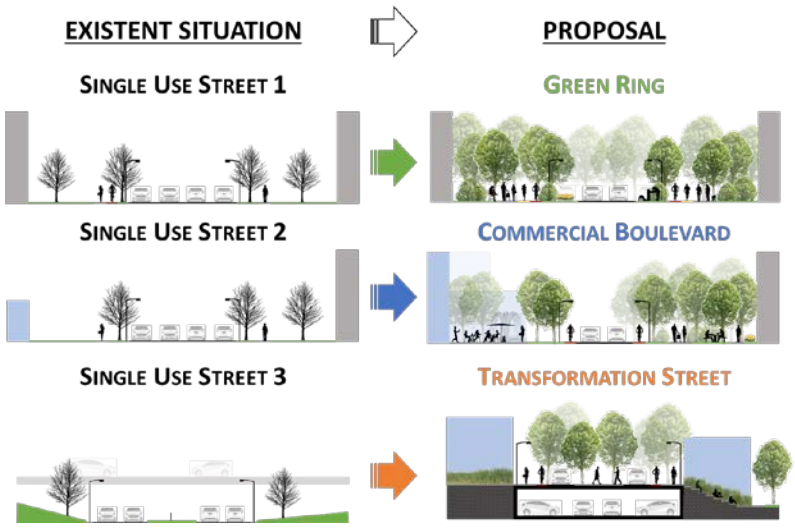


Fig. 59. Sections of the existent and proposed profiles of streets

There are two main problems of the streets in Lazdynai: inappropriate wideness and level differences that are physically segregating urban and green structures; and mono-functionality that makes urban structure boring, pedestrian useless and, thus, unsafe.

A proposal to the streets of Lazdynai district is to diversify their profiles (Fig. 58, Fig. 59). This could be done by providing different specializations to each of them and by changing their status from car-oriented to human-sensitive. Lazdynai is a very suitable district for this kind of a strategy, as it has only three main inner streets, and the realisation of their diverse potential comes almost naturally:

• *The green ring* (Fig. 58: green). Architektų str. encircles the entire district and is already perceived as a public space for strolling by some residents, as was revealed in the empirical research of the thesis. Therefore, the potential social values of this street could be enforced, by reducing amount of transport lanes, but developing a strong structure for active human movement: nice sidewalks, running tracks, bicycle lanes and high quality green surroundings with relevant infrastructure (water stations for people and their pets, benches, small inclusions of recreational or beauty elements). This street, instead of segregating the existent urban structure, could become a connecting linear park, attracting residents by well-developed green activities.

- *The commercial boulevard* (Fig. 58: blue). Erfurto str. is the central street of Lazdynai district. It crosses the district broadways and goes through its main (under-developed though) local

centre. This street has a potential of becoming the main pedestrian alley, containing full range of commercial and administrative objects. Strengthening of commercial functions could increase the importance of the local centre itself, and to provide lacking centrality to the district.

- *The transformation street* (Fig 58: orange). The relevant part of Laisvės av., based on the previous analyses, has lost its usage intensity, when Vilnius western bypass was developed. Its four car-lane structure, with a wide green lane in the middle and only viaducts for pedestrian passage at the ends of the districts (in Architektų str.), seems irrelevant to the existent situation nowadays. It is physically segregating the south and north parts of Lazdynai (urban and green structures) and barely has any sidewalks. It does not contribute to a coherent urban fabric. To solve these issues, first of all, viaducts are suggested to be eliminated and the pedestrian connection of the south and north parts of the district improved. This could be done either by lowering the green ring to the level of Laisvės av. or by elevating Laisvės av. to the level of the green ring. The second option was chosen, as the existent level of Laisvės av. is not natural. It interferes the natural relief and breakdowns the natural framework of pine-forest massifs. Restoration of this natural framework could join the south and north parts of Lazdynai physically and, thus, enforce its social values. Nevertheless, the demolition of drive-ups on the viaducts would clear out rather a large horizontal physical space that could be used for new urban developments, while elevation of the street would create some vertical space that could be comfortably used for underground parkings of the local centre.

Open space program: aspect of greenery

The existent green structures of the territory is fragmented due to the interfering massive streets, as was discussed before. Moreover, they work as barriers from other districts by themselves as well. Under-development of such large green territories makes them and the surrounding territories unsafe, as sufficient social control is not created (Jacobs, 1993). On the other hand, this disrupted green structure is the part of the green network of entire Vilnius city, and has a great potential of becoming a valuable recreational resource, thus, would be beneficial for local users and could attract people from the other parts of the city.

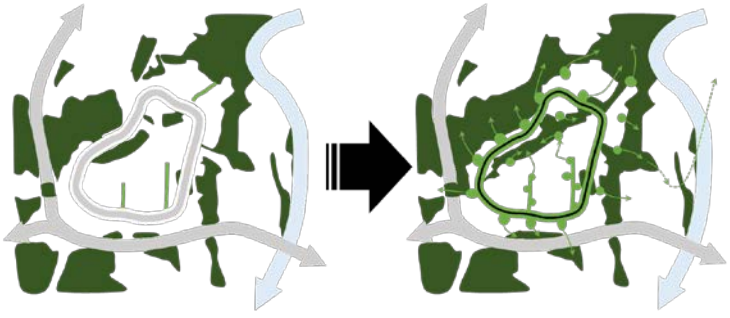


Fig. 60. Schemes of the existent and proposed structure of greenery

This could be done by (Fig. 60):

- regenerating the connections of fragmented *large green areas* (Fig. 60: dark green)
- developing the *green ring* of health and leisure, as a circular network of pocket spaces (Fig. 60: the green ring)
- developing *small park-like facilities* on the edges of the large green areas for sport and relaxation, helping to attract resident to these green forests (Fig. 60: light green circles)
- completing the existent *pedestrian alleys*, by developing small pocket urban places on their path (Fig. 60: light green verticals)

To ensure that the pocket spaces are used by resident, their function should be carefully chosen, based on social groups, living close by or that are wanted to be attracted. According to the full-composition social profile, developed in the previous section, and the analysis of the leisure needs of different social groups, such assignment of activities could be made:

Fig. 61. Scheme of the proposed activities for the network of pocket spaces

- playgrounds, skate-parks, climbing-parks, outside-school facilities, pet lots and similar activities could be developed nearby residential areas more fit for *families*
- board-game pavilions, gardening facilities: besides areas where more *seniors* could be living
- outside working lounges, competitive active sport facilities, calm mental-physical development pockets: close to *young educated residents*
- pick-nick zones, fields for light physical activities (such as frisbee or badminton), exercising grounds could appear in the more *common places*

After the assignment of different activities to the different social groups was made, these activities had to be assigned to the particular urban places in Lazdynai district, thus, a diverse network of small pocket spaces could be developed (Fig. 61).

Building program: aspect of commerce

Lazdynai has a fundamental commercial structure, on the other hand, it is rather week, scattered and lack centrality. This deficiency of commercial units in the district makes residents travel out of the district for work, their daily and special needs (as was revealed in the empirical research of the thesis), and limit the attraction of global users to the district, despite its huge recreational potential, thus, according to Jacobs (1993), suppresses vitality of open urban spaces.

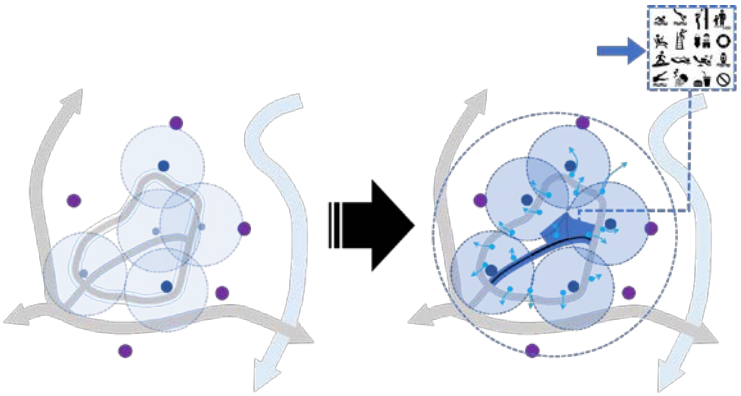


Fig. 62. Schemes of the existent and proposed commercial structure

Based on these insights, the best option to strengthen the existent system, seemed by reinforcing the main local centre and by developing the solid network of the commercial units of diversified importance. The proposed strategy, in essence, could be broken down into a few directions (Fig. 62):

- to strengthen the *main local centre* for the fulfilment of the special and work needs of local users (Fig. 62: blue central area)

- to create a network of *small commercial units* for fulfilment of the daily needs of local users (Fig.62: cyan)
- to develop a *specialisation* for the main local centre, in order to attract global users from the surrounding territories for work and recreation

Recreational specialisation with water activities would be almost natural to Lazdynai district, as it already has the biggest swimming pool in Vilnius (under reconstruction now), is located practically inside a pine-forest and borders Neris River.

Besides the above mentioned strategy directions, Janet Jacobs (1993) suggests, that the commercial aspect could overlay with the greenery aspect in such a way, that small commercial units could help attracting people to the large green areas of a city as well. This could help softening the edges of dark forest massifs and to draw this natural greenery inwards the urban structure, thus, could help creating a feeling of living in a resort. It could be done by creating kind of a luring system (Fig. 63), which should be constructed as followed:

Fig. 63. Scheme of the luring system, based on Janet Jacobs (1993)

- *small pocket park-like facilities* (Fig. 63: light green) should be created not deep inside the forests, where nobody can see them from the outside, but on their edges, thus, making them visible and attractive from the outside, preferably from the streets (the green ring in the case of Lazdynai)
- *small commercial units* (Fig. 63: cyan) should be mirrored to these pocket park-like facilities of related functions, as it could help users to notice these associative connections, and, therefore, it could encourage them to partake in the suggested activity in these mirrored green urban spaces (e.g. a large window in a café with a bookstore, oriented to a park could attract people to a visible small public space, fit for reading and relaxation; a shop of board-games could attract people to a nice board-game pavilions; a shop of gardening in the right place could encourage development of a flower park, etc.)
- strong connection between the above mentioned elements and carefully selected locations for them could gradually attract people from the urban structure to *large green areas* (Fig. 63: dark green), thus, such structure could make large forests connective urban elements, instead of barriers

Building program: aspect of housing

The last aspect of the developed design strategy is housing. The focus of this program is kept on the identification of differences between the defined neighbourhoods, finding which social groups would benefit the most, when living in one or another type of urban neighbourhood, and on the diversification of the privacy levels of existent urban structure overall. The diversification of the

privacy levels and functions of open spaces could increase the usage of urban spaces and residents' responsibility for them, as was deeper discussed previously in the thesis. The introduction of neighbourhood-clusters in urban areas could increase social control and, therefore, overall safety inside those neighbourhoods. Moreover, it could help orienting communal spaces to the target social groups, thus, increasing livability there.

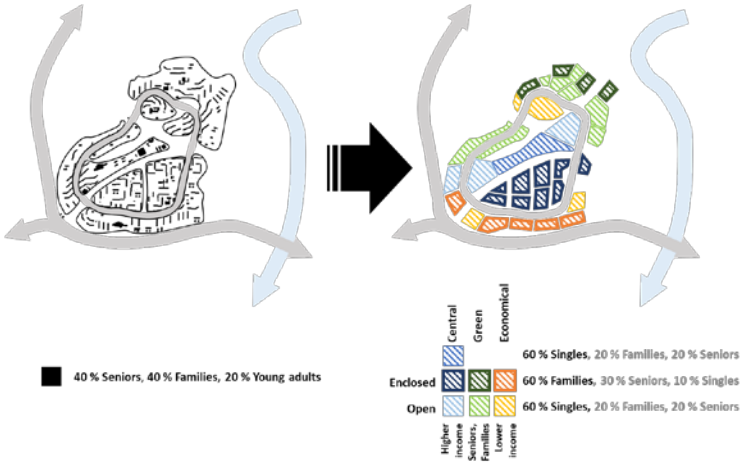


Fig. 64. Schemes of the existent and proposed structure of neighbourhoods

Housing program (Fig. 64) was developed based on the results of the previously performed theoretical and urban analyses. First of all, a simple matrix was developed, representing the main location values (central, green or economical), spatial typology (enclosed or open), the most benefitting social groups (of higher and lower income, seniors and families). Then, possible social composition for each kind of neighbourhood was defined (percentage of single residents, families and seniors).

In essence, the developed matrix represents two types of neighbourhoods: enclosed and open. Enclosed neighbourhoods are perceived as more suitable for families, while more open should be better fit for young single people. Further, these neighbourhood were diversified, based on locations as well: central, green and economic zones. It is important to mark, that it was decided that seniors should not be separated from other social groups in any way, ensuring interaction of "Life cycle" (Alexander et al, 1977), on the other hand, more private and calm (family like) structures and proximity to nature are expected to be priorities to them.

It is essentially important to note, that the proposed housing program and the assignment of the social groups to the specific neighbourhoods should not be seen as a top-down strategy. It is very important to remember, that these implementations are performed in the existent and inhabitant urban area, where people are residing, and the strategy is not to forcefully move everyone out at first and bring others in later. It is critical to understand, that a designer does not stand in a position (and should not be willing to) to make residents act in one way or another, instead he can make urban development decisions that, hopefully, would naturally change human behaviour in a natural, yet expected manner. In other words, when, for example, declaring that the enclosed neighbourhood is more suitable for families it is meant that it is expected that 60 % of the resident of this social group could be living there later, instead of 40 % residing now.

Finally, the reconstruction of the existent residential buildings (development of identifiable architecture, redevelopment of apartment structures) could be important in reaching the goal of the revitalisation of Modernistic districts, on the other hand, this master thesis is oriented to urban planning solutions and networks of neighbourhood scale, thus, possibilities of such regenerations are not further analysed.

Summary of the design strategy

Summarised design strategy is visualised in the overall scheme (Fig. 65) and can be described as followed.

Existing situation:

- *streets* (Fig. 58) are segregating urban and green structures and lack social functions
- *greenery* (Fig. 60) is fragmented and segregated from urban structure, therefore, abandoned
- *commerce* (Fig. 62) consists of under-developed network of local centres, while small commercial units are absent
- *housing* (Fig. 64) consists of transit oriented living areas with no diversity of privacy levels

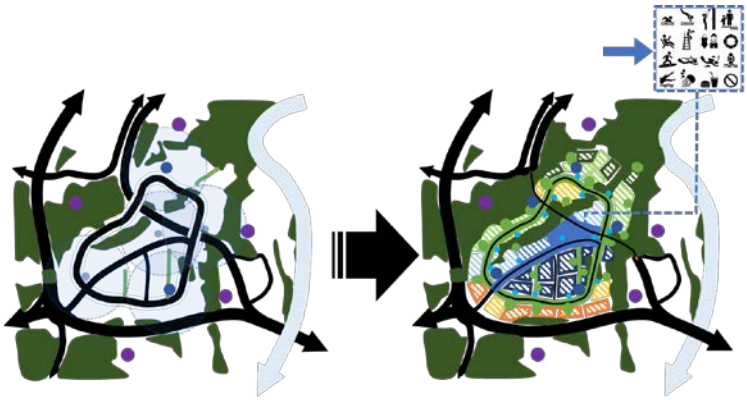


Fig. 65. Schemes of the existent urban structure and the proposed overall strategy

Developed design strategy:

- *streets* (Fig. 58) should be transformed to connecting urban elements, instead of being dividing barriers, by introducing diverse social values to them
- *greenery* (Fig. 60) should become more engaging by creating the ring of small public spaces that are inviting to explore larger green structures
- *commerce* (Fig. 62) should be strengthened by reinforcing the existent networks of local centres and of small commercial units, and by providing specialisation to a local centre that could help becoming of global interest
- *housing* (Fig. 64) should be transformed by clustering existent living areas to small neighbourhoods, while providing them more privacy and target oriented facilities

3.3. Design elaboration of the selected area in Lazdynai district in Vilnius

After the needed pre-project analyses were performed and the design strategy was developed, the design elaboration of a higher detail-level had to be made, in order to reveal how that strategy could work in practice. The entire district of Lazdynai is a territory of around 180 ha and it would not have been possible to elaborate it all. On the other hand, it was necessary to elaborate maximum aspects of the design strategy to show its full potential. Two different approaches could have been chosen for that. The first was to select several locations throughout the entire district, where a few different aspects intersect. The second was to find a single larger area that could cover the majority of the design strategy, and

Fig. 66. Selected territory for the design elaboration

that could illustrate a variety of the proposed design solutions. The second option was chosen, as the biggest urban issues in Modernist districts appear in physical gaps between the separate object (buildings, streets or greenery) and urban networks are particularly capable tool in solving such problem.

As a result, the central zone of Lazdynai district (Fig. 66) was decided to be the best single area for the design elaboration, as it covers all four aspects of the design strategy:

- all of the three *streets* that are proposed to be altered
- a part of the *large green area*, which is suggested to be re-unified and integrated better into the existent urban structure
- the main local centre, which is suggested to be newly developed and intensified *commercially*
- two main different types of housing *neighbourhoods*

After the essential design elaboration was finished, possibility of the Alexander's et al. (1977) patterns, already chosen in the theoretical research, application was decided to be checked. This overview could be perceived both: as a propositional further elaboration of the experimental project, either as the evaluation of the complexity of the already developed project. The second approach is especially valid, as Alexander et al. (1977) were emphasizing that a successful urban project should be filled with a variety of overlaying patterns. Despite that the assignation of the patterns was done at the end of the workflow of the design elaboration, they will be presented in brackets further in the text in the relevant places, as this approach provides clearer ascription. The visual summary of all of the patterns that were chosen in the theoretical research (as well as the marking of which of them were later not used in the experimental design) can be found in the **Appendix 1**.

3.3.1. New building structure and the main zoning

Design elaboration of the selected territory was started from the functional zoning and the configuration of new buildings. Buildings were planned in such a way that they could strengthen the boundaries of the neighbourhoods. Functional zoning (Fig. 67) and the new buildings (Fig. 68) were not developed in the linear way, but rather in a circular manner, as while developing one, another had to be re-developed respectively. Thus, the presented schemes should not be viewed in a linear order, but rather simultaneously as well.

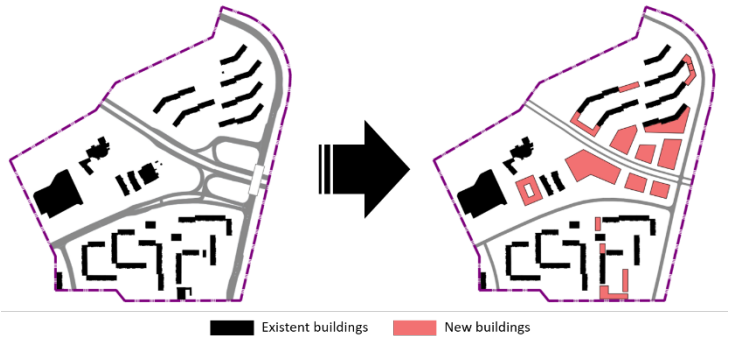


Fig. 67. Schemes of the existent and proposed building structures

First of all, buildings of the main local centre were developed. The main idea here was to use re-gained physical space from the eliminated viaduct (Pattern by Alexander et al.: "Site repair" (1977)) and to develop a commercial town in that area. It was decided that it could strengthen the centrality of the district, make it more intensively used by both, local and global, users, and to provide residents with the qualities of the downtown life (Patterns by Alexander et al.: "Density rings", "Activity nodes" (1977)). The essence here was to join the southern and northern parts of Lazdynai. It was done by forming mirrored urban structure on both sides of the transformation street. A clear

frontline, following the transformation street, was developed, as this kind of structure creates urban gateway for the arriving outside-district users (Pattern by Alexander et al.: “Main gateway” (1977)).

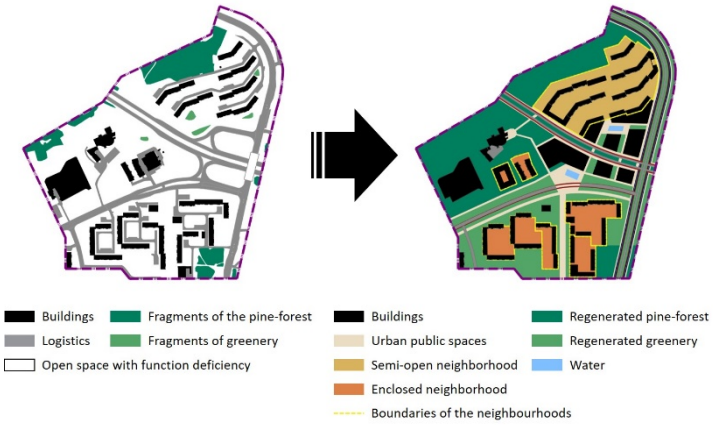


Fig. 68. Schemes of the existent situation and the proposed main zoning

While development of the main building composition was in progress, the principle zoning was helping to clarify the overall urbanistic hierarchy (Pattern by Alexander et al.: “Hierarchy of open space” (1977)). The main public urban spaces were organized, focusing on the pedestrian flows that should be running through the new local centre, and on joining the commercial boulevard with the main pedestrian alley (Patterns by Alexander et al.: “Promenade”, “Paths and goals”, “Network of paths and cars” (1977)). To emphasize the importance of this collision, the new central square of the entire district was developed there, as a dominant urban element.

Another important urban element that is already present in the territory is a church, yet the existent urban situation is not in its advantage. The church faces the back-sides of the existent buildings now and is overwhelmed by large parking lots. It was decided that the main eastern entrance of the church could be better emphasised, residents from the northern part of the district more clearly invited to it, and the more intimate atmosphere created. For this reason the main entering road and the paths were re-oriented from the transformation street and the pine-forest was brought inwards (Pattern by Alexander et al.: “Sacred sites” (1977)).

After the main pedestrian flows were tackled, courtyard-like zones were defined as urban neighbourhoods. A few smaller clusters of enclosed neighbourhoods were naturally defined in the southern part of the territory and one large semi-enclosed in the northern (Patterns by Alexander et al.: degrees of publicness”, “Identifiable neighbourhood”, “House cluster” (1977)). The defined neighbourhoods were surrounded with green parks, where more spontaneous social interactions could happen with residents from other neighbourhoods or with visitors. The existent pine-forest was decided to be drawn inwards the urban structure as much as possible, as its resort-like natural structure could contribute to the idea of developing a specialized local centre, oriented to water and recreational activities, as the swimming pool (Pattern by Alexander et al.: “Still water” (1977)) and natural pine-forest already exist there.

3.3.2. Elaboration of the profiles of the main streets

In essence, all open urban spaces can be divided into private and public. Private spaces are the yards of neighbourhoods, while the most physical space consuming and the most important public spaces are streets. This is why it was decided to elaborate the vision of the main streets in Lazdynai district in more detail. The following visualisations represent all three re-developed streets that were better described in the design strategy: the transformation street (Fig. 69), the green ring (Fig. 70) and the commercial boulevard (Fig. 71).

Fig. 69. Visualisation of the transformation street

Fig. 70. Visualisation of the commercial boulevard

Fig. 71. Visualisation of the green ring

3.3.3. Elaboration of the main pedestrian alley and the central square

The main pedestrian alley was re-developed as a chain of social urban spaces, attached on the sides of its main axis (Fig. 72) (Pattern by Alexander et al.: “Activity pockets” (1977)). This kind of configuration provides the main pedestrian path with small pocket spaces that can be diversified by their functions and oriented to different social groups (playgrounds, outdoor cafes, work-lounges, etc.). Collision of the commercial boulevard and the main pedestrian alley is emphasized by a central square, as was mentioned before. Due to this solution, the pentagonal square is developed in such a way that it is basically ignoring the carriageway. The priority to pedestrians there is even stronger emphasized by creating a huge pedestrian crossing along the commercial boulevard. (Pattern by Alexander et al.: “Road crossing” (1977)). It was decided to act in this manner in order to manifest that the street is the most import public space itself and should be oriented to people, not to cars. Moreover, such solution helps to join pedestrian flows that are coming from the newly developed local centre with the pedestrian alley even better.

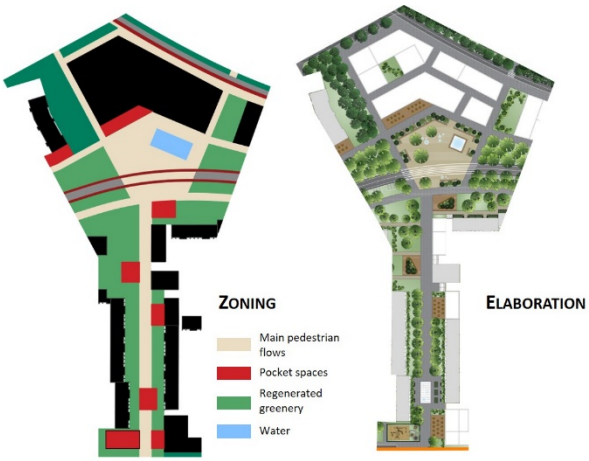


Fig. 72. Zoning and elaboration of the main pedestrian alley and the central square

The square (Fig. 72) was further elaborated with a great attention to its size, natural human need for back-cover and its division to smaller social activities (Patterns by Alexander et al.: „Pedestrian density”, “Small public squares”, “Beer hall” (1977)). Privacy and cosiness (Fig. 73) was created by developing plinths of greenery around the edges of the square for safe back of the benches and levelling down the southern edges. The main water-pool was left as a main accent of the square and smaller zones of ground-fountains were developed providing the relaxing view and sound of running water, also attracting children to play. A few trees, same as in the commercial boulevard, were planted in a free-manner inside the square, ensuring softer transect through the boulevard to the street, while also providing informal sitting places and some mild shadow. (Patterns by Alexander et al.: “Something roughly in the middle”, “Pools and streams” (1977))

Fig. 73. Visualisation of the main square

3.3.4. Elaboration of the private neighbourhoods

Enclosed neighbourhoods were decided to be targeted to families as this social group requires most safety and privacy. Mature adults and children of different age are expected to be dominant there, but other social groups, such as young adults and seniors should not be excluded, thus, the communal places should be fulfilling their social needs as well (Pattern by Alexander et al.: “Household mix” (1977)). These private neighbourhoods are especially fit to encourage social exchange of generations and could be beneficial to all three dominant social groups: seniors, children and their parents. Seniors are encouraged for casual accidental social interactions and, thus, might feel less segregated from the society. Children, gets an opportunity to get a life-wisdom teacher, while simultaneously developing comprehension and compassion. Moreover, parent might get an opportunity to acquire an instant assistance for watching their children, thus, to obtain some free-time for their needs, if the discussed relationship prosper. (Patterns by Alexander et al.: “The family”, “Life cycle” (1977)).

Six different function zones were developed in order to ensure the expected social behaviour model in the courtyards of the private neighbourhoods (Fig. 74):

- *neighbourhood plazas* of larger area for interaction and events of the entire community
- *sports grounds* of the diversified equipment as is necessary for all social groups
- *children playgrounds* of diversified equipment for the different age groups (Pattern by Alexander et al.: “Adventure playground” (1977))
- *calm zones* of comfortable cosy green area for relaxation and calm social interactions
- *urban agriculture plots* that are mostly oriented to seniors as they tend to feel alien in urban structures and lack connection to nature
- *dense green zones* as proximity to nature is especially important to seniors

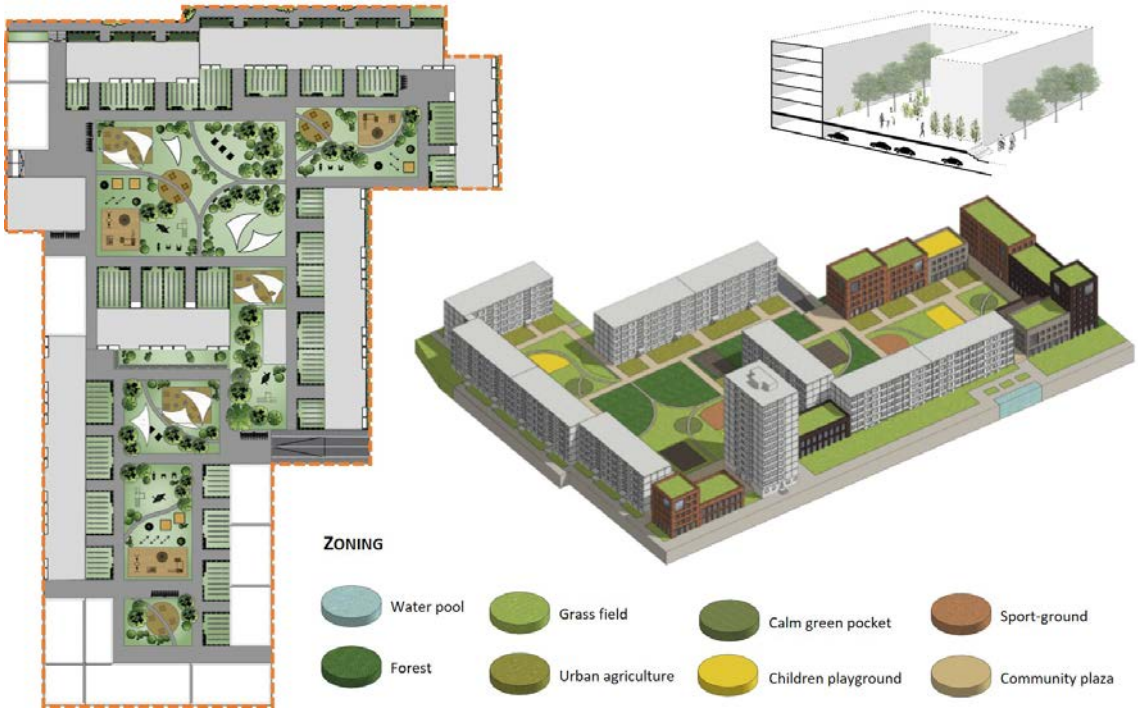


Fig. 74. Zoning and elaboration of the private neighbourhoods

All these social places could get a required physical space in Modernist neighbourhoods by removing all of the parking places out of the courtyards. All of these parking places are proposed to be moved

under the ground. In addition, this transformation provides neighbourhoods with even more parking places, and this quantity change is especially important for families, as deficiency of instant parking is felt now. While the parking lot is lowered by half a storey down, the terrace of the social places is lifted half a storey up (Patterns by Alexander et al.: “Common land”, “Common areas at the heart” (1977)). Moreover, this elevation helps to clarify the demarcation edge of the private area (Pattern by Alexander et al.: “Neighbourhood boundary” (1977)). A few new buildings were developed in a few places, where the courtyards were not fully enclosed, as well. These inclusions could also supplement the neighbourhoods with identifiable character, diversity of housing types and possibilities for local business (Patterns by Alexander et al.: “Circulation realm”, “Scattered work”, “Corner grocery” (1977)).

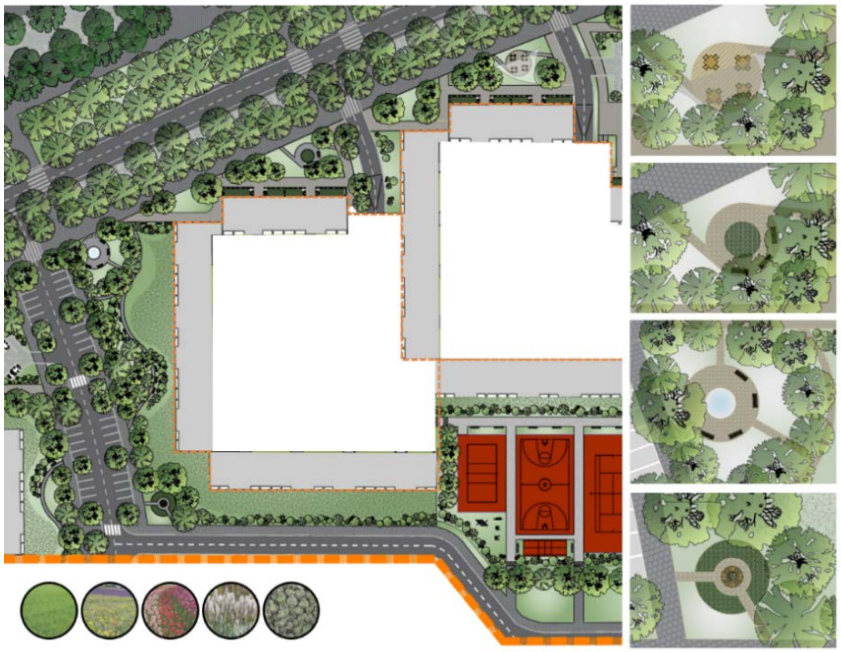


Fig. 75. Elaboration of the green areas around neighbourhoods

Green areas around the neighbourhoods (Fig. 75) could be developed in such a way that the complexity of nature would be felt. This could be done by planting trees and bushes of different sizes and by paying attention to the species of grasses, as the climate zone of Lithuania is especially favourable to them. Further, small social places could appear along the commercial boulevard and the green ring to create a structure of elongated park, accompanied with tiny social facilities (Patterns by Alexander et al.: “Positive outdoor space”, “Accessible green” (1977)). This could attract passing people to stay in these streets instead of only passing through them, and thus, to foster street-life.

3.3.5. Elaboration of the active neighbourhood

Another type of neighbourhood was developed in the northern part of the selected territory. Morphotype of the building structure there is more of the transit-orientation, thus, it was decided that such structure would be most beneficial to young adults or single people, as they tent to seek more for accidental social encounters and are less sensitive to “fenced” privacy.

Nevertheless, the main functions and some essential privacy has to be provided (Fig. 76). The elongated terrain-following building structure suggested that the main zoning should remain of the similar character as it is now, yet the parking had to be re-developed, because it pollutes all the instant environment of the residential-buildings now. For this reason it was decided, that the middle lane between the buildings could become more enclosed and surrendered to logistics, yet the outer lanes along the buildings should be developed as lush forests with a variety of diverse social paces. This neighbourhood is explicitly favourable for this kind of arrangement, as even green structures are naturally diversified: massif of the pine-forest are growing in the north and softer deciduous trees in

the south side. These natural frameworks should be strengthened, as they could ensure refreshing green environment. It is important that the middle lane, despite its dedication to logistics, should not become a field of grey asphalt, but rather be developed as a green inner garden. It could be done by designing parking places of soft covers and ensuring diverse vegetation (Patterns by Alexander et al.: “Small parking lots”, “Shielded parking” (1977)).

Fig. 76. Zoning and elaboration of the active neighbourhood

Such types of social places were developed in order to fulfil the needs of the young people and other social groups:

- *neighbourhood plazas* for larger scale interaction of the community
- *sports grounds* of even more diversified equipment and higher frequency than in the private neighbourhoods as young and single people tend to be more active (Pattern by Alexander et al.: “Local sports” (1977))
- *children playgrounds* of smaller scale then in the private neighbourhoods
- *calm areas* for relaxation and calm social interactions
- *dense green zones* as pine-forest that are brought inwards the urban structure could create a resort-like atmosphere
- *green park areas* as diverse lanes of forests could stimulate different social interactions
- *open air working lounges* of open or partly covered terraces that would be suitable for work, with cafes or other types of snack facilities nearby, with modern-office free-time equipment (ping-pong, darts, frisbee, etc.) (Pattern by Alexander et al.: “Street café” (1977))
- *logistics* of soft-ground parking places and the main road

Moreover, this district is especially interesting because the existent houses are built on slopes, repeating the curvature of the terrain. The usage of different altitudes for small social places could provide them with diversified characters and privacy levels.

3.3.6. Elaboration of the central neighbourhood

The new central neighbourhood is developed as the main local centre of Lazdynai district, as it is at the intersection of all three main streets of the district: the transformation street, the green ring and the commercial boulevard (Patterns by Alexander et al.: “Looped local roads”, “Shopping street” (1977)). The idea was that this new neighbourhood had to supplement the entire district with diversified functions, morphotypes and character. It had to improve the life quality of the existent residents and to attract new people for living, working and spending their free-time there (Pattern by Alexander et al.: “Magic of the city”).

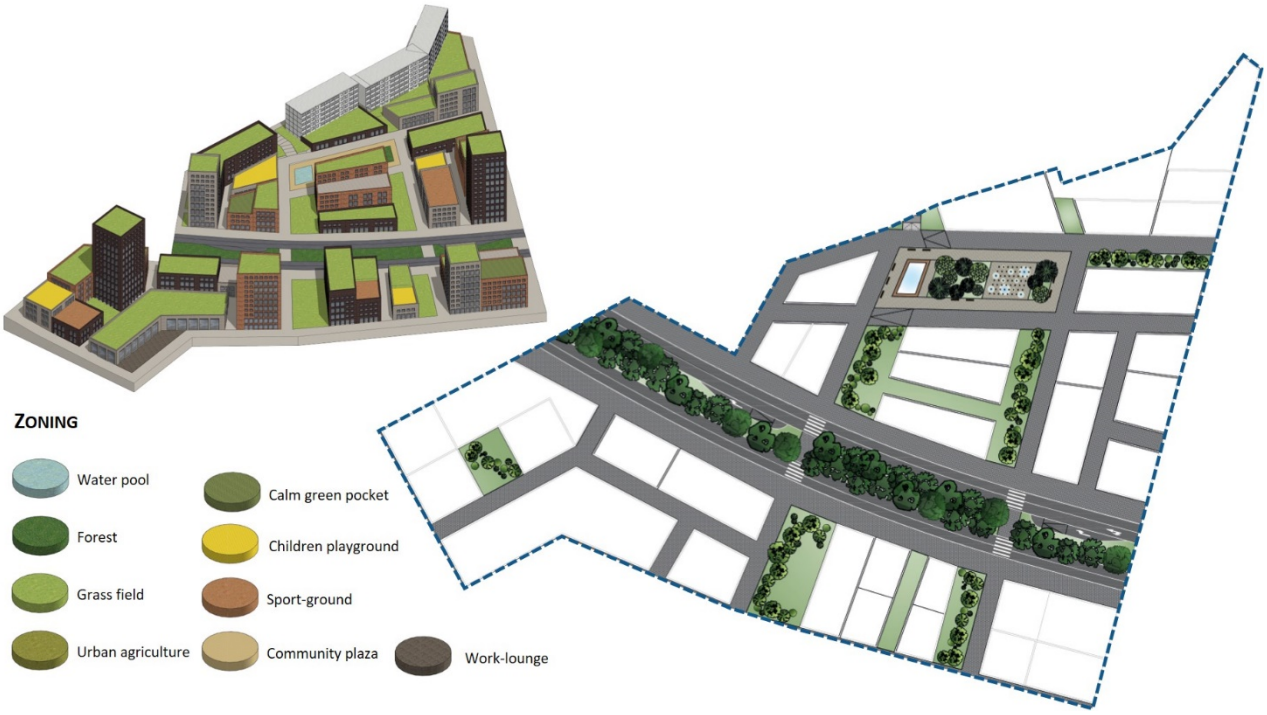


Fig. 77. Zoning and elaboration of the central neighbourhood

A vibrant urban structure of the terraced buildings and five dominant verticals was developed there, empathizing the main building with the highest tower for better identification of the re-developed district (Patterns by Alexander et al.: “Housing hill”, “High places”, “Main building”, “Town hall”, Necklace of community projects” (1977)). Furthermore, the new central neighbourhood, as mentioned before, should further be developed with a priority to its self-sufficiency and supplementation of lacking functions to the district and new opportunities for local businesses (Patterns by Alexander et al.: “Individually owned shops”, “Travelers inn”, “Family of entrances” (1977)). Later in elaboration process it was decided that the volumes of the new buildings should be smaller due to a need of natural insolation, thus, the contour of the buildings was left the same (Fig. 67), but a system of inner passages, following the terraced structure (Fig. 77), was developed.

The ground level of the neighbourhood was designed as a public space, oriented to both local users and visitors from outside of the district. Nevertheless, the local users of every neighbourhood should have a possibility to access more private urban places of different functions. This was accomplished by developing the stepped roofs of new buildings as a system of green terraces (Pattern by Alexander et al.: “Work community” (1977)). The main functions of the terraces were used the same as in the private and active neighbourhoods, thus, will not be explained here.

The developed design strategy proposed that the vertical space, acquired from eliminating the viaduct, could be used for the underground parking of the new local centre. This initial idea was pursued in the design elaboration, thus, the entrance and the exit of the underground parking lot was designed in the green lane of the transformation street. It is significant to note, that in spite that the transformation street is narrowed down, it is still a part of the main western Vilnius transportation axis, thus, the greater importance should be given to ensure safe pedestrian passage. This should be done by limiting car speed and raising the pedestrian crossings (Pattern by Alexander et al.: "Raised walk" (1977)).

As only the fragments of the design visual elaboration is presented in the main text, the entire graphical part of the thesis can be found as the **Appendix 10**.

3.4. Validation of the conception developed in the empirical research

One of the most important tasks of the experimental project is the validation of the conceptual model, developed as a final result of the empirical research of the thesis (Fig. 39). The essence of that model was that urban design could be a catalyst of any urban space becoming a favourite urban place, by initially choosing the right intensity of the revitalisation strategy (intensification, repair or change). This conception was used from the very beginning of the experimental project, when the full-composition social profile of the selected territory and the strategy of achieving it was being developed (Fig. 45, Fig. 46 and Fig. 47). It was also kept in mind while elaborating the design strategy of the experimental project: the intensification of the green structure of Architektų str. for the re-development of the green ring; and the radical change of Laisvės av. for the redevelopment of the transformation street; as the examples. Due to the useful application of the conceptual model during the strategic phases of the experimental project, it could be confirmed that the developed concept is a useful tool for the complex urban planning.

3.5. Evaluation of the experimental project

Initially, the experimental project was evaluated in an attempt to apply the patterns by Alexander et al. (1977) that were selected in the theoretical research, into the elaborated design, as was already mentioned in the introduction of the previous section of the thesis. Possibility to notice a wide variety of different patterns, corresponding to the urban values that were developed as the essence of the vital urban neighbourhood, confirms correspondence of the developed project to the hypothetical model (Fig. 15) and thus, its overall richness.

Finally, the experimental project was evaluated using the repeated Space syntax analyses for the pedestrian movement. Segment analysis maps of all three types of users (instant, local and global) and Agent-based analysis maps of two types of users (instant and local) were generated again in the same manner as in the empirical research, but in the redeveloped territory. The revival of urban territory of the design elaboration is obvious in all of the generated maps, but only the most important maps of Segment analysis is presented in the text, while the maps of Agent-based analysis are completely left aside, nevertheless, all of the maps of existent and present situations could be found as the **Appendix 9**. The presented maps of Segment analysis (Fig. 78) certainly confirm that the experimental project makes the elaborated territory most active (Ch R400) and best reachable (Int R400) in the entire district and by this the other physically related urban elements, such as the eastern part of the green ring and the main pedestrian alley, easier and more often chosen by the pedestrians as well. These obvious changes in the urban fabric confirm that the solutions of the experimental

project and the entire projects overall, could make positive impacts, seeking to revitalise Modernist districts.

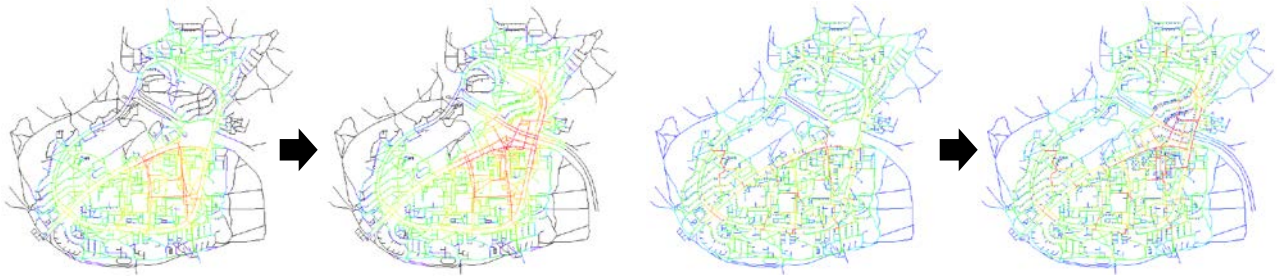


Fig. 78. Segment analysis of the existent and proposed pedestrian paths: Int R400 and Ch R400, colour-corrected

3.6. Main findings of the experimental project

I. The summarised results of the wide-range **empirical research** of the thesis ensured that the selected would have the largest potential for change. Territory of the right size was crucial for the design elaboration, since the completely different elaboration tools are suitable, depending on the scale of the site. The selection of wrong size could limit possible tools of the urban development, as the ones that are fit for a master plan of entire city are too general for a single neighbourhood and vice versa, for example.

II. The deep **sociological analysis** was essential to understand the existent sociological composition of the selected territory. Further, it revealed the differences between two analysed districts and of the remaining city. This helped to define the missing social groups that could enrich the existent social compositions of the districts. Such development of the *full-composition social profile* was essential in later analysis of human needs, as it reduced amount of target groups. The latter literature analysis provided the solutions of the open urban places with a wide variety of diverse activities, relevant to the targeted social groups

III. Development of the **design strategy**, by analysing the existent urban structure through the different aspects, helped to understand the fundamental components of the selected territory. The design strategy itself became a clear plan of how the entire district could be improved and prevented from the major hesitations later, in the design elaboration stage.

IV. Careful selection of the **design elaboration** territory was critical, as it had to represent the practical usage of the developed design strategy, providing a variety of diverse urban solutions. It also confirmed that the *conceptual model*, developed in the empirical research of the thesis is a useful tool for strategical urban planning, as it helps to categorise the possible solutions in any stage of urban development.

V. The **design evaluation**, based on *Alexander et al.* (1977), proved that the developed experimental project could be perceived as a complex system, as it is overlaid by a wide range of urban patterns. The design evaluation based on the *Space Syntax methods* also proved that the solutions of the elaborated area of the experimental project provided Lazdynai district with centrality, joined the fragmented urban fabric and made the related open urban spaces better reachable and more active.

Conclusions

1. The *document analysis* confirmed that Lithuanian urban development goals coincide with international interests and are oriented to complex solutions that include social, economic and environmental aspects. Further urban development is directed towards self-sustainable poly-centric urban structures with a compact land usage, thus, the revitalization of already urbanised territories and the application of effective urban networks is fundamental in all scales of projects. Despite the good ideological intensions, there is no practically working legislation that is ensuring the application of complex urban planning in Lithuanian legal framework, as it is limited to the technical renovation of apartment-buildings only.
2. The *literature analysis* revealed that *New Urbanism* provides a set of principles that suggest how to create a vital city and it is proven by the relevant case studies, yet its concept is often misinterpreted by society and the ideas are hard to implement in practice. This happens due to a lack of the systemisation of those ideas as part of them are theoretical, while others are practical, and the suggested solutions are too general and of completely different scales (from graphical design to politics). The theoretical research further suggests that this could be solved by providing New Urbanism with the clear system of urban principles that any vital city should possess. It could be done by borrowing the urban qualities of Integral Urbanism as the backbone of the concept and supporting the broad New Urbanism ideas with the practical tools, suggested by Alexander et al. This systemisation is finally resulted with *the hypothetical model* of five essential practice oriented urban values: *dispersity, connectivity, diversity, identity* and *sensitivity*.
3. The *empirical research* was able to verify later that the developed five urban values of *the hypothetical model* could indeed play the essential role in creating a vital urban neighbourhood, while a lack of these values in the specific places of urban fabric could be perceived as the potential for the revitalisation. The uneven structural configuration (*dispersity* and *connectivity*) of urban fabric can be noticed with different Space syntax methods. Segment analysis of pedestrian paths is able to reveal the usage intensity of a neighbourhood, based on residents' movement in the network of paths; Agent-based analysis is able to supplement that information with the interpretation of movement in an open space and with the response to surrounding spatial elements; and Visibility-graph analysis contributes to identifying urban spaces that lack social control due to deficiency of visual inter-connectivity. The *diversification* of urban elements, such as housing, public objects and urban spaces, could ensure the rich social composition of an urban neighbourhood, while residents' involvement into urban planning through Sociotope mapping techniques (surveys, dialogs, walks, workshops, etc.) could enable urban planners to choose *sensitive* urban solutions that resonate with the already existent social values of a place and a local community, and by this to create an authentic and *identifiable* urban environment.
4. The insights of the results of the empirical research became fundamental in creating *the conceptual model* of the revitalisation of Modernist urban district, affirming that urban design could be able to become a catalyst for the long-term changes of urban environment. The applied methods of the empirical research also confirmed that strategic urban planning, based on the analyses of urban networks, could be able to locate the most damaged places of urban fabric and to suggest the most effective minor solutions for the major changes. The developed concept suggests that all of the urban elements could be divided into *favourite, avoided* and

abandoned and the revitalisation of Modernist urban neighbourhoods should be proceeded in a sensitive manner, by *intensifying* the existent spatial and social values of already favourite elements, by *repairing* the damaged spatial aspects of avoided objects and by completely *changing* only the totally neglected.

5. The developed *design strategy* suggests that the two essential programs, of the two aspects each, should be involved into the complex revitalisation of any Modernist urban neighbourhood: the program of open spaces (*streets* and *greenery*) and the building program (*commerce* and *housing*). The analysis of the existent *sociological composition* proved to be a valuable approach when seeking to create a socially diverse urban neighbourhood, as it helps to identify the dominant and the missing social groups in an urban territory. This knowledge, together with the analysis of human needs for urban spaces, based on different social aspects (age, marital status, income source, education level, etc.), enables later to diversify urban spaces and to adapt them to relevant social groups. These analyses provided the developed design strategy with the specificity of the full-composition social community and helped to grasp the authenticity of Lazdynai district, thus, could be useful in other urban development projects as well.

6. The selected area for *the design elaboration* worked well to reveal the full potential of the design strategy as it covered the main intersection of all of the developed aspects of the design programs (streets, greenery, commerce and housing). *The conceptual model* of the revitalisation of Modernist urban neighbourhoods was proven to be a useful tool for the *strategic urban planning*, as it was used from the very beginning of the experimental project and helped to develop the full-composition sociological profile of the selected territory, as well as a *validation* tool of the entire project, as the empirical methods that were suggested in its structure were helpful to evaluation the results of the elaborated design of the selected area in Lazdynai district.

7. *Evaluation of the project.* The re-conducted *Space syntax analyses* confirmed that the solutions of the experimental project provided Lazdynai district with the centrality that was absent before, as the elaborated area of a new local centre became especially active and highly reachable for of all main types of users (*instant*, *local* and *global*). The successful attempt to apply *the patterns by Alexander et al.*, selected in the theoretical research as possible practical tools for the revitalisation of an urban fabric, also confirmed that the regenerated urban structure could be perceived as a multi-layered urban network, involving all five urban values of the hypothetical model. Based on these results, the experimental project and the entire thesis is confirmed to be *evaluated as a successful project*.

8. *Further recommendations.* All of the maps, acquired in the empirical research (Space syntax and Sociotope mapping), could be used as *tools for the analysis* of an existent situation in the selected territory straight away, but the presented Sociotope maps could provide even higher value if they were developed further. The development could involve the definition of more sociotopes and the more accurate analysis of their social values. These analyses could involve both community and expert evaluation. Finally, the developed design strategy should be applied as a whole in the projects of urban revitalisation, because only the application of complex solutions would be able to provide the long-term impact to the re-developed territory and enhance its further socially natural renewal.

List of references

1. Adventures Guatemala. (2017). *Paseo Cayala – private city built to escape crime.* Retrieved from https://adventuresguatemala.com/paseo-cayala-private-city-built-escape-crime/
2. Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King I., & Shlomo, A. (1977). *A pattern language: Towns, buildings, construction.* New York: Oxford University Press.
3. Austin, G. P. (2013). *Case study and sustainability assessment of Bo01, Malmo, Sweden.* doi:10.3992/jgb.8.3.34
4. Baltic Urban Lab. (n. d.). *Vastra Hamnen area – Bo01 – waterfront regeneration Malmo.* Retrieved from https://www.balticurbanlab.eu/goodpractices/v%C3%A4stra-hamnen-area-bo01-waterfront-regeneration-malm%C3%B6
5. Baltijos tyrimai (2014, September). Lietuvos gyventojai apie aplinką ir gyvenamąjį būstą. Lietuvos gyventojų apklausos ataskaita. Retrieved from https://www.architekturumai.lt/wp-content/uploads/B258-2014-09-architektura-ataskaita_su-foto.pdf
6. Barnett, E. (2013). *Density opponents push back against pro-transit strategy*. Retrieved from https://www.seattlemet.com/articles/2013/3/13/onequestion-for-the-head-of-the-planning-commission-march-2013
7. Bernstein, F. A. (2005). Seaside at 25: Troubles in Paradise. *The New York Times*. Retrieved from https://www.nytimes.com/2005/12/09/travel/escapes/seaside-at-25-troubles-in-paradise.html
8. Blumenfeld, H. (1967). *The Modern Metropolis: Its Origins, Growth, Characteristics and Planning.* Cambridge: MIT Press
9. Buntin, S. B. (2019). *Unsprawl: The community of Civano Tucson, Arizona*. Retrieved from https://www.terrain.org/2019/unsprawl/civano/
10. Butler, C. (2013). *Drawbacks of New Urbanism*. Retrieved from https://boiseplanning.wordpress.com/2013/10/21/drawbacks-of-new-urbanism/
11. Calthorpe Associates. (2012). *Sustainable cities China: Design manual for low carbon development.* Retrieved from http://www.chinastc.org/sites/default/files/CSCP_LowCarbonDevelopmentDesignManual_EN.pdf
12. Carlton, I. (2009). *Histories of Transit-oriented Development: Perspectives on the Development of the TOD Concept.* Retrieved from https://www.econstor.eu/bitstream/10419/59412/1/609256262.pdf
13. Castells, M. (2004). An Introduction to the Information Age. In: F.Webster, R. Blom, E. Karvonen, H. Melin, K. Nordenstreng, E. Puoskari eds. *The Information Society Reader*. London and New York: Routledge.
14. Central. (2016). *Atelier Brussels – the productive metropolis*. Retrieved from https://issuu.com/architectureworkroom/docs/central_screenmode
15. Congress for the New Urbanism. (n. d. a). *What is New Urbanism?* Retrieved from https://www.cnu.org/resources/what-new-urbanism
16. Congress for the New Urbanism. (n. d. b). *The charter of the New Urbanism*. Retrieved from https://www.cnu.org/who-we-are/charter-new-urbanism

17. Costa, D. L., & Kahn, M. E. (2002). *Civic engagement and community heterogeneity: An economist's perspective*. Retrieved from http://web.mit.edu/costa/www/costa.kahn.1.4pdf.pdf
18. Cullen, G. (1961). *The concise townscape*. New York: Van Nostrand Reinhold Company.
19. Cullen, G. (2015). *Concise Townscape*. London: Routledge
20. *Daugiabučių namų atnaujinimo (modernizavimo) programa, 2004 m. rugsėjo 23 d. Nr. 1213, suvestinė redakcija nuo (2020-02-12).* (2020) [viewed April 14, 2021]. Retrieved from https://www.e-tar.lt/portal/lt/legalAct/TAR.AE67B6739526/asr
21. Delvaux, M. (2016). *Atelier Brussels – the productive metropolis*. Retrieved from https://issuu.com/architectureworkroom/docs/central_screenmode
22. DeWolf, Ch. (2002). *Why New Urbanism fails*. Retrieved from https://www.planetizen.com/node/42
23. Duany A., Sorlien, S., & Wright, A. (2012). *SmartCode: Version 9.2*. Retrieved from https://www.dpz.com/uploads/Books/SmartCode-v9.2.pdf
24. Duany, A., Sorlien, S., & Wright, A. (2012). *SmartCode: Version 9.2.* Retrieved from https://www.dpz.com/uploads/Books/SmartCode-v9.2.pdf
25. Dudal, R. (2016a). *Urban economy.* 2016 m. Urbanistinis forumas Nr. X. [Video record]. Retrieved from [personal archive of prof. Zaleckis, K.]
26. Dudal, R. (2016b). *Urban economy.* 2016 m. Urbanistinis forumas Nr. X. Retrieved from http://lntpa.lt/darnios-pletros-akademija/urbanistinis-forumas/
27. Dupuy, G. (2000). A revised history of network urbanism. Network Urbanism, *OASE*, (53), 3-29. Retrieved from https://www.oasejournal.nl/en/Issues/53/ARevisedHistoryOfNetworkUrbanism
28. Ellin, N. (2006). *Integral urbanism*. New York: Routledge.
29. Ellis, C. (2002). The New Urbanism: Critiques and Rebuttals. *Journal of Urban Design*, 7(3), 261-291. Retrieved from https://doi.org/10.1080/1357480022000039330
30. Fang, K. (2015). *Public transport and urban design.* World Bank Blogs. Retrieved from https://blogs.worldbank.org/transport/public-transport-and-urban-design
31. Gehl, J., & Svarre, B. (2013). *How to study public life.* Washington, DC: Island Press.
32. Gindroz, R. (2002). City Life and New Urbanism. *Fordham Urban Law Journal*. 29(4). Retrieved from http://ir.lawnet.fordham.edu/ulj/vol29/iss4/3
33. GutGut. (n. d.) Panelak. Retrieved from http://www.gutgut.sk/Work/PANELAK
34. Hagens, J. E. (2005). The network world: The example of urban network in spatial planning. *The Networked World*. Retrieved from http://content.dow.wur.nl/internet/webdocs/internet/lup/hagens/networkedworld.pdf
35. Hall, E. T. (1966). *The hidden dimension.* New York: Doubleday.
36. Hillier B., Turner, A., Yang, T., & Park, H. T. (2010). Metric and Topo-Geometric Properties of Urban Street Networks: Some convergences, divergences and new results. *The Journal of Space Syntax, Volume: 1, Issue: 2.* Retrieved from http://joss.bartlett.ucl.ac.uk/journal/index.php/joss/article/view/258
37. Huxtable, A. L. (1997). *The Unreal America: Architecture and Illusion*. New York: New Press
38. *Kauno miesto savivaldybės teritorijos bendrasis planas*. *Aiškinamasis raštas. 5 tomas. Sprendiniai* (2013). Retrieved from http://www.kaunas.lt/wp-content/uploads/sites/8/2015/06/aiskinamasis-rastas.pdf

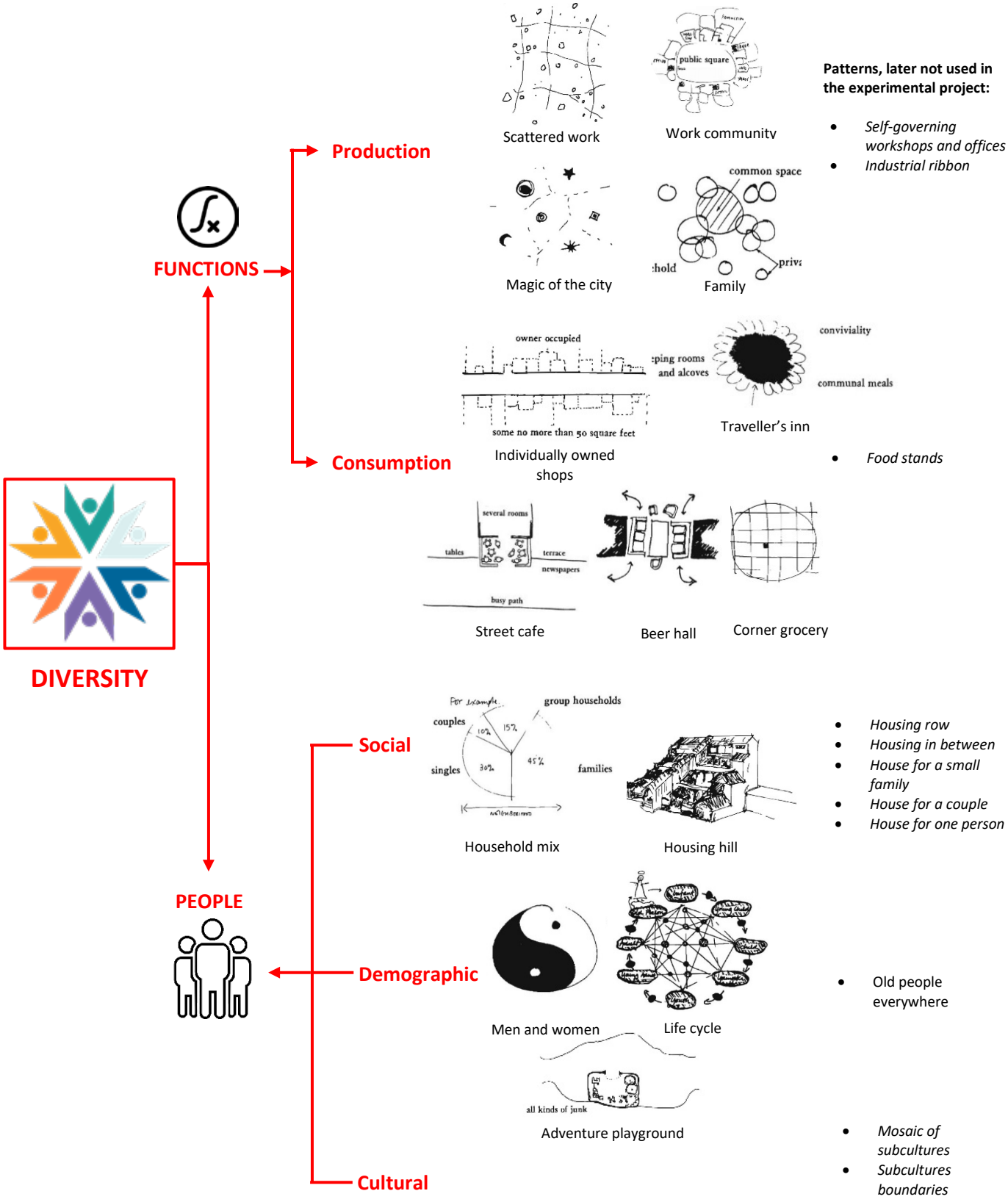
39. *Klaipėdos miesto savivaldybės bendrasis planas*. *Sprendiniai*. *Aiškinamasis raštas* (2019). Retrieved from https://www.klaipeda.lt/data/public/uploads/2021/03/klaipedos-bp-aiskinamasis-rastas-2021-03-09.pdf
40. Klundert, W. (2014). *Bijlmermeer Regenerated. Modifications of public and semi-public areas – What can we learn?: Doctoral dissertation.* Westminster University Retrieved from http://www.veilig-ontwerp-beheer.nl/publicaties/bijlmermeer-regenerated
41. Lang, J. (2012). Integral Urbanism. *Journal of Urban Design*, 17:3, 457-460. doi: 10.1080/13574809.2012.684296
42. Leccese, M., McCormick, K., & Congress for the New Urbanism. (1999). *Charter of the new urbanism*. New York: McGraw Hill.
43. *LR valstybinės paramos daugiabučiams namams atnaujinti (modernizuoti) įstatymas, 1992 m. balandžio 30 d. Nr. I-2455, suvestinė redakcija nuo (2020-01-01).* (2020) [viewed April 14, 2021]. Retrieved from https://www.e-tar.lt/portal/lt/legalAct/TAR.9D04F98F7C14/asr
44. Lucka, D. (2018). How to build a community: New Urbanism and its critics. *Urban Development Issues* 59(1), 17-26. doi: https://doi.org/10.2478/udi-2018-0025
45. Lynch, K. (1960). *The image of the city*. Cambridge: MIT Press.
46. Lynch, K. (1984). *Good city form*. Cambridge: MIT Press
47. Maki, F. (1964). *Investigation in collective form*. St. Louis: School of Architecture, Washington University.
48. National Association of City Transportation Officials. (2016). *Global Street Design Guide*. Washington DC: Island Press
49. Neal, P. (2003). Urban villages and the making of communities. New York: Spon Press
50. Ness (van) A., Lopez, & Manuel, J. J. (2007). Micro scale spatial relationships in urban studies: the relationship between private and public space and its impact on street life. *Proceedings, 6th International Space Syntax Symposium, Istanbul Technical University, Cenkler, Istanbul.* Retrieved from http://www.spacesyntaxistanbul.itu.edu.tr/papers/longpapers/023%20-%20VanNes%20Lopez.pdf
51. Niewiadomski, G. (2015). *Kolejny podwórzec gotowy*. Retrieved from https://www.fakt.pl/wydarzenia/polska/lodz/ulica-traugutta-w-lodzi-zamienila-sie-w-podworzec/9f14ekj
52. Pancewicz, L. (2016), *Urban innovations, their initiators and urban management – how to make it work together?* 2016 m. Urbanistinis forumas Nr. X. [Video record]. Retrieved from [personal archive of prof. Zaleckis, K.]
53. Penn, A., & Turner, A. (2001). Space Syntax Based Agent Simulation. Retrieved from https://discovery.ucl.ac.uk/id/eprint/2027/1/penn.pdf
54. Piazzoni, M. F. (2018) Authenticity Makes the City. How "the Authentic" Affects the Production of Space. In L. Tate & B. Shannon *Planning for Authenticities*, New York and London: Routledge. 154-169.
55. Plus Jeden Den. (2016). *Rarita z Rimavskej Soboty: Celá Európa sa môže inšpirovať!* Retrieved from https://www1.pluska.sk/regiony/vychodne-slovensko/rarita-rimavskej-soboty-cela-europa-moze-inspirovat

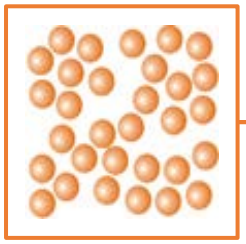
56. Popova, S. (2004). *Le Corbusier and the critique on Modernism: Modern Architecture*. Retrieved from https://www.researchgate.net/publication/323523325
57. Sahu, A. (2017). A methodology to modify land uses in transit oriented development scenario. *Journal of Environmental Management*, 213, 467-477. Retrieved from https://www.sciencedirect.com/science/article/pii/S0301479717311660?via%3Dihub
58. Schaick, J., & Klassen, I. T. (2008). *Urban networks – network urbanism: Gabriel Dupuy* Amsterdam: Techne Press.
59. Seaside. (n. d.) Retrieved from https://seasidefl.com
60. Spacescape. (2014). *Sollentuna sociotopkarta: Grönstrukturens värden och funktioner i den bebygda miljön*. Retrieved from http://www.spacescape.se/project/sollentuna-sociotopkarta/
61. Spacescape. (2014). *Sollentuna sociotopkarta: Grönstrukturens värden och funktioner i den bebygda miljön.* Retrieved from http://www.spacescape.se/project/sollentuna-sociotopkarta/
62. Speck, J. (2013). Walkable city: How downtown can save America, one step at a time. New York: North Point Press
63. Stahle, A. (2006). Sociotope mapping – exploring public open space and its multiple use values in urban and landscape planning practice. *Nordic Journal of Architectural Research,* 19(4), 59-71.
64. Stahle, A. (n. d.). *The sociotopes and landscape of inhabitants*. Retrieved from http://iaurif.org/fileadmin/NewEtudes/Etude_945/The_sociotopes_and_landscape_of_inhabitants.pdf
65. Steuteville R. (2018). *25 great ideas of New Urbanism*. A CNU Journal.
66. Stockholms Stad. (2002). *Sociotopkarta för parker och andra friytor i Stockholms innerstad – om metoden, dialogen och resultatet.* Retrieved from [personal archive of prof. Zaleckis, K.]
67. Tasak-Kok, T. (2015). *Creating „spaces for diversity" from „spaces of modernity": the case of the Jane-Finch neighbourhood, Toronto (Canada).* Retrieved from https://www.academia.edu/14485683/CREATING_SPACES_FOR_DIVERSITY_FROM_SPACES_OF_MODERNITY_THE
68. Tiukšienė, Z., & Sisaitė, N. (2015). *Pasižvalgymai po Vilnių.* Vilnius: Vilniaus apskrities Adomo Mickevičiaus viešoji biblioteka.
69. U.S. Department of Housing and Urban Development. (1972). *HUD International brief, volume 16*. Office of International Affairs: Washington, DC.
70. United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development. *New York: United Nations, Department of Economic and Social Affairs*. Retrieved from https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
71. United Nations. (2017). *New Urban Agenda.* Retrieved from https://uploads.habitat3.org/hb3/NUA-English.pdf
72. *Vilniaus miesto savivaldybės teritorijos planas iki 2015 metų*. (2007). Retrieved from https://vilnius.lt/wp-content/uploads/2018/03/vilniaus_m_savivaldyb_teritor_bp_iki_2015m.pdf
73. *Vilniaus miesto savivaldybės teritorijos planas. Aiškinamasis raštas.* (2019). Retrieved from https://vilnius.lt/wp-

content/uploads/2019/09/Vilniaus_BP_Sprendiniai_Aiskinamasis_rastas_tvirtinti_2019_09_13.pdf

74. Von Bertalanffy, L. (1968). *General System Theory: Foundations, Development.* New York: George Braziller.
75. Wachter, J. (2016a). *Exploring the potential of the microrayon.* 2016 m. Urbanistinis forumas Nr. X. [Video record]. Retrieved from [personal archive of prof. Zaleckis, K.]
76. Wachter, J. (2016b). *Exploring the potential of the microrayon.* Urbanistinis forumas Nr. X. Retrieved from http://lntpa.lt/darnios-pletros-akademija/urbanistinis-forumas/
77. World Habitat Awards. (n. d.). *ZukunftsWerkStadt Leinefelde*. Retrieved from https://www.world-habitat.org/world-habitat-awards/winners-and-finalists/zukunftswerkstadt-leinefelde/#award-content
78. Zaleckis, K. (2018). *Erdvės sintaksė urbanistinei analizei: koncepcijos, apskaičiavimai ir pavyzdžiai.* Vilnius: Vilniaus dailės akademijos leidykla.
79. Zaleckis, K., Tranavičiūtė, B., Grunskis, T., Gražulevičiūtė-Villeniškė, I., Vitkuvienė, J., Sinkienė, J., & Armagan Doğan, H. (2021). *Modernization of Public Spaces in Lithuanian Cities.* Berlin: Sciendo. doi: https://doi.org/10.1515/9788395793875
80. ZukunftsWerkStadt. (2008). *Urban redevelopment in Leinefelde Sudstadt. Germany*. Retrieved from https://www.leinefelde-worbis.de/fileadmin/user_upload/bauamt/Bilder/Stadtumbau_Leinefelde/Veroeffentlichungen/Studyvisit.pdf

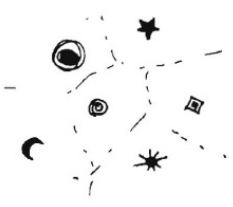
Appendix 1. Shemes of the concept supporting urban patterns and other methods





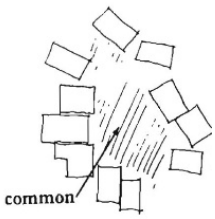
DISPERSITY

POROSIT'

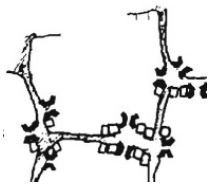


Magic of the city

Identifiable neighborhood



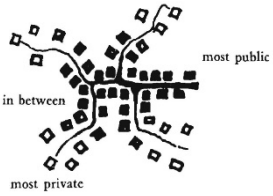
House cluster



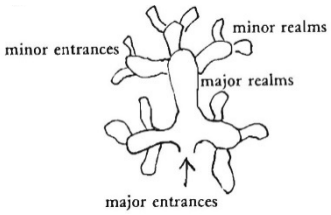
Neighborhood boundaries

TRANSECT

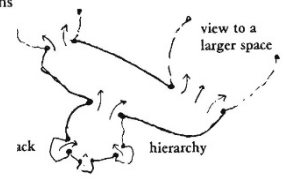
Density rings



Degrees of publicness

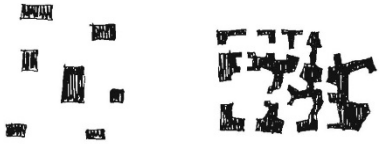


Circulation realms

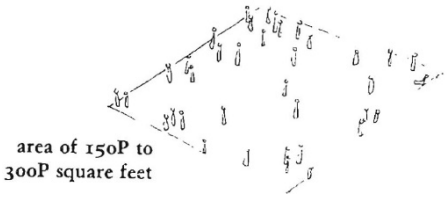


Hierarchy of open space

DENSITY



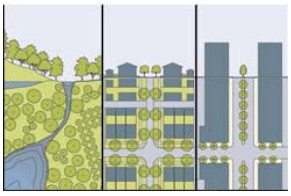
Positive outdoor space



Pedestrian density

Patterns, later not used in the experimental project:

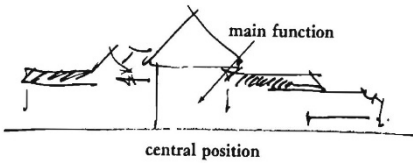
- *Community of 7000*



SmartCode by Duany, Sorlien & Wright (2012)

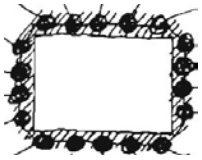
IDENTITY

LOCAL CENTER

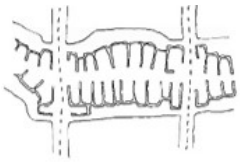


Main building

Local town hall

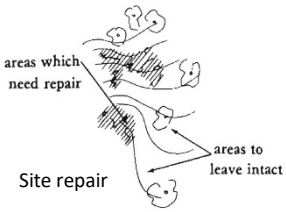


Necklace of community projects

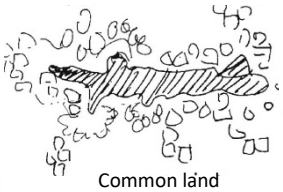


Shopping street

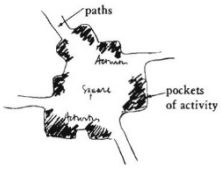
OPEN URBAN SPACES



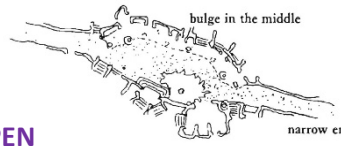
Site repair



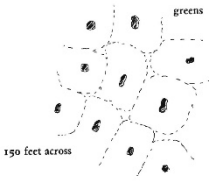
Common land



Activity pockets

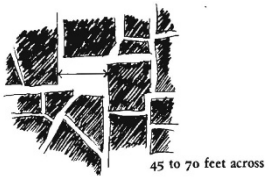


Path shape

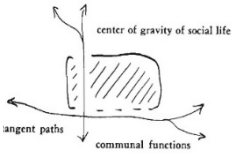


Accessible greens

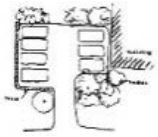
Shielded Parking



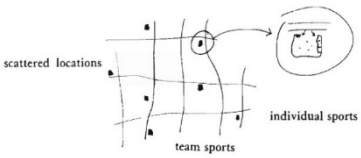
Small public squares



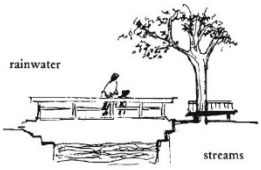
Common areas at the heart



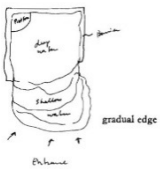
Small Parking Lot



Local sports

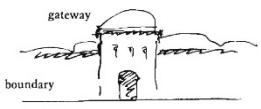


Pools and streams

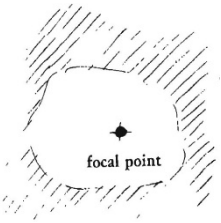


Still water

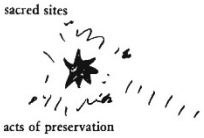
INDIVIDUAL ELEMENTS



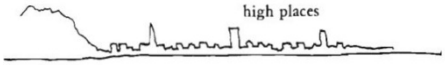
Main gateway



Something roughly in the middle



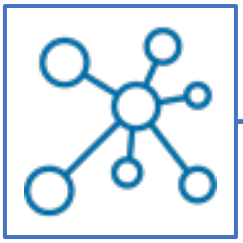
Sacred sites



High places

Patterns, later not used in the experimental project:

- *Eccentric nucleus*
- *Pedestrian street*
- *Nine percent parking*
- *Things from your life*
- *Ornament*
- *Carnival*
- *Dancing in the street*
- *Sleeping in public*

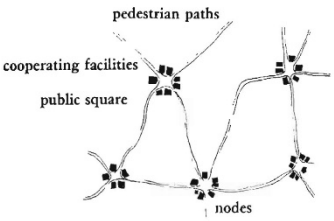


CONNECTIVITY

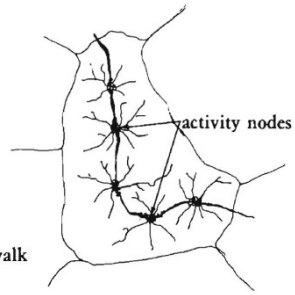
TOD
(Carlton, 2009)

GOALS

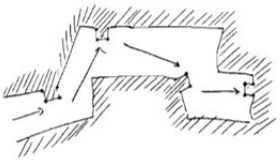
NODES



Activity nodes

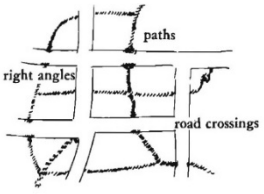


Promenade

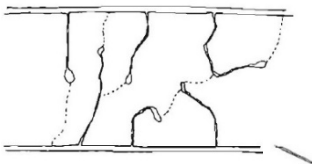


Family of entrances

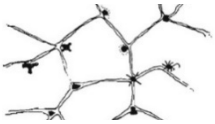
LINKS



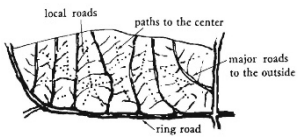
Network of paths and roads



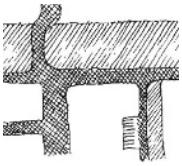
Looped local roads



Paths and goals

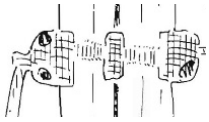


Local transport areas



Bike paths and racks

Raised walk

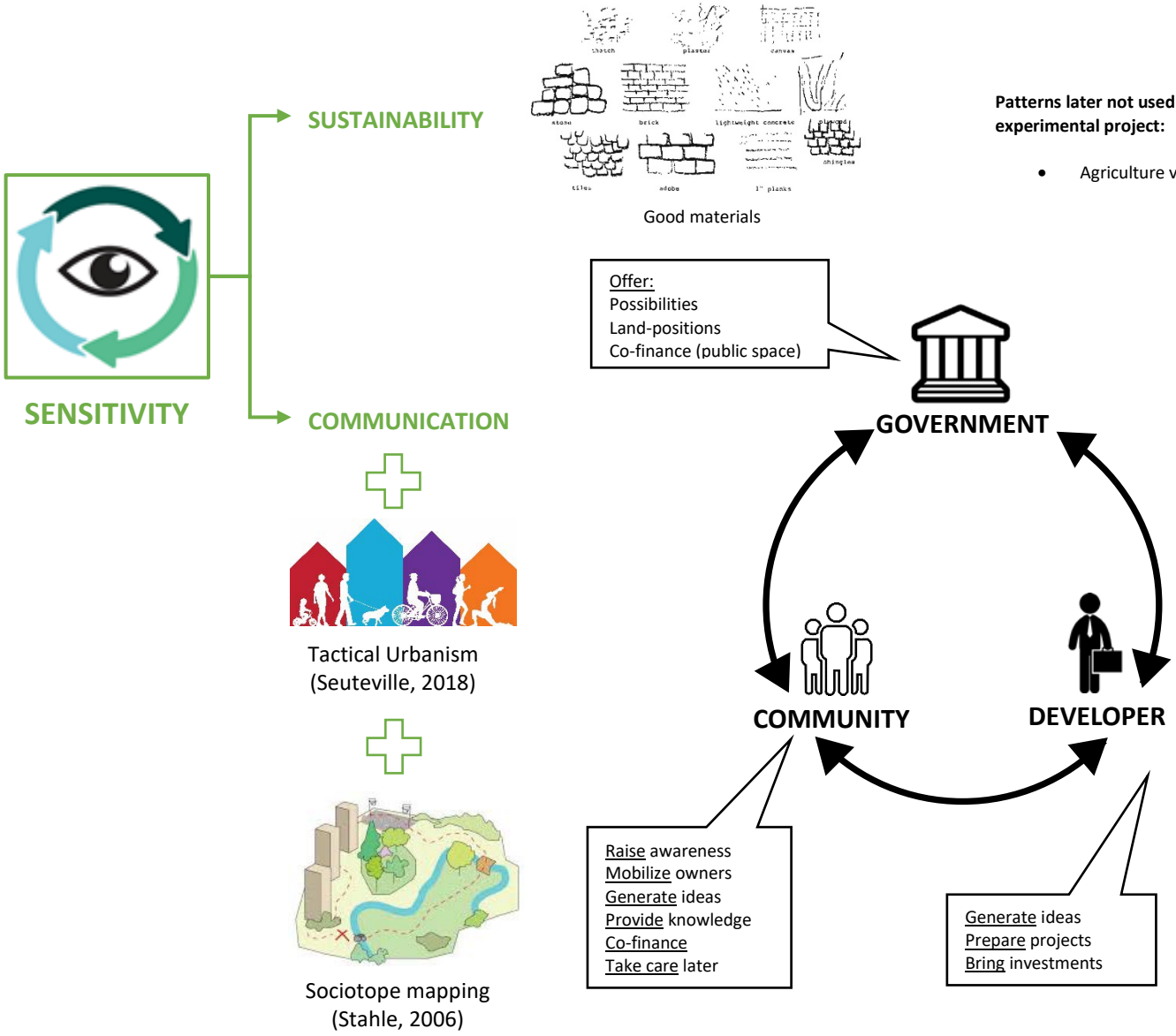


Road crossing

NACTO (2016)

Patterns later not used in the experimental project:

- *Web of public transportation*
- *Web of shopping*
- *Network of learning*
- *City country fingers*
- *Interchange*
- *Local transport area*
- *Children in the city*
- *Short passages*



This thesis is oriented to spatial development, therefore, government and developer strategies are not further analyzed.

All of the patterns, presented in these schemes are borrowed from Alexander et al. (1977). The ones that were not applied in the experimental project, are not necessarily not applicable at all, but rather the scale of the project was too big either too small. Such patterns are mentioned in the schemes without pictures.

Appendix 2. Case studies of the relevant urban revitalisations

1. Regeneration of Bijlmermeer district in Amsterdam (Netherlands)

Project of Bijlmermeer district in Amsterdam, according to Klundert (2014), was initiated in the 1960's, was being developed as a Modernist "city of a future" for the middle class, yet it received harsh criticism in the early planning stages already, followed with obvious problems after the completion of its development: beginning with the low quality of materials and construction of apartment-buildings, poorly designed engineering systems, continuing with under-developed environment planning and infrastructures, and finishing with increasing social problems. Distances between buildings were vast, commercial objects and services, instead of being landmarks, were hidden in the basements under huge multi-storey parking lots, recycle system was not developed almost at all. These were just a few problem to mention. As a result, the citizens of middle class chose to reside in single-family houses with private gardens and parking places, while these huge apartment-buildings were finally occupied by those of lowest-income, causing even worse social situation.

Therefore, a complex program of urban regeneration (Fig. 2) was launched in 1992 and continues till this day. It includes renovation and demolition of apartment-buildings, qualitative improvements of apartments and surroundings, and solvation of social problems.

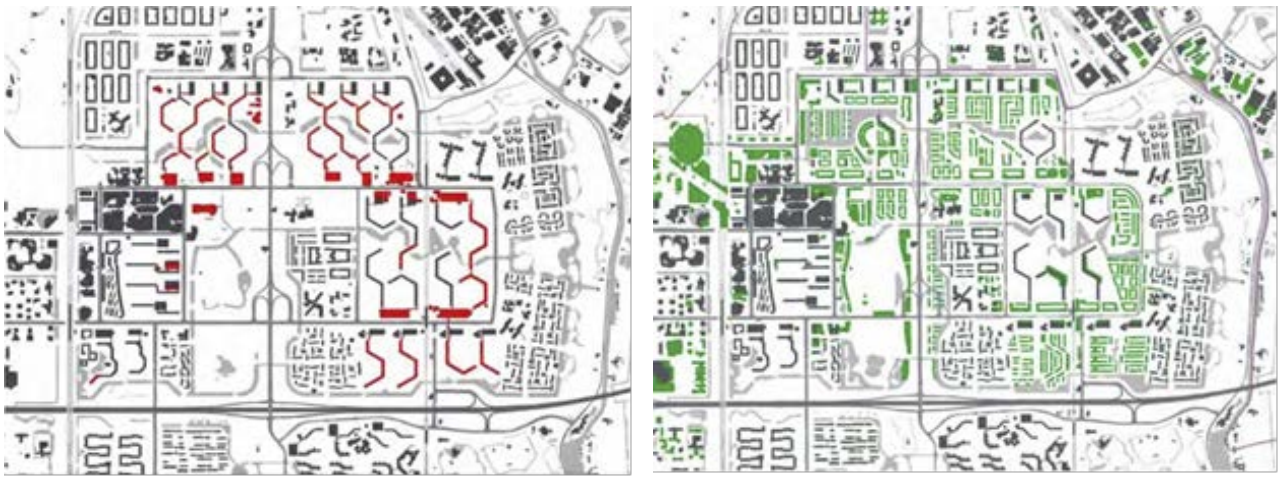


Fig. 1. Schemes of demolished (red) and newly developed (green) buildings (Klundert, 2014)

Revitalisation of the district was carried out by carefully selecting, which buildings have to be renovated, which have potential to be re-built, using more human planning principles, and which would better be completely demolished (Fig. 1). A part of the apartment-buildings and the majority of the multi-storey parking lots appeared among the buildings to be demolished.

The first floors of the apartment-buildings, selected for renovation, were converted to public and commercial units. Staircases and elevators were reorganised there, and recycle places were replaced or removed. Communal open spaces were created inside the newly organised courtyards, while open urban spaces were re-developed for public usage.

The transportation-lines of undergrounds and trains were renovated, while social, cultural and religious infrastructures were developed from scratch. The main street of the district became the heart of the

district as it was turned into a boulevard for shopping and offices. Objects of city significance, such as a football stadium, the centre of theatre and cinema, shopping malls, luxurious office zone, all were newly developed inside the district. Community was involved in all the processes of urban regeneration by conveying surveys and long-term analyses.

Fig. 2. Bijlmermeer before and after regeneration (Klundert, 2014)

Klundert (2014) states, that data, acquired from a long-term observation reveals, that regeneration of Bijlmermeer is indeed successful: social exclusion from the core of Amsterdam is continuously decreasing, residents on different surveys affirm their increasing satisfaction of living quality there, while the district itself has gained much higher level of importance in the context of the entire city.

2. Revival of Sudstadt district in Leinefelde-Worbis (Germany)

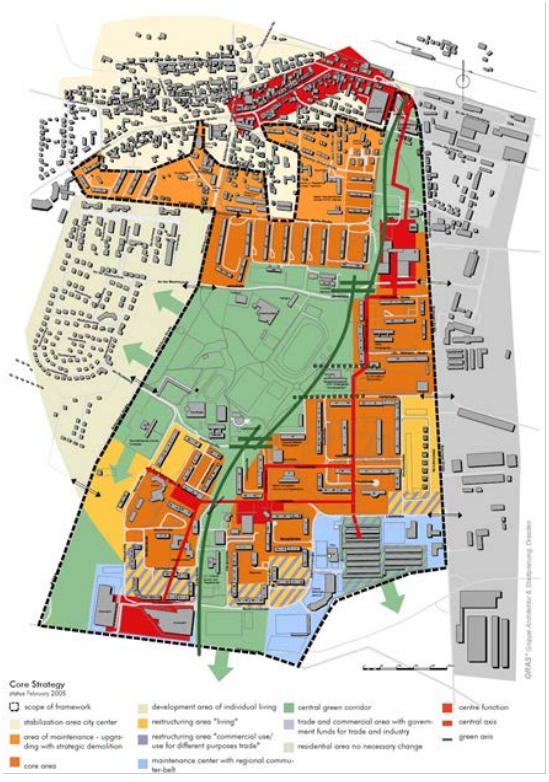


Fig. 3. Strategy plan of Sudstadt revival (ZukunftsWerkStadt, 2008)

Based on ZukunftsWerkStadt (2008), Leinefelde was a small German village until the early 1970's, but heavy industrialisation was started in the eastern region after World War II and Leinefelde was decided to be expanded to a modern city, oriented to textile industry, thus it was developed using Modernist urban planning principles (the concept of high-raise apartment-buildings, surrounded with green fields) just in thirty years. However, after Germany unification, textile industry was unable to cope with transition from planned to market economy and collapsed, resulting in the majority of the population moving to reside out of the district for other job opportunities. The situation was even worse because Modernist residential buildings were of limited typology and of low quality and could not compete with the housing of newer times. As a result, a large portion of the population fled, and Modernist districts, such as Sudstadt, were abandoned.

In order to bring life back to Leinefelde, by applying harmonious urban planning there and by improving the systems of infrastructures in a wider Germany territory, Leinefelde was joined together with another nearby town of Worbis to a single municipality, and the urban revival project ZukunftsWerkStadt (2008) was started. The aim of the project was sustainable urban development, seeking to create new job opportunities, attracting living conditions, social and economic stability and community spirit. The new master plan (Fig 3) that was developed in consultations with all stakeholders, became an overall guideline of the project.

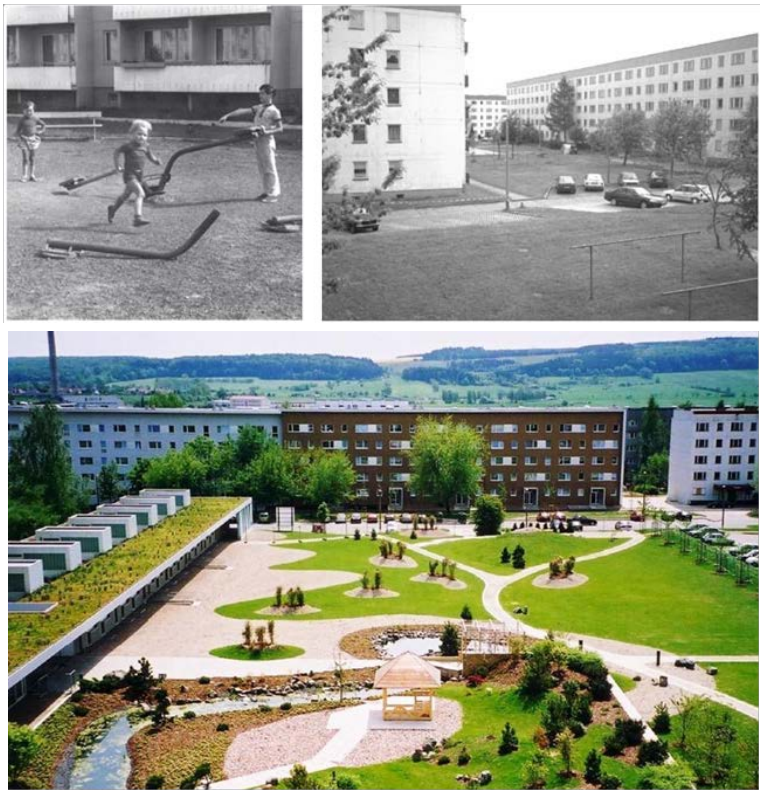


Fig. 4. Sudstadt before revival and after (ZukunftsWerkStadt, 2008; World Habitat Awards, n. d.)

In order to achieve diversified and equal society, more different typologies of housing and public spaces had to be introduced into the urban structure. To make physical space for such developments, 50 % of Modernist apartment-buildings were demolished and the rest were renovated. The renovation of these apartment-buildings was not limited just to the improvements of facades, but included the re-designing of interior spaces, by diversifying the sizes of apartments. Residential neighbourhoods were developed by creating closed communal courtyards between buildings, while small pocket yards were designed for private use, thus, ensuring the diversified privacy levels. Three privacy levels were introduced into urban structure total: public, semi-private and private, ensuring the effective use of land, creating authentic local identity and thus, increasing people responsibility for their surroundings. Parking lots were redesigned and public open spaces were provided with diverse functions of outside activities, adapted to different demographic groups and natural ecosystems for the life of different plants and animals. All of these changes, based on ZukunftsWerkStadt (2008), improved the quality of living environment then, and improves the relationships of the community till now.

A special attention was given to the renewal of social and transport infrastructure, as well. The buildings of the old textile factory were re-designed and adapted for new work-places of modern business. Moreover, community was being involved into this revitalisation project from the very beginning of the processes, thus, increasing their connection with the living environment and by that, fostering their consciousness about the usage of urban places and responsibility for its further evolution.

According to the statistics, presented by World Habitat Awards (n. d.), this project was indeed successful (Fig. 4), as the outwards migration of population was stopped and even positive growth was observed by 6 % at 2000's. Both, young families and elder people, started choosing life in Sudstadt because of the qualitative social infrastructure and the environment, as well, as dew to new job opportunities. This project succeeded because of a complex urban revitalisation, emphasis on quality and involvement of all stakeholders (government, residents and developers) into the development processes. These virtues should be valued in all similar projects, seeking to create prosperous urban communities.

3. Conversion of Vastra Hamnen, Malme (Sweden)

Vastra Hamnen (West Port), according to Neal (2003), was the main industrial territory in Malme. It was extremely polluted, but its location was an especially good strategic place: on the sea-shore and close to the downtown of Malme. Thus, it was decided to convert this brown territory to a multi-functional residential area. The project, under the name of "Bo01: The City of Tomorrow", was introduced in the international housing expedition in 2001, as a manifest, drawing an attention to how we are living now and how we could live in the sustainable future, and emphasizing that humanity and beauty are fundamentals for sustainable society.

Fig. 5. Conversion of Vastra Hamnen, Malme (Austin, 2013)

Baltic Urban Lab (n. d.) and Neal (2003) explains that a new master plan, developed for this project, aimed to create attractive living environment, joining together education, recreation and cultural aspects (Fig. 5). Dividing land into the different sizes of plots allowed to control the density of the different parts of the territory, thus, creating an opportunity to people of different social groups reside close-by each other. Local identity was created by designing buildings that are emphasizing Scandinavian character. Business was attracted by the system of well-developed public spaces, the pedestrian-friendly design of environment promoted walking, and the comfortable system of sustainable public transport stimulated the refusal of polluting transport. Moreover, the underground waste managing system was set up, where organic waste was being recycled into fuel and non-organic was being separated. The whole neighbourhood was supplied with energy from renewable sources.

Vastra Hamnen is currently prospering neighbourhood that promotes further development of this brown area.

4. Sociotop Mapping method usage in Sollentuna (Sweden)

The master plan of Sollentuna city by Spacescape (2014) was developed in 2012 One of its components was a map of Sociotopes (Fig. 6). It was the additional analysis of open spaces and their social values in urban environment. 633 open green areas were recognised in an entire city in that map, and later were submitted to experts and citizens for evaluation. After these evaluations, the most popular open areas were identified as Sociotopes, and further analysed. 21 social values (favourite social activities) were distinguished as the most relevant to Sollentuna and the Sociotop map, representing these values, was created. This map provided information of what people like (doing) in the particular open urban places already and what improvements could be made to make these places even more liked by the citizens.

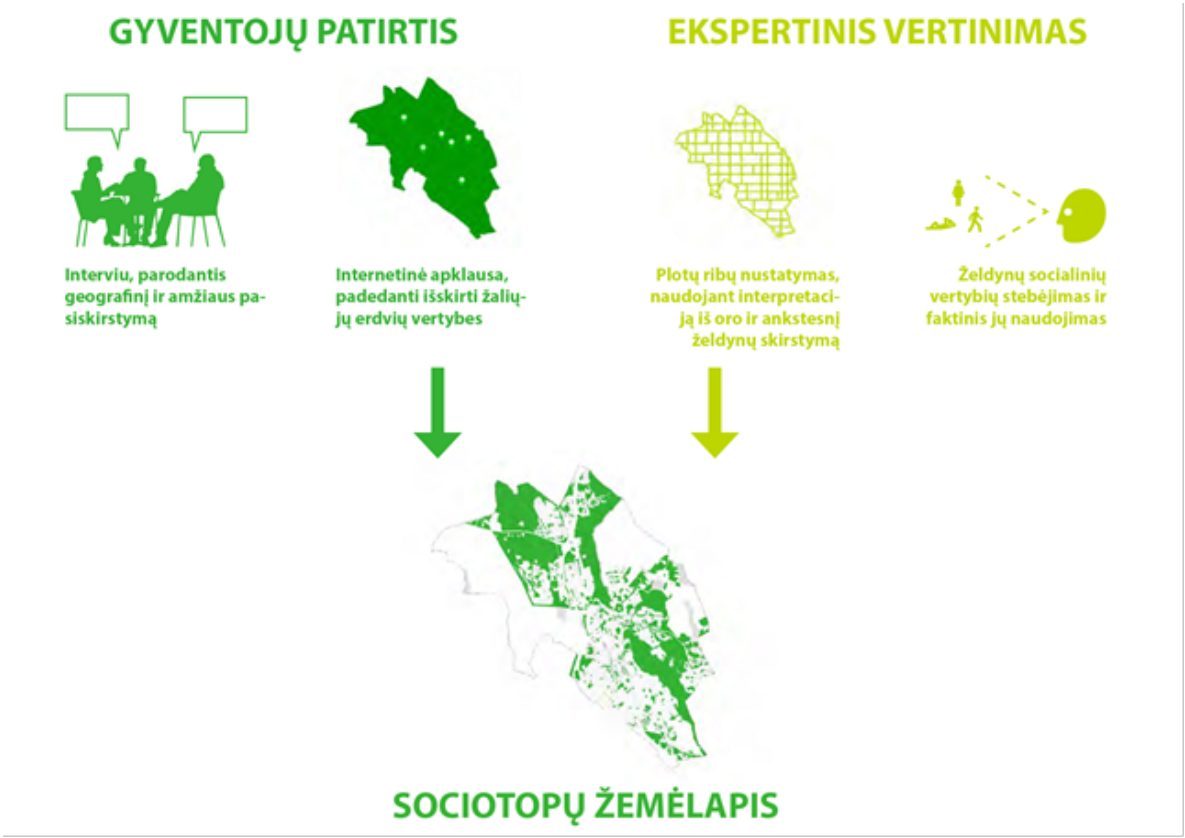


Fig. 6. Application of Sociotop mapping method (Spacescape, 2014)

Further, the analysis of correlations between the Sociotop map and different aspects of urban configurations, such the density of population, the accessibility of green open spaces, distances to them, etc., were carried out. This analysis revealed that green urban places are intensively used in Sollentuna by the residents, on the other hand, under-development of pedestrian and bicycle infrastructure, connecting residential areas with these green places, is felt, the central area of the city lack green urban spaces that would be adapted for schools and nurseries, and residents are willing to see more developments of sport facilities and viewpoints for nice panoramas that should be initiated by the municipality.

Based on Spacescape (2014), urban open spaces, where a lot of social values overlap, has a great potential to become the main gathering points of the city, while spaces with a high-intensity single value could be developed for that particular specialisations. It was also interesting and counterintuitive that very often huge urban spaces possessed just a few social values and are especially fostering solitude (dominating social values: relaxation, calmness, random wandering), while tiny urban places often had a variety of intensively expressed social values and were gathering people together.

To sum up, Sociotop mapping is a great tool, enabling to acquire the scientific proven information of which open places are favorited by the community and have a hidden potential of becoming real urban places, which social values are the most relevant in the particular city, neighbourhood or open space, and which social values could gather community even better to these places.

5. Revitalisation of Traugutta Street in Lodze (Poland)

Traugutta Street (Fig. 7) is in the very centre of Lodze city and connects the newly built railway station with the main city street. Despite its strategically important location, according to Pancewicz (2016), it did not possess any identity until very recent. It was just another joint for car traffic and the government of the city had no plans to change the situation. However, local activists realised the significance of this street. It was not only an important connector to cars, but to pedestrians as well, thus, they suggested to convert it to a "shared-street", the one, where cars and pedestrians have equal priorities. In order to succeed with this project, intensive communication with the local government and the community was started from the very beginning: a variety of proposals were created and all of the stakeholders were voting for their favourites.

Fig. 7. Traugutta street before and after revitalisation (Google, 2011; Niewiadomski, 2015)

Finally, the carriageway was narrowed, providing enough space for the new tidy parking places, bicycle paths and stands, pedestrian-walks with benches on the sides, new trees, and even a place for a children playground. This project, according to Niewadomski (2015), is a great example that a street can be not just a spiritless corridor for car movement, but can become a full-fledged public place, encouraging new small local businesses and services, inviting people to walk, stay and interact. This all can be done, but, based on Pancewicz (2016), strong communication and community involvement from the very beginning of such a project is essential.

6. Renovation of the apartment-building in Rimavska Sobota (Slovakia)

Based on Plus Jeden Den (2016), a private development-company bought the whole apartment-building from the State in the small town of Rimavska Sobota in 2008 and, together with architecture studio GutGut from Bratislava, carried out a complex renovation to it, as a pilot project in order to test the real potential of worn-out Soviet apartment-buildings to fit the contemporary needs (Fig. 8). Community survey revealed, according to GutGut (n. d.), that this kind of house most often are disliked by people, because of the three main aspects: their aesthetics, a lack of apartment size diversity and the poor quality of environment. The change of these three aspects became the main goal of the renovation.

Fig. 8. Apartment-building in Rimavska Sobota before and after the renovation (GutGut, n. d.)

The façade of the main entrance of the building was emphasised by designing a wide shed along the ground floor. The ground floor, occupied by individual storages, was reorganised to public spaces, with auxiliaries (gym, sauna, café, relaxation lounge), all having direct connections with the newly developed communal garden, providing qualitative planting solutions and zones for different outdoor activities. The whole territory was fenced and surveillance cameras were installed.

The plans of standard floors were re-designed as well. The flats of typical size were reorganised in such a way that single, double, triple apartments and four-room penthouses with private roof terraces, could appear. Some apartments were provided with new characterising balconies, creating the new identity of the building.

Based on GutGut (n. d.), this project succeeded by diversifying the alternatives of living spaces and the functions of the building overall, by solving the problems of inside and outside communal spaces, by completely changing the boring Soviet aesthetics of the facades and, thus, providing a new prominent identity to the building. This is a good example of how a complex renovation is able to up-lift the quality of Modernist architecture.

7. Experimental project Metahub Delta in Brussels (Belgium)

Delta territory was almost completely empty till 1980's, till, according to Central (2016), a huge viaduct, connecting Namur city with Brussels, accompanied with a bus and underground station, was developed, and provided the territory with Gates of Brussels status. Today territory is the important Brussels transport hub and is very significant strategically, as high-quality residential areas and, even two student campuses are established in the surrounding areas. However, due to the inhuman scale of hard infrastructure and the design of the building itself, Gates of Brussels are segregated from these surrounding territories, both, physically and functionally.

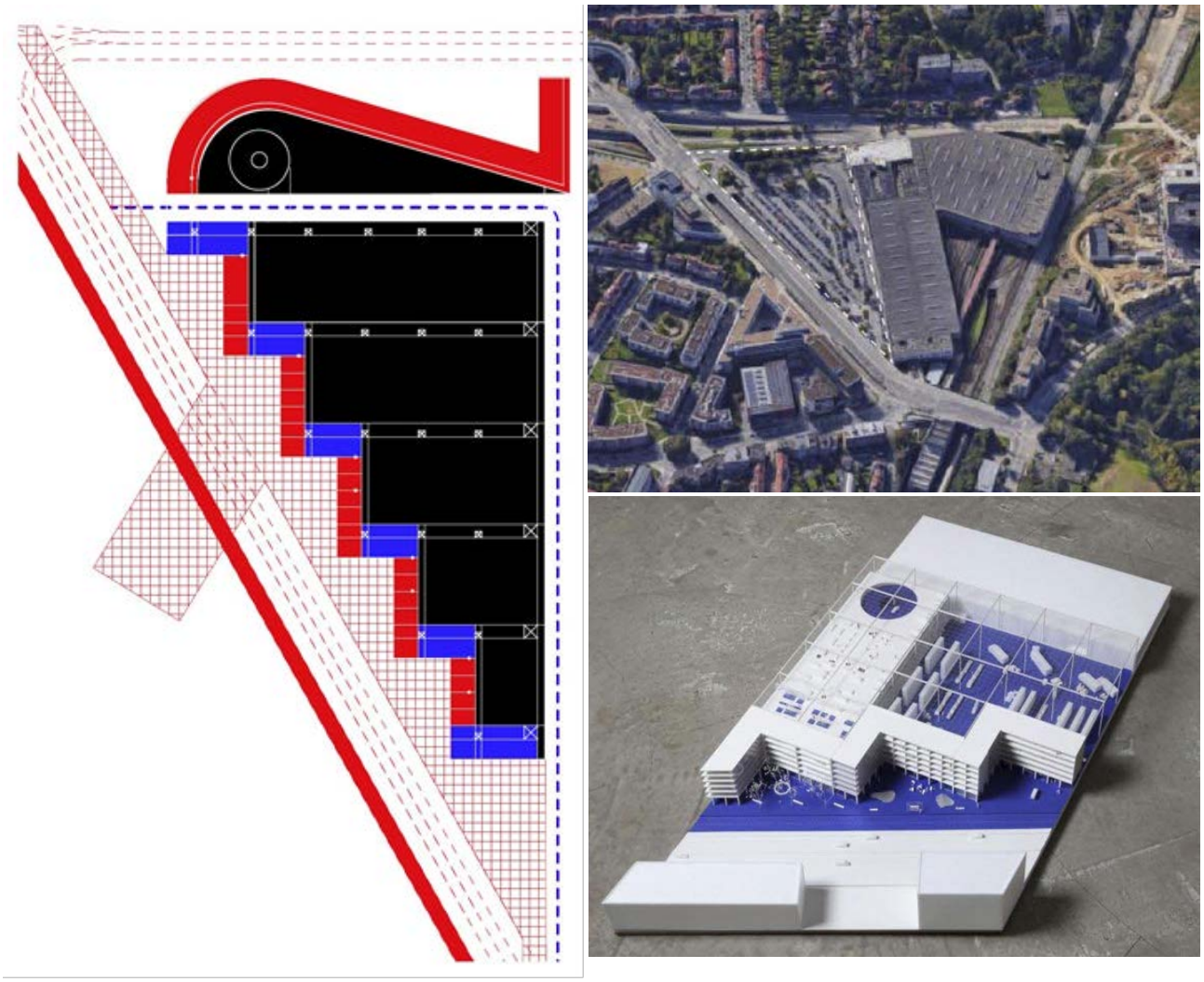


Fig. 9. Experimental project Metahub Delta in Brussels (Central, 2016; Dudal, 2016b)

The triangle-shaped land plot of more than two hectares in Delta territory, presently occupied by a huge parking lot, was selected for the experimental project of Metahub (Fig. 9). The projects of this

scale could expect at least some support only if they create added-value not only in a small context, but to the entire city as well. Such scale added-value is expected to be created by joining three completely different functions in this territory: the existent transport hub, diverse residences and public spaces.

A possible physical form for such a goal was created by performing analysis on the character of the buildings in the surrounding areas. It was noticed that the existent urban development is extremely opportunistic: office and traditional low-raise residential buildings are chaotically scattered throughout the area. This kind of urban structure does not provide added-value to the territory, on the other hand, it creates an opportunity to re-think, how these different functions could synergistically exist next to each other in a physical space. Thus, the architectural expression of the Metahub was created based on these two archetypes of the buildings: offices and residential buildings. The principles of a conglomerate were used in order to combine different functions together: the functions of metropolis and the function of other logistics were left at the back, while the front was dedicated for smaller residential units, where the first floors were given for public spaces. (Central, 2016) Such solutions helped combining together the needs of local and global transit users.

This experimental project is important to the thesis to show how the urban-architectural objects of such scale could be smoothly implemented into an urban fabric, creating added-value not only to itself, but to the surround urban territories and the entire city (Dudal, 2016a). This is a great proof that new combination of different physical structures and functions are possible, and that an inventive point of view should be pursued, in order to revitalise “not-working” urban territories (Central, 2016). Buildings of industrial, logistic, commercial, social or other function could be injected into the existent urban structures in order to strengthen local urban communities.

The list of references that were used for the case studies is presented further, as only the summarised results are presented in the main text of the thesis and not all of the references are included there.

List of references

1. Klundert, W. (2014). Bijlmermeer Regenerated. Modifications of public and semi-public areas – What can we learn?: PHD thesis. Westminster University. Retrieved from http://www.veilig-ontwerp-beheer.nl/publicaties/bijlmermeer-regenerated
2. ZukunftsWerkStadt. (2008). *Urban redevelopment in Leinefelde Sudstadt. Germany*. Retrieved from https://www.leinefelde-worbis.de/fileadmin/user_upload/bauamt/Bilder/Stadtumbau_Leinefelde/Veroeffentlichungen/Studyvisit.pdf
3. World Habitat Awards. (n. d.). *ZukunftsWerkStadt Leinefelde*. Retrieved from https://www.world-habitat.org/world-habitat-awards/winners-and-finalists/zukunftswerkstadt-leinefelde/#award-content
4. Neal, P. (2003). *Urban villages and the making of communities*. New York: Spon Press

5. Baltic Urban Lab (n. d.). *Vastra Hamnen area – Bo01 – waterfront regeneration*. Retrieved from https://www.balticurbanlab.eu/goodpractices/v%C3%A4stra-hamnen-area-bo01-waterfront-regeneration-malm%C3%B6
6. Spacescape. (2014). *Sollentuna sociotopkarta: Grönstrukturens värden och funktioner i den bebygda miljön.* Retrieved form: http://www.spacescape.se/project/sollentuna-sociotopkarta/
7. Pancewicz, L. (2016), *Urban innovations, their initiators and urban management – how to make it work together?* 2016 m. Urbanistinis forumas Nr. X. [Video record]. Retrieved from [personal prof. K. Zaleckis archive]
8. Niewiadomski, G. (2015). *Kolejny podwórzec gotowy*. Retrieved from https://www.fakt.pl/wydarzenia/polska/lodz/ulica-traugutta-w-lodzi-zamienila-sie-w-podworzec/9f14ekj
9. Plus Jeden Den. (2016). *Rarita z Rimavskej Soboty: Celá Európa sa môže inšpirovať!*. Retrieved from https://www1.pluska.sk/regiony/vychodne-slovensko/rarita-rimavskej-soboty-cela-europa-moze-inspirovat
10. GutGut (n. d.) Panelak. Retrieved from http://www.gutgut.sk/Work/PANELAK
11. Central (2016). *Atelier Brussels – the productive metropolis*. Retrieved from https://issuu.com/architectureworkroom/docs/central_screenmode

Appendix 3. Process of the territory selection for the empirical research

Chronology of the development

Initially, the chronological order of Vilnius urban development (Fig. 1) was made. Modernistic urban districts of 20th century were grouped by the decade of planning and construction. Žirmūnai is considered as the first Modernistic district and was developed on the existed homestead-based urban fabric. Later city was mostly developed from the south-west side of the city, with Lazdynai, as the first Modernistic district build in basically open non-urbanized area, to north-west and north, with Fabijoniškės and Pašilaičiai becoming the last districts of the Soviet era.

Fig. 1. Chronological order of Vilnius districts building

While grouping of the Vilnius districts in a chronological order seemed to be the clear representation of urban-body development, when analysing longer periods of time (e.g. centuries), this approach did not work well when grouping architectural and urban planning developments only of 20th century. The groups, divided by the decades of urban planning and construction, represented the physical spread directions of urbanization processes well, but the districts possessed almost none other features in common. A decade seemed to be not long period enough, to see changes in urban planning and architecture, as their processes themselves often last more time, not even mentioning that the different professionals were working on the different districts, and this human factor appeared to be more significant in this short time-span, thus, the division of the districts by decades did not give any generalized conclusions.

Morphotype uniqueness

This is why a simple analysis of the morphotype of Vilnius Modernist districts (Fig. 2) was decided to be performed, by assigning the districts to the groups of similar morphological features.

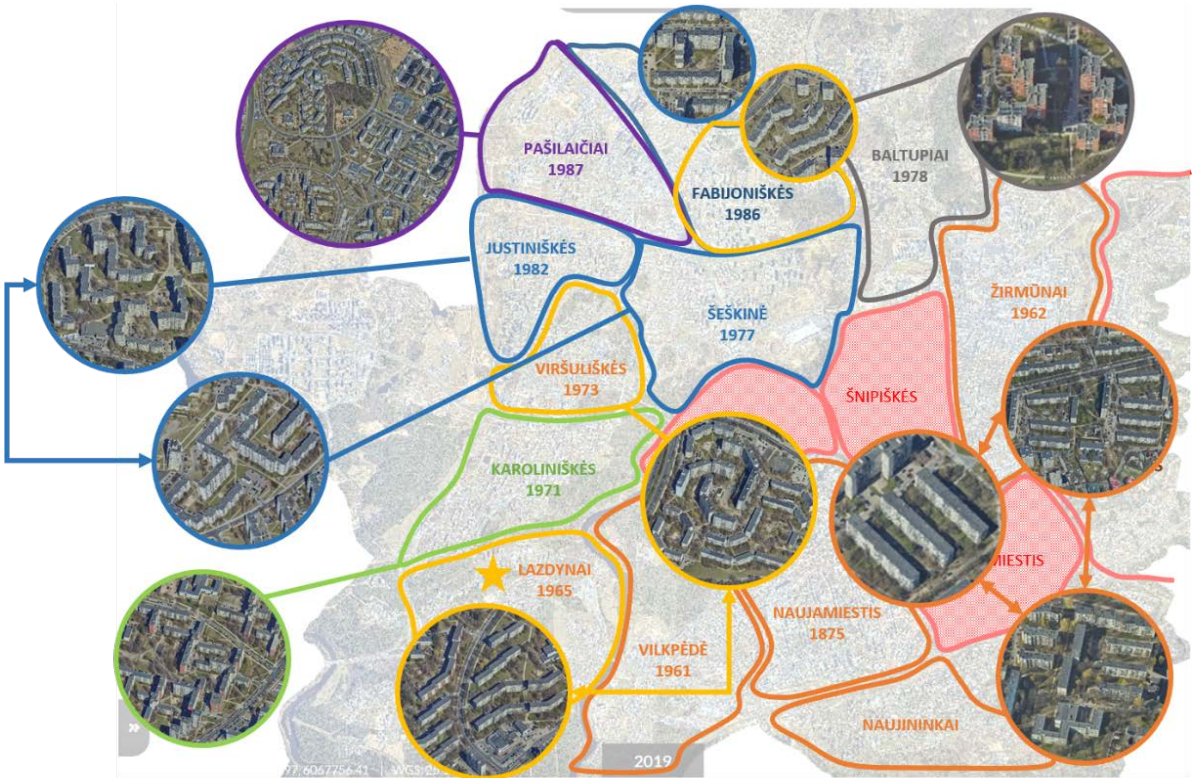


Fig. 2. Morphology of Vilnius Modernist districts

1. The red group (Senamiestis, Žvėrynas and Šnipiškės) is Vilnius city core. These districts are not perceived as Modernist developments in this analysis, as interventions during Modernist period was only occasional and overall, non-Modernist planning features are much more dominant there.

2. The orange group (Žirmūnai, Naujininkai, Naujamiestis and Vilkpėdė) represents the earliest stage of Modernist planning. These districts were developed on the existing, mostly village-type urban fabric, and often, due to new at the time steam-based technologies and quick industrialization, as towns for workers. A simple, regular urban planning scheme is the main feature of this group. Vilkpėdė district was ruled out from the list of possible Modernist districts for deeper analysis at this point, as it is mostly industrial nowadays and, if selected, would not represent the main topic of this thesis. Naujamiestis and Naujininkai were questionable as well, as they have a strong historical urban fabric and their planning issues could jump out of the main topic as well.

3. The yellow group (Lazdynai, Viršuliškės and the older part of Fabijoniškės). Lazdynai district, could be said, is a symbol for a new urban planning era, as it became the first district to be developed in a non-urbanized territory. Despite the typical construction usage, architects presented a great respect to natural surroundings, thus, sensitively

reacted to the complicated terrain of the territory. The contours of elongated apartment-buildings repeat the curves of the relief by creating terraces of different levels, relevant to the surrounding slopes. Viršuliškės and Fabijoniškės seam trying to repeat this semi-natural flow of elongated buildings, on the other hand, these two districts do not possess such an expressive natural environment as Lazdynai does.

4. The green district (Karoliniškės) seams unique in Vilnius urban fabric and does not share any essential features with the other district. Its composition consists of the groups of the "X" shape apartment-building, leaving only narrow ground-floor passages near intersections of their flanks. Although all of the buildings look almost the same from above, the flanks possess a range of diversity in the size and typology of apartments. Karoliniškės was also the first Modernist district, where contrasting colourful facades were introduced.

5. The blue group (Justiniškės, Šeškinė and the newer part of Fabijoniškės) have familiarities with the yellow group, as the clusters of buildings possess some dynamic flow, creating semi-closed courtyards. On the other hand, the composition is more regular-shaped and the buildings are not elongated, as they were in the yellow group, but rather divided in smaller volumes that create chain-like configurations.

6. The grey district (Baltupiai) is of unique morphotype, having a mix of features that are similar to the previously discussed districts, but Modernist buildings cover rather a small area in this district overall, thus, it is not analysed further.

7. The purple district (Pašilaičiai) is another unique district, which could be perceived as the latest Modernist solution. It has a unique inner street network, consisting of three round circular streets, and possess the most diverse housing morphotype, partly-borrowed from previously built districts and combined together in a new way.

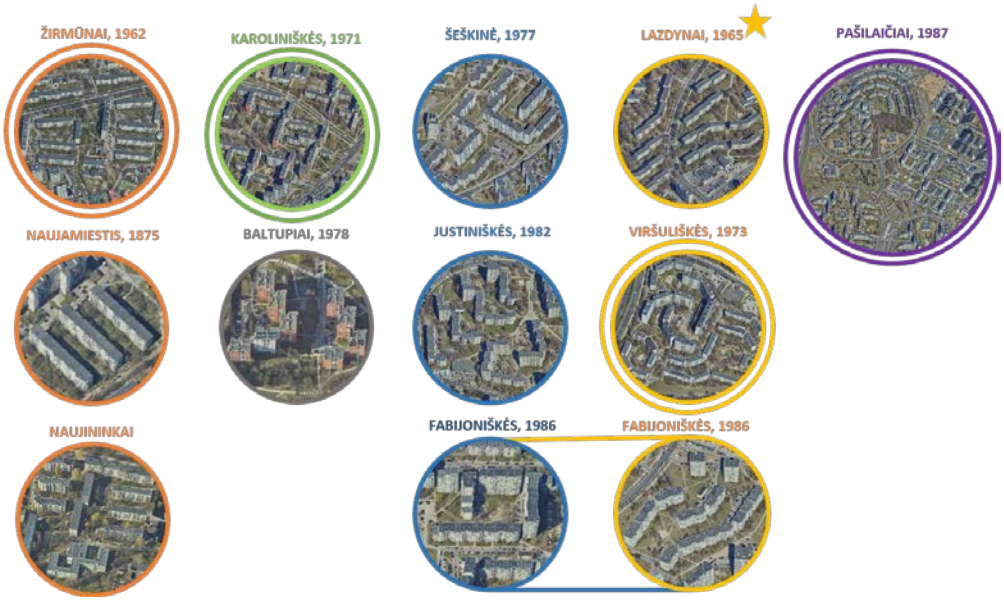


Fig. 3. Morphological groups of Vilnius Modernist districts

After grouping districts by morphotype, most significant (unique) were marked to get a set of 3-4 districts giving the best reflection of entire planning ideology (Fig. 3). Žirmūnai – as possessing most regular, Karoliniškės – most unique, Viršuliškės – most dynamic and Pašilaičiai – most diverse urban network structure. And yet Lazdynai was left behind while in separate analysis they seemed as priority to be selected for the further analysis.

Acknowledgement

An (inter)-national acknowledgement for urban planning was decided to be taken into account as well. Lazdynai has an exceptional significance in this criterion, as it was planned as a demonstrative Modernist urban planning object by architect V. Čekanauskas and his team in 1963, and was evaluated with the highest award for the time – national Lenin prize (Fig. 1, Fig. 2, Fig 3: yellow star). It was the first time when Lenin prize was given for urban development. (Tiukšienė and Sisaitė, 2015)

Morphotype typicality

At this point, one more criteria-based question appeared: is it more import to analyse really unique districts or the most typical are providing more valuable information? On one hand, a set of unique districts could give an ability to analyse diverse urban fabrics and to provide an ability to come up with solutions that are adaptable to a wide range of problems that Modernist districts face. On the other hand, these unique districts could not help to develop a generalised strategy that would be helpful for the revitalisation of any Modernist district, as the set of problems could be unique and relevant only to those particular unique districts, not to Modernist urban planning, as a whole. This is why the typicality of morphotype was decided to be included into the set of criteria as well, covering large urban areas of similar issues.

Integrity of the territory

Chronological analysis represents how the urbanization spread during the time: starting from the city-core, later it extended towards all directions, covering ever-increasing territory. Modernist districts embody majority of this rapid areal spread, and the locations of these districts are scattered to all directions, the exact location depending of the exact time of development.

The morphotype analysis, suggested the set of districts that were scattered throughout the city fabric. On the other hand, it was decided that a single integral territory would be more beneficial for the empirical experiment, as it could give a possibility to analyse not only the inner issues of the separate districts, but could help to identify, how these separate districts interact with one another as well. The argument of relations between the districts seemed especially valid as the fragmentation of an urban fabric in the cities that were planned based on Modernist planning principles appears mostly due to the separation of individual district by vast green territories that lack social functions and often become barriers to residents.

Based on this criteria, the orange group of Modernist districts (Žirmūnai, Naujamiestis and Naujininkai) was taken out of the consideration, as they were detached from the remaining, later Modernist development.

Fractal factor

After considering so many different criteria, the hierarchy of their importance was still unclear, thus, some kind of objectivity was needed. This is why a mathematical-based method of Fractal factor was involved as well. Fractal analysis is a simple model, analysing raster black and white image by dividing its canvas into a grid of equal size cells, and calculating the cells that contain information (have any black pixels inside). This calculation later is repeated a few times with the grids of different density, and the ratio between informative pixels in the grids of different scales is perceived as fractal dimension (factor). The idea of this calculation is based on the concept that the main feature of a fractal is its self-recurrence in different scales. The factor of black and white images is always between 1 and 2, and the greater value of the factor is, the more complex structure of the image it represents. An image with a high fractal value should be understood as possessing the diversity of the scales and sizes of the elements and the evenness of their distribution overall. A high fractal value in the urbanistic image could be associated with a greater diversity in function, density and connectivity in the analysed territory.

Three separate pictures for seven selected districts were prepared from topographical drawing of Vilnius, representing different urban components: buildings, streets and everything together (buildings, streets and yards) (Fig. 4). The higher value of the aspect of buildings is expected to represent a higher diversity in house sizes, shapes and a high building density. The higher value of the aspect of streets is expected to represent more developed street network and better connectivity inside the territory. The aspect of everything is a combination of the first two aspects, with the addition of yards (large hard ground covers for parking lots or other functions). This aspect could help comparing the first two aspects and represents the overall density of the entire district.

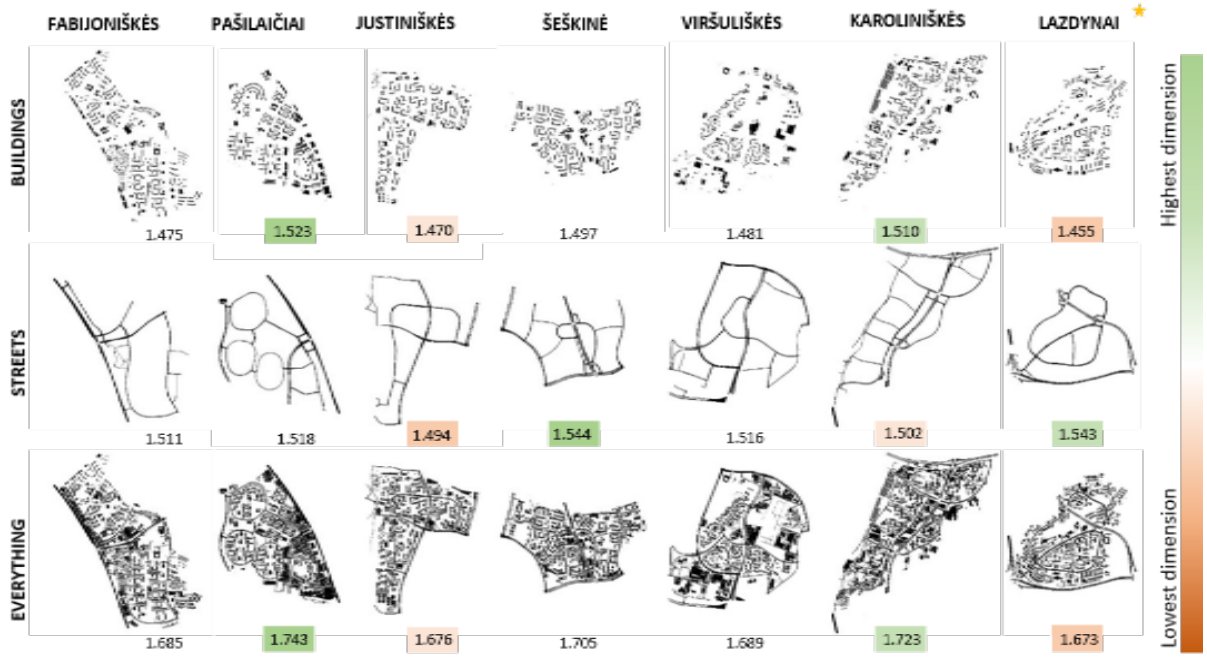


Fig. 4. Fractal analysis of west and north-west Vilnius Modernist districts

After the table of all fractal factors was generated, the two highest and the two lowest values of each aspect was brightened. It became obvious that the aspects of buildings and everything correlate with each other a lot and both could be used interchangeably. The aspect of streets does not correlate with the others at all and show a completely different results, thus, should be considered as a significant factor for deeper analysis.

Some other conclusions could be made, corresponding to the relation between fractal analysis results and the general perception of the analysed districts:

- **Pašilaičiai** has the highest dimensions in the aspects of buildings and everything. Pašilaičiai, in fact, is one of the newest Modernist districts (1987's) and has quite a wide diversity of housing.
- **Justiniškės** has very low dimensions in all three aspects. In reality, the diversity of housing is quite low there, the network of streets is scarce.
- **Šeškinė** has the highest dimension in the aspect of streets. It could be said that in reality this district has strongly expressed local centre and quite well integrated network of streets.
- **Karoliniškės** has high dimensions in the aspects of buildings and everything. In reality it has a pretty unique and complex building structure, consisting of a greater housing variety. Despite that, the dimension of streets is quite low. This may be due to the poor integration of its main corridor to the remaining structure.
- In reality **Lazdynai** is considered probably the best district of the Modernist period. However, fractal analysis show very low dimensions in aspects of buildings and everything. This might be because of a low housing diversity and a scarce building fabric (which not necessarily should be considered as a bad thing) overall. Nevertheless, the aspect of streets is quite high-valued. It could be correlated with the well-integrated structure of the main street.

Conclusion

During the entire selection process, 6 criteria were developed:

- chronological diversity (60's, 70's, 80's)
- morphological uniqueness
- morphological typicality
- (inter)national acknowledgement
- territory integrity
- fractal factor significance

Four districts were selected as having priority for possessing such qualities:

- Lazdynai – (inter)national acknowledgement, fractal significance (low in "buildings" (1.455) and high in "streets" (1.546) aspects), chronology (1960s)
- Karoliniškės – morphological uniqueness, fractal significance (high in "buildings" (1.510) and low in "streets" (1.502) aspect), chronology (1970s)

- Justiniškės – morphological typicality, fractal significance (low in both aspects – 1.470 and 1.494 respectively), chronology (1980s)
- Viršuliškės – continuity of the territory for the experiment

Pašilaičiai was one more district that met a nice set of criteria (morphological uniqueness, fractal significance (highest value in “buildings” (1.523) aspect), chronology (the last district before the Independence)), but was set aside as a good option for a small single-district analysis, but lacking inner integrity for 4-district analysis. The obtained conclusions are likely to be relevant to a particular district, but could be difficult to generalize for a universal strategic model.

Appendix 4. Questionnaire of the sociological web survey

"LAUKO ERDVIŲ VILNIAUS MIESTO (Rajono pavadinimas) RAJONE VERTINIMAS"

Gerbiamas dalyvi,

Esu Milda Sutkaitytė, Kauno technologijos Universiteto (KTU) architektūros studijų studentė. Šiuo metu rašau magistro baigiamąjį darbą tema „Vilniaus miesto miegamųjų rajonų atgaivinimo metodai". Šios anketos tikslas yra nustatyti Vilniaus miesto (Rajono pavadinimas) rajono urbanistinių lauko erdvių naudojimo būdus ir jų vystymo galimybes, bei santykį tarp lauko erdvių kokybės ir gyventojų bendruomeniškumo.

Anketoje pateikiamos 5 grupės nesudėtingų klausimų po 5-15 vienoje grupėje (viso 55 klausimai). Anketos pildymo laikas – apie 15 min. Anketos klausimai yra skirtingų tipų: prašoma pasirinkti tik vieną arba kelis atsakymo variantus iš pateiktų arba prašoma atsakyti į klausimą be pateiktų variantų. Todėl atidžiai perskaitykite klausimus ir pateikite jums labiausiai tinkamus atsakymus.

Jūsų dalyvavimas šioje apklausoje yra labai svarbus siekiant įrodyti, kad gyventojų įtraukimas aplinkos projektavimo procesų užuomazgose yra būtinas kuriant gyventojams patrauklią aplinką ir keliant miegamųjų rajonų kokybę, todėl kviečiu išsakyti savo nuomonę žemiau pateiktais klausimais!

Ši anketa yra anoniminė, jūsų pateikti duomenys bus naudojami baigiamojo darbo tikslams pasiekti. Iškilusius klausimus galite susisiekti el. paštu [redacted]

Ačiū už jūsų laiką!

I grupė klausimų. Šie klausimai skirti su jumis šiek tiek susipažinti ir sužinoti ryšį tarp jūsų ir (rajono pavadinimas).

1. **Jūsų lytis:**
☐ Vyras ☐ Moteris

2. **Jūsų amžius:**
☐ iki 15 m. ☐ 15-19 m. ☐ 20-25 m. ☐ 26-40 m. ☐ 40-65 m. ☐ virš 65 m.

3. **(Rajono pavadinimas) jūs:**
☐ gyvenate ☐ dirbate ☐ mokotės ☐ kita

4. **Kokioje vietoje?**
Adresas (įrašykite gatvės pavadinimą, namo Nr.): .....

5. **Kaip ilgai seniai?**
☐ iki 1 metų ☐ 1-3 metus ☐ 3-10 metų ☐ ilgiau nei 10 metų

II grupė klausimų. Šie klausimai skirti išsiaiškinti jūsų judėjimo kryptims Vilniaus mieste ir (rajono pavadinimas) rajono viduje.

6. **Jeigu gyvenate NE (Rajono pavadinimas), tuomet kokiame Vilniaus miesto rajone (priemiestyje), kitame mieste?**
   (Įrašykite Vilniaus m. rajono arba gyvenvietės, miesto pavadinimą).....

7. **Jeigu dirbate (mokotės) NE (Rajono pavadinimas), tuomet kokiame Vilniaus miesto rajone (priemiestyje), kitame mieste?**
   (Įrašykite Vilniaus m. rajono arba gyvenvietės, miesto pavadinimą).....

8. **Kur dažniausiai apsiperkate kasdienėms reikmėms?**
   (Įrašykite vietos pavadinimą ir / arba adresą) .....

9. **Kokioje vietoje dažniausiai leidžiate laisvalaikį Vilniaus mieste ne namuose?**
   (Įrašykite vietos pavadinimą arba adresą) .....

10. Ar jūs dažnai einate pasivaikščioti?

	Kasdien	Kartą per savaitę	Kartą per mėnesį	Rečiau
Žiemą	☐	☐	☐	☐
Pavasarį/rudenį	☐	☐	☐	☐
Vasarą	☐	☐	☐	☐

11. Kai einate pasivaikščioti, dažniausiai vaikštote (pasirinkite teisingiausią)**:**
☐ **(Rajono pavadinimas)** ☐ Važiuojate į (link) miesto centrą ☐ Važiuojate tolyn nuo miesto centro

12. Kai einate pasivaikščioti (Rajono pavadinimas), dažniausiai vaikštote (pasirinkite teisingiausią)**:**
☐ Einu link miesto centro ☐ Einu toliau nuo miesto centro ☐ Vaikštau įvairiomis kryptimis **(Rajono pavadinimas)** viduje

13. Kiek laiko dažniausiai skiriate pasivaikščiojimui?
☐ iki 5 minučių ☐ 5-15 minučių ☐ 15-30 minučių ☐ 30-60 minučių ☐ daugiau nei 60 minučių

14. Jei sportuojate arba kitaip aktyviai leidžiate laiką (Rajono pavadinimas), kur dažniausiai?
☐ Lazdynuose nesportuoju ir aktyviomis veiklomis neužsiimu ☐ Namuose ☐ (įrašyti vietos pavadinimą arba adresą).....

15. Jei sportuojate arba aktyviai leidžiate laiką NE (Rajono pavadinimas) kur dažniausiai?
☐ Niekada nesportuoju ir aktyviomis veiklomis neužsiimu ☐ (įrašyti vietos pavadinimą arba adresą).....

III grupė klausimų. Šie klausimai skirti išsiaiškinti patraukliausias lauko erdves (Rajono pavadinimas), priežastis, kodėl jos gyventojams patrauklios ir priemones, kas galėtų būti padaryta, kad šios erdvės būtų gyventojų dar labiau mėgstamos.

16. Įvardinkite jūsų mėgstamiausią lauko erdvę (Rajono pavadinimas):
(įrašykite erdvės pavadinimą arba adresą, kur ji yra):……

17. Ši vieta yra netoli jūsų:
☐ gyvenamosios vietos ☐ darbo ar mokymosi įstaigos ☐ apsipirkimo, kt. kasdienių paslaugų vietos ☐ kita (įrašyti).....

18. Kodėl jums patinka lankytis šioje vietoje? *(Pasirinkite visus tinkamus)*

☐ Tai žalia oazė	☐ Ten galima žaisti krepšinį ar kitus žaidimus su kamuoliu
☐ Tai rami ir atpalaiduojanti vieta	☐ Ten galima žiemą čiuožinėti ar slidinėti
☐ Tai gyva, judri vieta	☐ Ten galima žaisti
☐ Ten galima pabūti ramumoje	☐ Ten patinka žaisti vaikams
☐ Ten saugu	☐ Tai gera vieta vedžioti augintinį (šunį, katę, kt.)
☐ Ten lankosi daug žmonių	☐ Ten galima pasimaudyti, pabraidžioti
☐ Ten yra kur atsisėsti	☐ Ten yra meno kūrinių ar fontanų
☐ Ten yra gražių augalų (gėlių, medžių)	☐ Ten gera eiti pasivaikščioti
☐ Ten galima susitikti su draugais, kaimynais	☐ Ten galima sportuoti
☐ Ten jaučiama laukinė gamta	☐ Ten galima sėdėti ar gulėti saulėje, degintis
☐ Ten galima pamatyti laukinių paukščių ar gyvūnų	☐ Ten atsiveria gražus vaizdas
☐ Ten arti vanduo	☐ Ten galima važinėti dviračiu, riedlente, kt.
☐ Ten galima stebėti sezoniškumą	☐ Ten yra kavinė ar kita maitinimo įstaiga
☐ Tai yra privati vieta	☐ Ten švaru ir tvarkinga
☐ Kita priežastis (įrašykite)	

19. Ką šioje vietoje dažniausiai veikiate? (įrašykite)
……

20. Paprastai šioje vietoje būnate:
☐ viena(-s) ☐ su šeimos nariu ☐ su draugais ☐ su augintiniu ☐ kita (įrašyti).....

21. Kaip dažnai lankotės šioje vietoje skirtingu metų laiku?

	Kasdien	Kartą per savaitę	Kartą per mėnesį	Rečiau
Žiemą	☐	☐	☐	☐
Pavasarį/rudenį	☐	☐	☐	☐
Vasarą	☐	☐	☐	☐

22. Kaip ilgai būnate šioje vietoje vieno apsilankymo metu?

	Kartais čia praleidžiu ilgesnį laiko tarpą (pvz. pietaujate)	Kartais šiek tiek pabūnu (pvz. sustojate pasigrožėti)	Dažniausiai tik praeinu
Žiemą	☐	☐	☐
Pavasarį/rudenį	☐	☐	☐
Vasarą	☐	☐	☐

23. Kokiu būdu dažniausiai atvykstate į šią vietą?

☐ pėsčiomis ☐ visuomeniniu transportu ☐ dviračiu
☐ automobiliu ☐ kita (įrašykite).....

24. Kiek laiko jums dažniausiai užtrunka pasiekti šią vietą?

☐ iki 5 minučių ☐ 5-15 minučių ☐ 15-30 minučių ☐ daugiau nei 30 minučių

25. Ką reikėtų padaryti, kad ši vieta jums būtų dar patrauklesnė? *(Pažymėkite vieną ar kelis tinkamus atsakymus)*

☐ Nieko daryti nereikia	☐ Įrengti daugiau suoliukų
☐ Geriau valyti ir prižiūrėti	☐ Atidaryti kavinukę ar nedidelę maitinimo (gėrimų) įstaigą
☐ Labiau rūpintis apsauga nuo niokojimo ir vandalizmo	☐ Užtikrinti geresnį bendrąjį saugumą
☐ Įrengti geresnį apšvietimą	☐ Gerinti pasiekiamumą (Įrengti geresnius takelius, perėjas)
☐ Įrengti apsaugą nuo lietaus (pastogę ar kt.)	☐ įrengti geresnę apsaugą nuo automobilių eismo
☐ Pasodinti daugiau gėlių, kt. augalų	☐ įrengti geresnę apsaugą nuo triukšmo
☐ įrengti vandens telkinį ar fontaną	☐ įrengti (daugiau) meno objektų
☐ Kitos siūlomos priemonės (įrašykite):	

26. Ar (Rajono pavadinimas) yra viešų vietų, kurias lankote ypatingomis progomis (pvz. pamatyti pirmas pavasario žibutes, stebėti pilnaties...)? Kokios, šios progos?

☐ Tokių progų nėra ☐ Lankau šias vietas:

Progos pavadinimas, laikas arba data	Lankoma vieta
• ……	……
• ……	……
• ……	……

***27.* Kokių viešų erdvių (nebūtinai lauko) jūsų nuomone labiausiai trūksta (Rajono pavadinimas)?** *(Pasirinkite vieną ar kelis tinkamus atsakymus)*

☐ Kur būtų daug žalumos	☐ Kur galima žaisti krepšinį ar kitus žaidimus su kamuoliu
☐ Kur būtų jaučiama laukinė gamta	☐ Kur galima žiemą čiuožinėti ar slidinėti

☐ Kur būtų gražių žydinčių augalų	☐ Kur būtų galima vedžioti augintinį (šunį, katę, kt.)
☐ Kur būtų galima pamatyti laukinių paukščių ar gyvūnų	☐ Kur būtų galima pasimaudyti, pabraidžioti
☐ Kur būtų vanduo	☐ Kur būtų meno kūrinių
☐ Ramios, atpalaiduojančios	☐ Kur būtų galima sportuoti
☐ Labiau privačios	☐ Kur būtų galima sėdėti ar gulėti saulėje, degintis
☐ Gyvos, judrios, kur lankosi daug žmonių	☐ Kur atsivertų gražus vaizdas
☐ Kur būtų galima susitikti su draugais, kaimynais	☐ Kur būtų galima važinėti dviračiu, riedlente, kt.
☐ Kur vaikai galėtų žaisti	☐ Kur būtų kavinė ar kita maitinimo įstaiga
☐ Kitokios (įrašykite):	

28. Kurių viešųjų erdvių ar vietų (Rajono pavadinimas) vengiate:

☐ tokių nėra

☐ vengiu šių vietų:

Vietos pavadinimas	Vengiu dieną	Vengiu vakare/naktį
• ……	☐	☐
• ……	☐	☐
• ……	☐	☐

29. Kodėl šių vietų vengiate?

(įrašykite): ……

30. Kurias gatves, supančias jūsų gyvenamąją vietą, laikytumėte jūsų gyvenamosios teritorijos riba?

Gatvės pavadinimas
• …….
• …….
• …….
• …….

IV grupė klausimų. Šie klausimai skirti sužinoti daugiau apie jūsų artimiausią gyvenamąją aplinką ir bendruomenę.

31. Kokio tipo būste jūs gyvenate?

☐ Daugiabutyje ☐ Blokuotame name (kotedže) ☐ nuosavame name ☐ kita (įrašykite).....

32. Jei turite balkoną ar privačią terasą, ką ten labiausiai mėgstate veikti?

☐ Nei balkono, nei terasos neturiu ☐ Mėgstu veikti: (įrašyti).....

33. Ar pro savo namų langus matote gražų vaizdą?
☐ Taip ☐ Labiau taip ☐ Labiau ne ☐ Ne ☐ Nežinau, negaliu atsakyti

34. Ką matote pro savo namų langus?
(įrašyti) .....

35. Ar vaizdas pro jūsų namų langą yra svarbus jūsų gyvenimo kokybei namuose?
☐ Taip ☐ Labiau taip ☐ Labiau ne ☐ Ne ☐ Nežinau, negaliu atsakyti

36. Ar leidžiate savo laisvalaikį savo gyvenamojo namo kieme? Kaip dažnai?

	Kasdien	Kartą per savaitę	Kartą per mėnesį	Rečiau, niekada
Žiemą	☐	☐	☐	☐
Pavasarį/rudenį	☐	☐	☐	☐
Vasarą	☐	☐	☐	☐

37. Kodėl Jums patinka čia leisti laiką?
(įrašyti).....

38. Kaip jums atrodo, ar jūsų kaimynai čia leidžia savo laiką?
☐ Taip, dažnai leidžia ☐ Kartais leidžia ☐ Niekada neleidžia ☐ Nežinau
☐ Kita (įrašyti).....

39. Ar savo gyvenamojo namo kieme bendraujate su kaimynais?
☐ Taip, daug bendrauju ☐ Taip, šiek tiek bendrauju ☐ Pasisveikinu ☐ Nebendrauju ir nesisveikinu

40. Kaip apibūdintumėte, kas yra jūsų kaimynai?
☐ Gyvenantys tame pačiame aukšte ☐ Gyvenantys toje pačioje laiptinėje ☐Gyvenantys tame pačiame name ☐ Gyvenantys tame pačiame arba gretimame name
☐ Kita (įrašyti).....

41. Ar galėtumėte teigti, kad pažįstate savo kaimynus?
☐ Taip, pažįstu daugumą ☐ Pažįstu kelias (1-5) arčiausiai gyvenančias šeimas ☐ Nepažįstu

42. Ar galėtumėte teigti, kad bendraujate su savo kaimynais?
☐ Taip, bendrauju su dauguma ☐ Taip, kartu leidžiame laisvalaikį su keliais kaimynais (kaimynų šeimomis) ☐ Taip, pasitaikius progai pasišnekame su keliais kaimynais ☐ Tik pasisveikiname ☐ Ne, nebendraujame

43. Ar galėtumėte teigti, kad gyvenate aktyvioje kaimynystėje?
☐ Taip ☐ Labiau taip ☐ Labiau ne ☐ Ne ☐ Nežinau, negaliu atsakyti

44. Ar prisidedate prie lauko erdvių tvarkymo (Rajono pavadinimas)?
☐ Prisidedu fiziškai ☐ prisidedu finansiškai ☐ prisidedu organizuodamas ☐ neprisidedu ☐kita (įrašyti).....

45. Ar Jūsų kaimynystė organizuoja bendras veiklas (renginius, susibūrimus, talkas...)?
☐ Taip, organizuojame reguliarius renginius ☐ taip, kartais organizuojame ☐ yra buvęs vienas ar keli ☐ ne, neorganizuojame

V grupė klausimų. Čia pateikiami baigiamieji klausimai, kuriais siekiama išsiaiškinti ar (Rajono pavadinimas) yra patrauklūs gyventojams ir ko jiems trūksta.

46. Kur Jūs užaugote?
☐ **(Rajono pavadinimas)** ☐ Kitame Vilniaus miesto rajone ☐ kitame mieste ☐ kaimo vietovėje

47. Ko labiausiai pasiilgstate (Rajono pavadinimas) lyginant su vieta, kurioje užaugote?
(įrašyti) .....

48. Ar ateityje norėtumėte likti gyventi (Rajono pavadinimas)?
☐ Taip ☐ Labiau taip ☐ Labiau ne ☐ Ne ☐ Nežinau, negaliu atsakyti

49. Kodėl? (įrašyti) .....

50. Jei rinktumėtės kitą rajoną Vilniaus mieste, kuriame labiausiai norėtumėte gyventi?
(įrašyti Vilniaus miesto rajono pavadinimą) .....

51. Kodėl?
(įrašyti) .....

52. Įvardinkite jūsų mėgstamiausią viešąją erdvę Vilniaus mieste ar rajone NE (Rajono pavadinimas):
(įrašykite erdvės pavadinimą ir / arba jos adresą)…….....

53. Kaip manote, ar mieste yra pakankamai gyventojams pritaikytų lauko erdvių?
☐ Nepakankamai ☐ Norėtųsi daugiau ☐ Pakankamai ☐ Per daug ☐ Nežinau, negaliu atsakyti

54. Kas jums labiausiai patinka gyvenant Vilniaus mieste?
☐ Čia gyvena malonūs, įdomūs žmonės
☐ Čia yra daug veiksmo ir judesio
☐ Aš čia jaučiuosi namuose
☐ Čia gyventi yra patogu
☐ Kita: (įrašyti) .....

Appendix 5. Descriptive and supplementary information of the sociological web survey

Preparation and dissemination of the sociological web survey

Separate web surveys were decided to be prepared for the seven districts: four of the districts were chosen as priorities and three more were added as extra, in case of a failure of respondents' engagement or other unpredictable factors. The web surveys were prepared using Google Forms online application and were posted in the Facebook groups of the communities of these districts.

Important things to note about Facebook groups as a publicity tool:

- Finding of the most important (the largest, the most active) Facebook groups is time consuming and joining them can take some time as well, because often the acceptance confirmation of group moderators is needed.
- The timing of the post is especially important, as the most attention it gets at the first part of the day, not to forgetting that often posts need the confirmation of group moderators as well.
- It was an excellent idea to conduct survey on a few extra districts, as the post in some groups were considered as spam by moderators, and even the account of the poster was blocked from that Facebook group, without any warning or other communication.
- The regularity of reminding posts is crucial to attract the larger number of respondents, as the post hides under other posts approximately in a day, and after two to three days no new respondents fill the survey. On the other hand, too often reminders can upset the moderators of groups, thus, a single post a week (three posts in total) seemed to work well.
- The motivating introduction of the post is critically important to attract more respondents.
- The administration of the posts is time consuming, as the concerned residents comment the post and sometimes even write personal messages. The response of an author is important to get even more respondents, as a warm communication encourage further share of the survey.

By lucky coincidence, the sociological web surveys were most actively filled in the four prioritised districts during the first week, thus, the surveys of other three districts were not re-publicized or analysed later.

284 respondents filled the surveys in 4 districts: 80 in Justiniškės, 75 in Viršuliškės, 75 in Lazdynai and 56 in Karoliniškės.

Descriptive statistics of the respondents (Fig. 1)

- The majority of the respondents are living in these districts for 10 years or more (most of them are 40-65 years old).
- The majority of the respondents, living in the districts for 3-10 years, are 26-40 years old.

- All of the children (respondents of less than 16 years old) are living for at least 3 years in those districts, often more than 10 years.
- The majority of the respondents of 40-65 years old, filled the survey in Lazdynai. It is the oldest Modernist district from the analysed four in reality as well.
- Lazdynai and Justiniškės are the most diverse districts by age groups.
- The majority of the respondents of young adulthood filled the survey in Viršuliškės.
- Karoliniškės got the least respondents overall.
- The majority of the respondents were women.

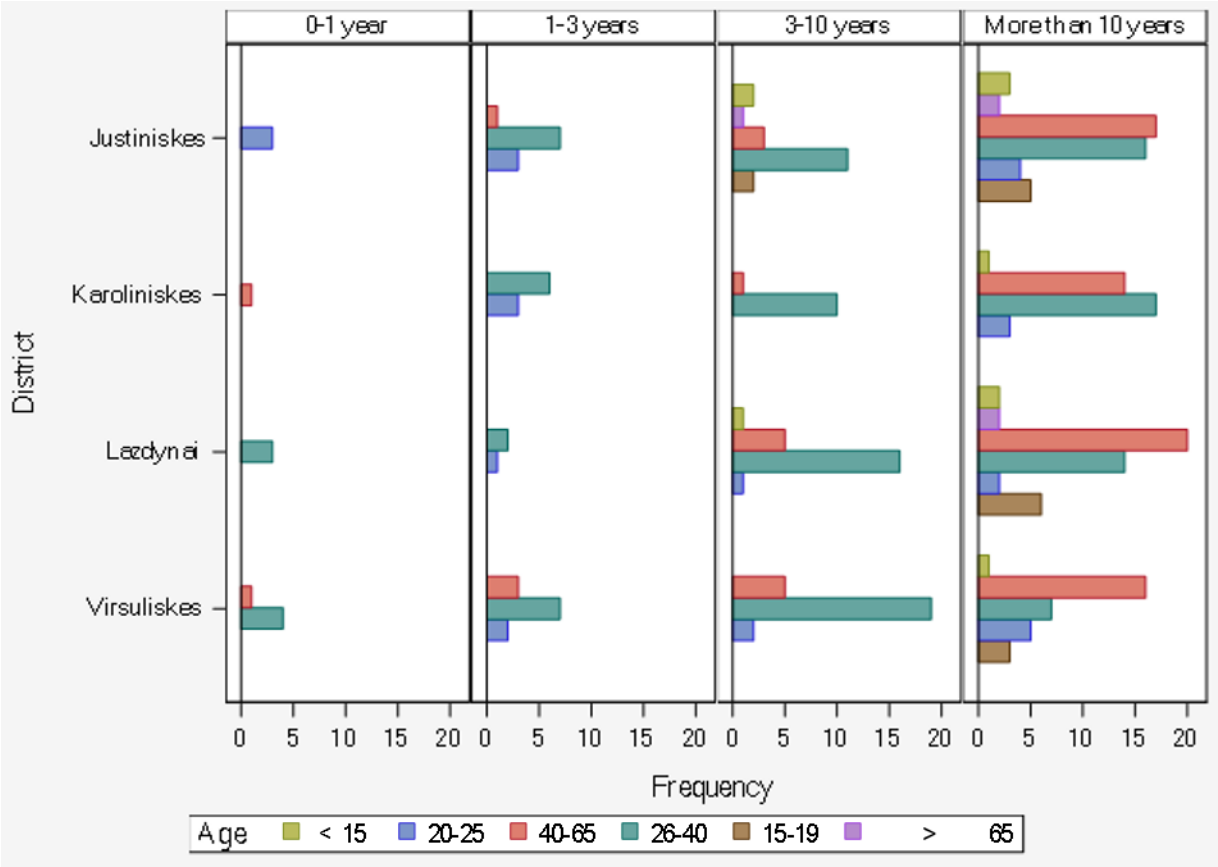


Fig. 1. Scheme of respondents by district, residing duration and age group

General overview of qualities and flaws in living environment

In addition to the main analysis, presented in the main text of the thesis, sociological web survey was asking respondents to evaluate their overall satisfaction about the living in their districts, to mention the other districts in Vilnius city that look more attractive to them and to tell the reasons why these districts are more attractive.

According to the results, the happiest respondents are living in Lazdynai, as even a third of them gave the maximum (5) score of satisfaction, 43 % gave the second best (4) and only 1 % gave the lowest score (1). The least enjoyment show respondents from Viršuliškės district: only 44 % gave high marks (4 or 5), but the lowest marks (1 or 2) were not so often as well, making up 15 % of the respondents. Karoliniškės and Justiniškės both got low evaluation (1 or 2) from

18 % of the respondents, while around 60 % respondents were satisfied (4 or 5) living in these districts. (Fig. 2)

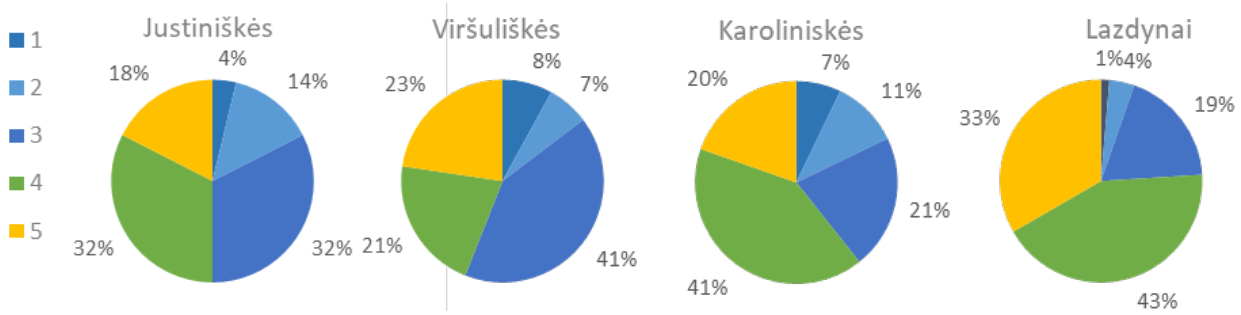


Fig. 2. Pie-charts of respondents' satisfaction about their districts

The chart below (Fig. 3) represents the other districts in Vilnius city, most appreciated by respondents for living. The question in the survey was asking to name the districts inside the city, nonetheless, 45 respondent expressed their willingness to live in the peripheral area or out of the city at all. Žvėrynas, Antakalnis and Pilaitė are the most attractive districts and outscore even the central area, the downtown and Užupis district.

23 respondent said that their district is the best and they would not like to change it to any other. The Majority of those respondents are living in Lazdynai district. 39 respondents mentioned the neighbouring districts that fall in the analysed four, with Lazdynai on the top of the popularity again. The other Modernist districts were mentioned only 45 times all together, with Žirmūnai appearing to be the most attractive.

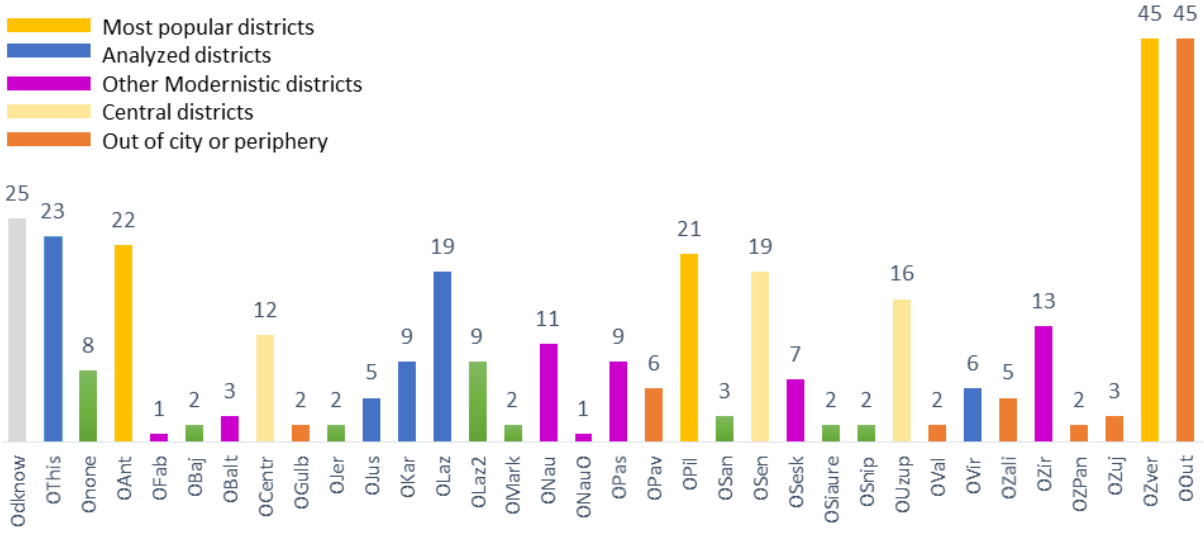


Fig. 3. Other preferred district in Vilnius city for living

Another question in the survey (Fig. 4) was asking respondents to compare their living district with the more favoured districts in Vilnius, and to mention the social qualities these districts possess. The majority of the respondents named *nature, tranquillity, beauty, closeness to the*

city centre and *connectivity* as the main influential factors. These results are very similar to the most popular social values, acquired in Sociotope mapping analysis in the thesis.

The answers to the further group of questions correlate more with the least popular social values and expose the flaws of Modernist districts even more. *Privacy* is the most desirable living quality, based on this chart, while the individual map of this social value is almost empty (**Appendix 6** of the thesis). This proves that Modernist urban planning eliminated privacy as a redundant quality in urban life. *Cosiness*, *special atmosphere* and *mood* are very abstract expressions, mentioned by respondents, but reveals the *lack of identity and authenticity* in Modernist urban neighbourhoods once more.

Finally, a couple of unexpected responses were acquired, suggesting that the most important factor choosing a district for living is *status* or *prestige* on their own.

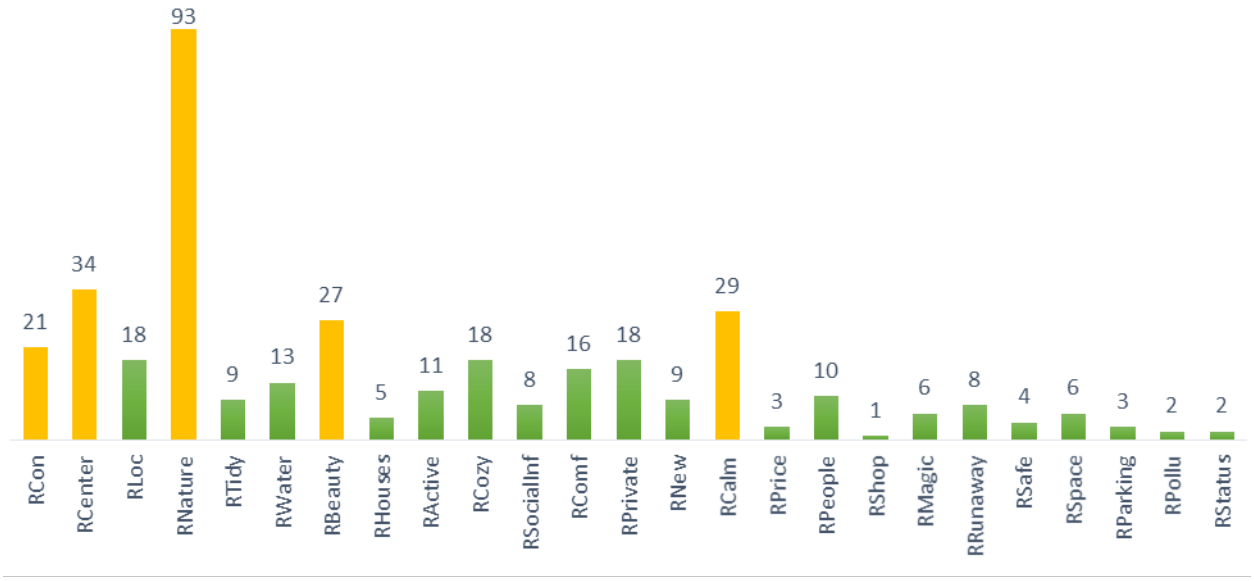
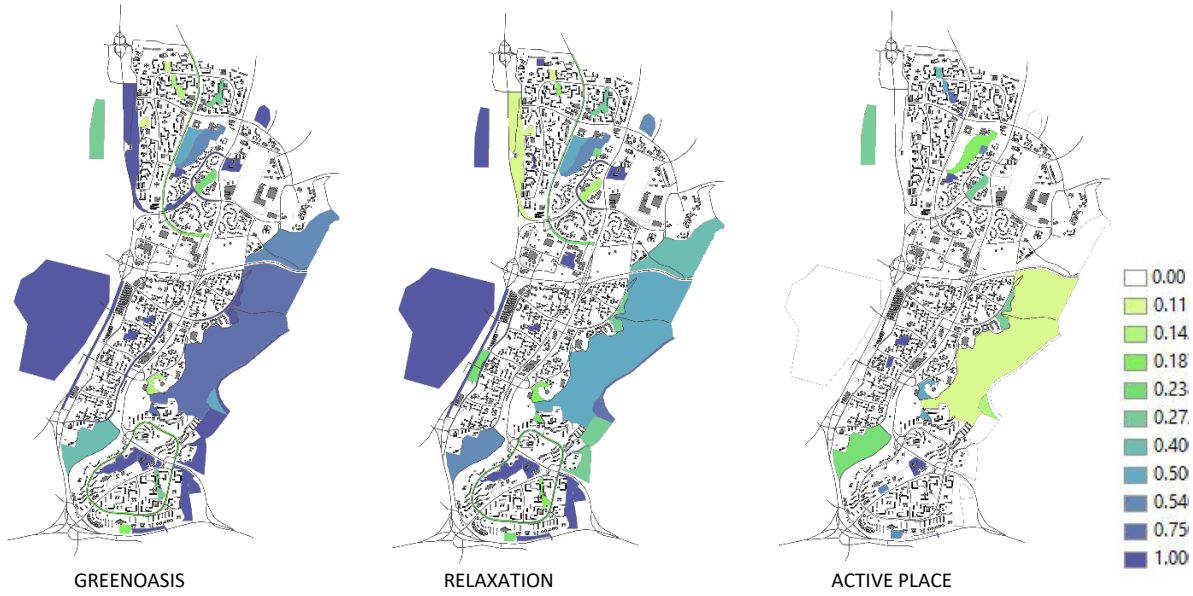


Fig. 4. Categorized qualities of other Vilnius districts

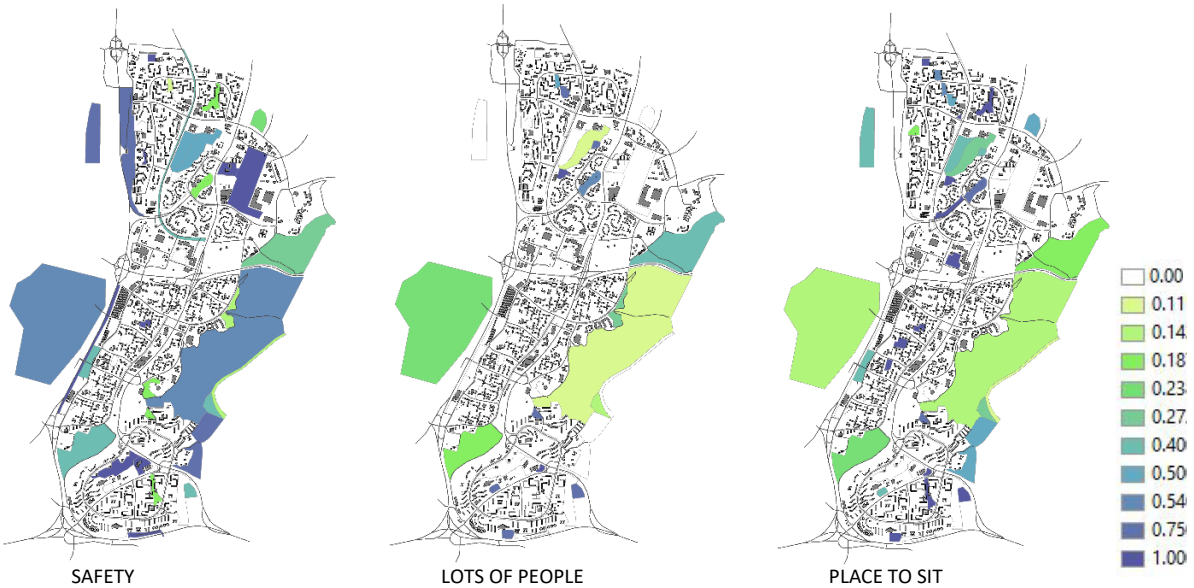
Appendix 6. Maps of the sociotope values and flaws in western Vilnius

Maps of social values in western Vilnius

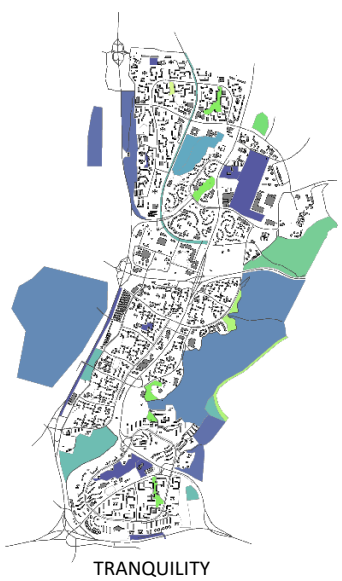
Colour intensity represents the normalized intensity of the particular social value in the particular sociotope: a number of respondents, who assigned thet social value to the sociotope, divided by a number of overall respondent, who chose that sociotope as their favourite open urban space. Normalization is necessary to reveal the intensity of a particular social value, based on the opinion of the majority, and allowing the places that have less users (because they are small, segregated or very specific) not to be over-dominated by the most popular places, as the intensity of any social value is a qualitative measure and does not depend directly on the number of users.



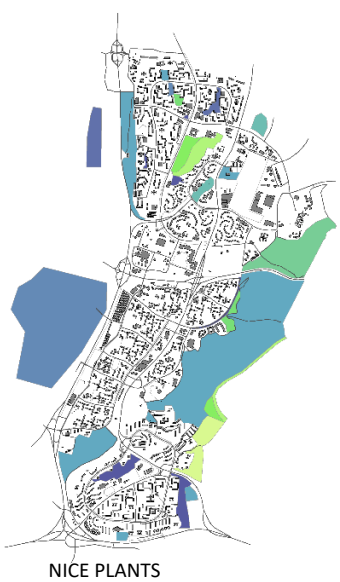
GREENOASIS RELAXATION ACTIVE PLACE



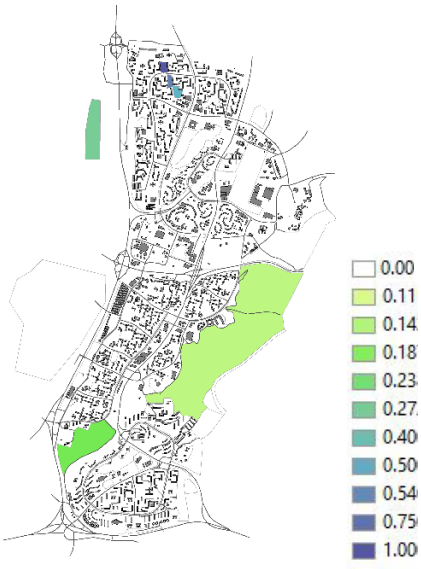
SAFETY LOTS OF PEOPLE PLACE TO SIT



TRANQUILITY



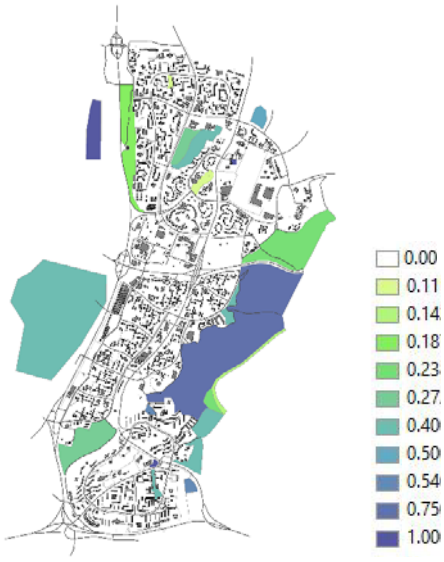
NICE PLANTS



ART

FRIENDS

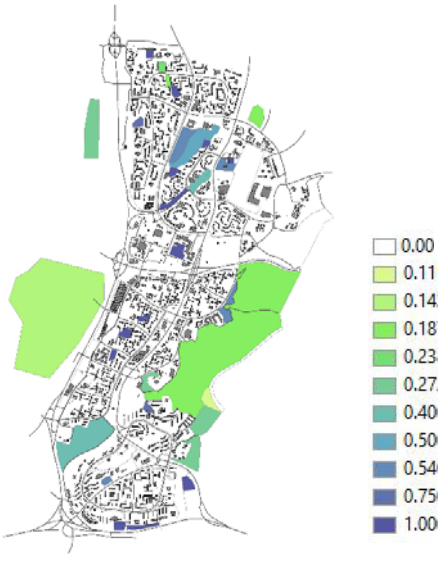
WILDERNESS



ANIMALS

SEASONS

PRIVACY

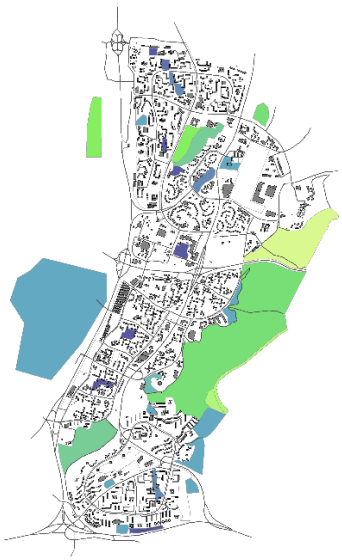


GAMES

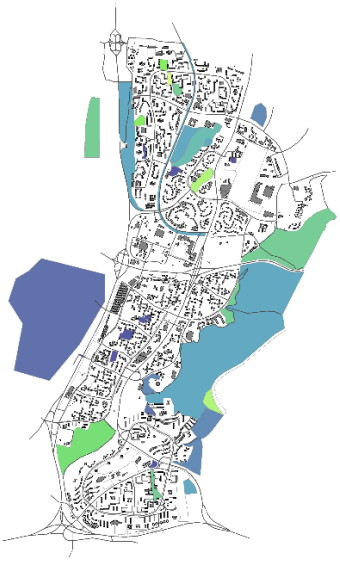
WATER

WINTER

VIEW

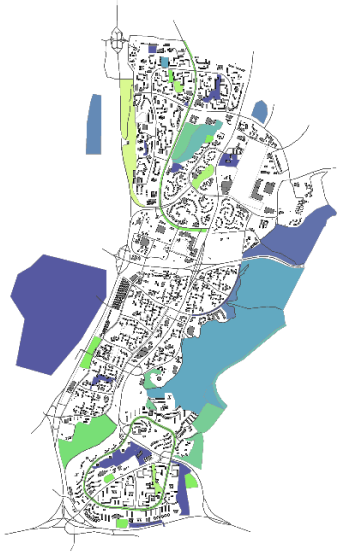


CHILDREN



PETS

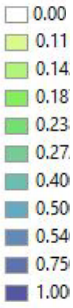
SWIMMING

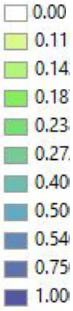


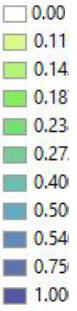
WALKING

SPORT

SUN





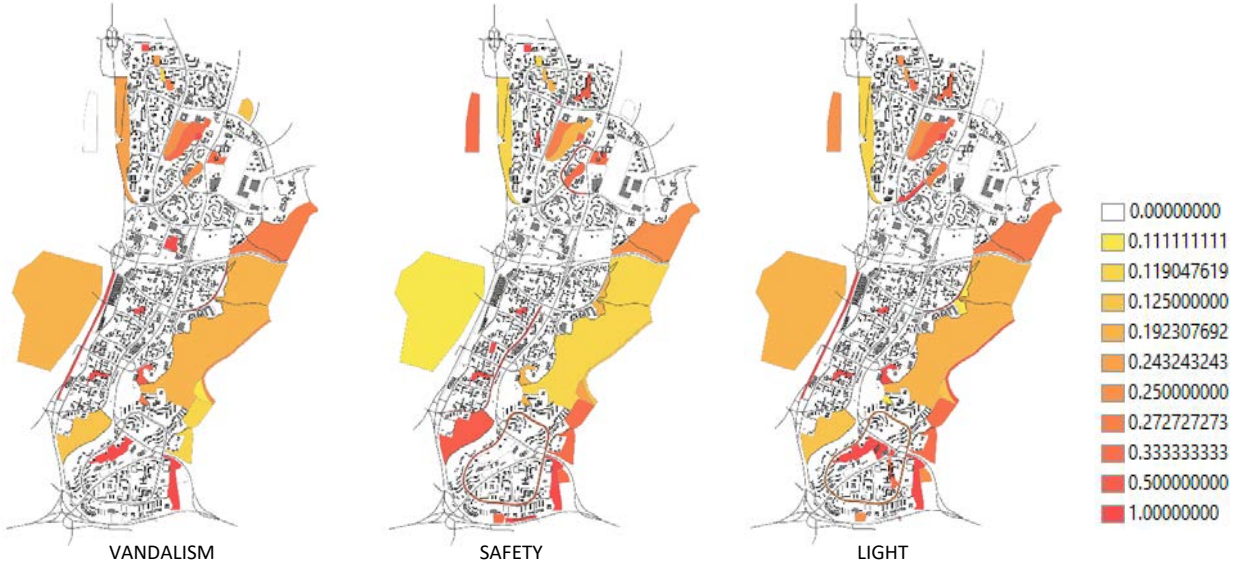


RIDE CAFE CLEANLINESS

Maps of sociotope flaws in West Vilnius

Colour of intensity represents normalised values, same manner as in *the maps of sociotope values.*

BENCH CLEANLINESS CAFE

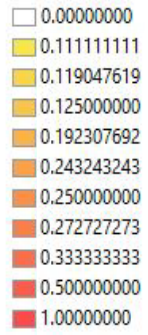


VANDALISM SAFETY LIGHT

REACH

RAIN PROTECTION

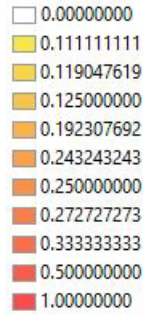
ART



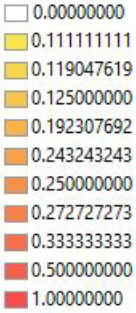
TRAFFIC PROTECTION

NICE PLANTS

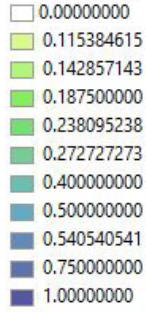
NOISE PROTECTION



WATER



ALL IS PERFECT!



Appendix 7. Technical data preparation for Space syntax analyses

Data preparation for Space syntax

The open-source data of buildings and roads of Lithuania was downloaded from www.geofabrics.co and cleaned-up, leaving only the area of the analysed territory. While the layer of buildings seemed to look good and even very recent construction sites were already included, a little bit different situation was with the layer of roads. It looked normal at the first glance, but the detail level appeared to be not the same in different places, when started to analyse closer: even the smallest naturally occurred trails were present in some areas, while the main pedestrian-walks were missing in others. Data, of such uneven completion, could not be proceeded further and a decision to draw the missing pathways was made. Recently made high quality ortho-photos from https://erdvinis.vilnius.lt/ taken in 2019 were priceless to fill missing data by hand.

Data preparation and parameters for Visibility-graph analysis of social control

Data preparation, prior uploading it to DepthMapX application, for Visibility-graph analysis:

- the analysed territory must have closed boundary;
- the polygons of buildings have to be included into the drawing as the main obstacles;
- fenced territories or other kind of areas with public access limitation have to be included into the drawing as closed polygons, because fenced objects have higher depth of social control;
- entrances to the buildings should to be marked in any easy to visually find way, in order to make them easy to find in DepthMapX later (entrances to the technical buildings, garages or others buildings of limited usage should not be marked, as their impact to social control is very little)

The settings and workflow:

- Firstly, a grid was created in order to perform Visibility-graph analysis, as it needs *nodes* as is described in the main text. Grid of *6 meters* was selected, because it was the smallest possible scale, allowed by DepthMapX to this size of territory.
- Later, a regular procedure for Visibility-graph analysis was performed with no particular parameters.
- The most time consuming job of the analysis was to mark entrances to the buildings in DepthMapX, as all of them have to be selected in the created grid by hand, providing the method of Visibility-graph with the information of which box of the grid is contributing social control.
- Finally, a metric step depth analysis was performed, based on the selected entrances.

Data preparation and parameters for Agent-based analysis

The majority of the procedures of data preparation were performed in the same manner as was done for the Visibility-graph analysis of social control, with a couple extra:

- the analysed territory was divided into district and each of these districts was analysed separately, as a higher resolution grid was needed in order to allow pedestrian flow through narrow passages between buildings, and DepthMapX was not allowing it in the territory size of all four districts;
- streets, that were mentioned as the borderlines for the living territories by respondents in the sociological web survey, were included into the drawings as obstacles, with only street-crossings allowing the pedestrian flow

The settings and workflow:

Visibility-graph was created identically the same way like it was created for the map of social control, with only one exception that mentioned before: the spacing of the grid was chosen of 2 meters, as the smaller territory size (after its division to four separate districts) gave this possibility.

Agent-based analysis was performed twice for each district, with a different number of time-steps in system, representing instant and local movement (200 and 400 meters, respectively), same as these distances were selected in Segment analysis for pedestrian paths. The other modified settings were used as followed:

- agent release from selected locations (entrances to the building)
- time-steps in system: 100 and 200
- record trails for: 100.000 agents
- movement rule: standard

Appendix 8. Analysis of the social composition of Lazdynai and Karoliniškės

Overall density and distribution by genders

Modernist districts are the most densely populated in entire Vilnius. This is especially valid for Karoliniškės.

The core of *Karoliniškės should not be densified* (except a few places), while *Lazdynai could accommodate more people*, compared to the overall western Modernist districts (Fig. 1). One of such places, where new buildings could appear in Karoliniškės, is the area around Press Palace, by Vilnius western bypass, near Sietyno str. 1. On the other hand, other low-accommodated areas in Karoliniškės are of different functions: open urban spaces, social infrastructure or some commerce. This shows the functional diversity of large areas in horizontal urban plane. Natural social values should be intensified in some of these places (area around Šimulionio garden, building Maciulevičiaus g. 51). Lazdynai district does not stand out in the overall density aspect, comparing it with other western Modernist districts. On the other hand, the fragmentation of the overall structure is present there.

Around 1.3 times *more women* are living in the city core than men, while men more often choose to live in the suburbs (Fig. 2). This could especially be said about the southern Modernist districts. Some proposals of how to attract men to these districts could be developed.

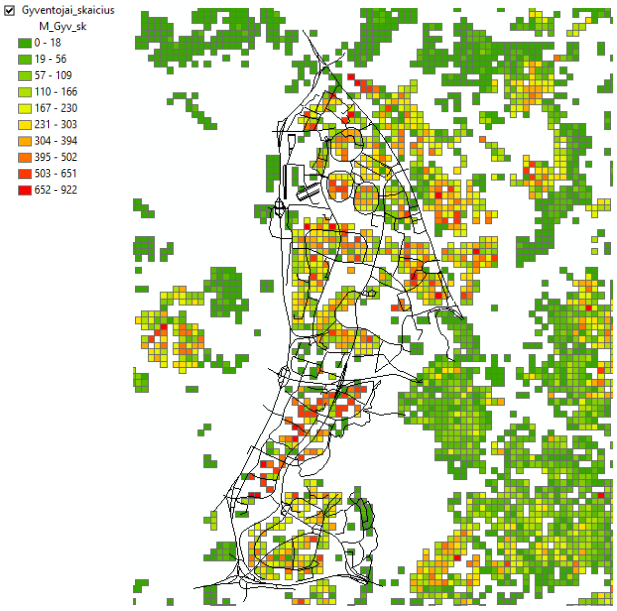


Fig. 1. Map of the residents' distribution

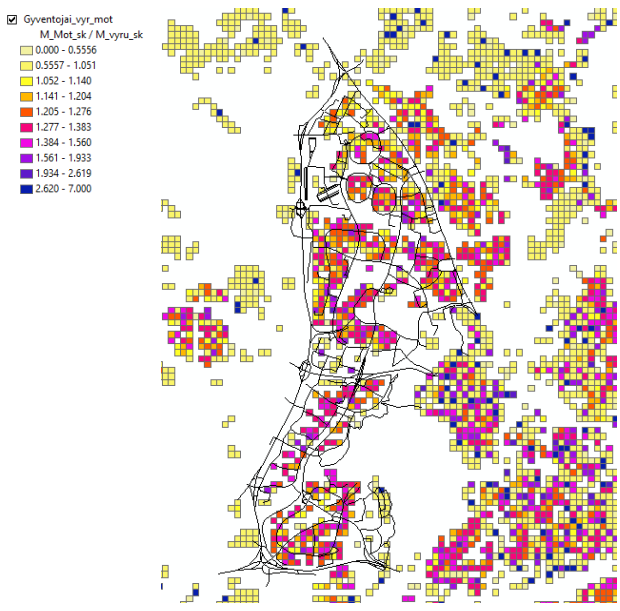


Fig. 2. Map of the gender distribution

Distribution by age groups (Fig. 3)

Children (0-14 years)

Around 15 % of the population in the southern Modernist districts are children (0-14 years). The percentage is similar in the entire core of Vilnius, but more children are living in the

suburbs. On the other hand, Karoliniškės populate more children than other parts of the city overall.

While the ratio of children and overall residents in the analysed territory is similar to the overall western Modernist districts, their number is quite high in Karoliniškės. The map of women and men ratio (Fig. 2) shows that this ratio is higher in Karoliniškės as well. These two maps correlate with the maps of divorced and single residents (Fig. 7) as well. It could be concluded that *divorced or widow mothers* are more often met there than anywhere else in the city.

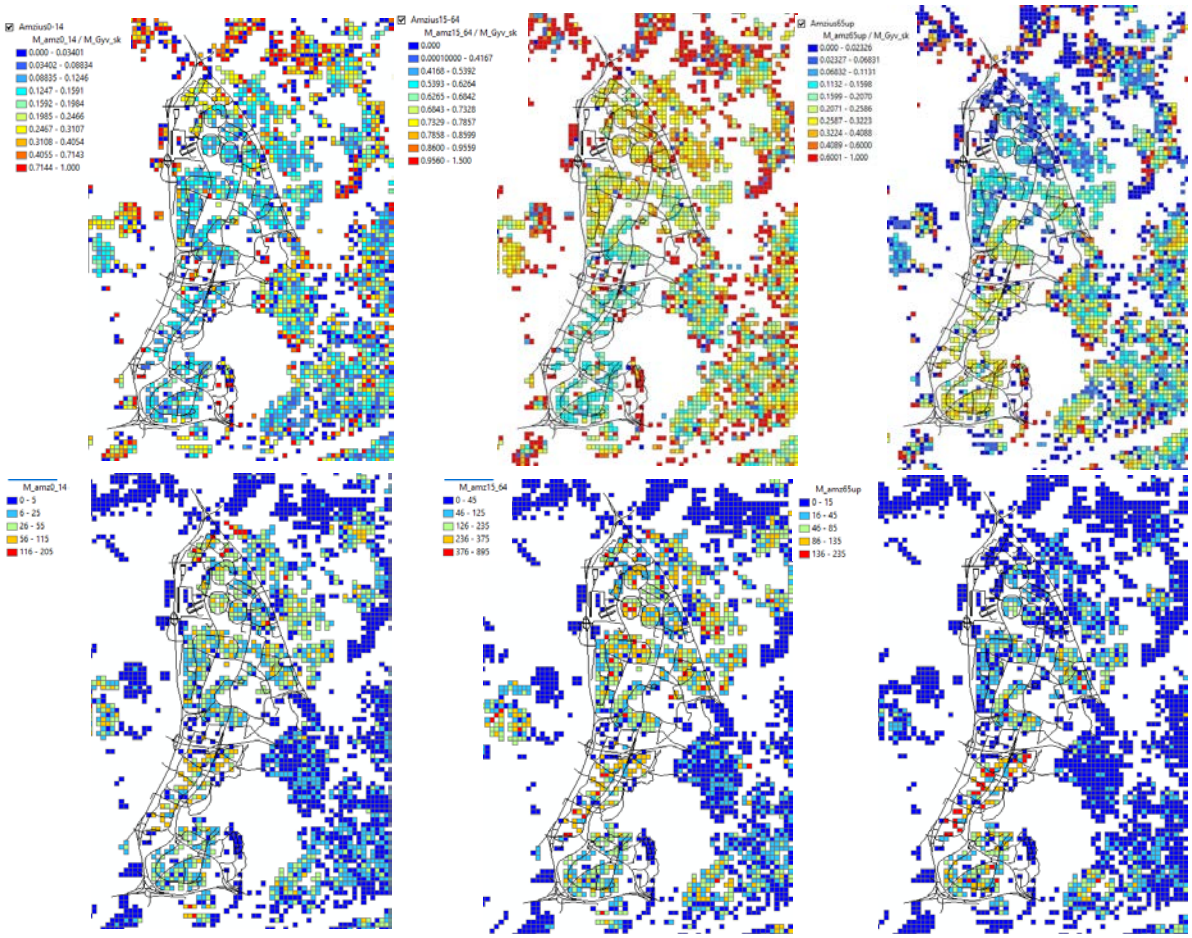


Fig. 3. Maps of the age-groups' distribution

Working age group (15-64 years)

Around 60 % of the population in the southern Modernist districts are people of working age (15-64 years). Southern Modernist districts, together with Žirmūnai, stands out from the map in this category as the least working. *Lazdynai* stands out as a *sparsely populated district* of this age group in the overall city, compared to other Modernist districts, while *Karoliniškės as most dense*.

A low percent of working-age people means that the districts are hardly restoring themselves:

- might be that little new residents are coming
- residents might be not wealthy enough to take care of their surroundings on their own

Seniors (65+ years)

Around 25 % of the population in the southern Modernist districts are seniors (65+ years). Southern Modernist districts, together with Žirmūnai, stands out from the city core in this category as having the most seniors. These districts (especially Karoliniškės) stands out as *especially densely populated district by seniors*, compared to the rest of the city an even to the other Modernist districts.

Suggestions for improvements:

- to improve infrastructure for elderly: more socially active places, gardening possibilities, communal activities, calm places, public toilets;
- to attract more working-age residents: could be more possible in Lazdynai district or on the edges of Karoliniškės;
- to improve infrastructure for single mothers

Distribution by education level (Fig. 4)

High and higher education

Around 45 % of the residents from the overall number acquire *high education* in the southern Modernist districts. Compared to city centre (60 %) and even the northern Modernist districts (50 %), the percentage is a bit lower, but not the lowest for sure. If checking ratio with the working-age group, western Modernist districts are all similar (40 %), but Lazdynai gets a bit higher percentage (50 %), similar to Žirmūnai and some parts of the city centre.

Around 15 % of the residents from the overall number acquire *higher education* in all western Modernist districts. The distribution is quite even as well. If checking the ratio with working-age group, the southern Modernist districts (25 %) get higher percentage than the northern Modernist districts (20 %) or even the centre of the city (unevenly distributed ~20 %).

To sum up, younger high or higher educated people are choosing Lazdynai as their residence now (Fig. 4: comparing upper and lower maps).

Secondary and basic education

All Modernist districts show similar results in the values of *secondary education* (25 %), but Karoliniškės have some higher outliers, while Lazdynai have some clusters of lower values. If checking the ratio with the working-age group, the southern Modernist districts (35 %) get higher percentage than the northern Modernistic districts (30 %) or the centre of the city (unevenly distributed ~20 %).

The basic education is the highest achievement for 15 % of the population in most of the Modernist districts, but the percentage there is a little higher than in the city centre, and much lower than in the suburbs (30 %). The southern Modernist districts get a little higher percentage than the northern Modernist districts as well.

The overall review

It looks like the mid-educated residents are living in Modernist districts overall, compared to the entire city. The most of them acquire high or higher education. On the other hand, these districts have a lot of secondary-educated residents. The southern Modernist districts accommodate quite a lot of secondary-educated working-age residents as well. Lazdynai stand out as the district of highest-educated working-group residents, Karoliniškės joins them with if added the higher-educated residents as well. To sum up, the southern Modernist districts are quite diverse by the education level.

The most outliers of the education level could be noted around *Press Palace* and *Exhibition Palace*. The higher-educated residents in Lazdynai are more often living in the north part and less in the south. The most working-age residents have the higher-education in Karoliniškės district, but the north part of Karoliniškės has more residents with secondary or only basic education level as well.

The southern Modernist districts are densely populated overall, and these extra residents come from the secondary-educated.

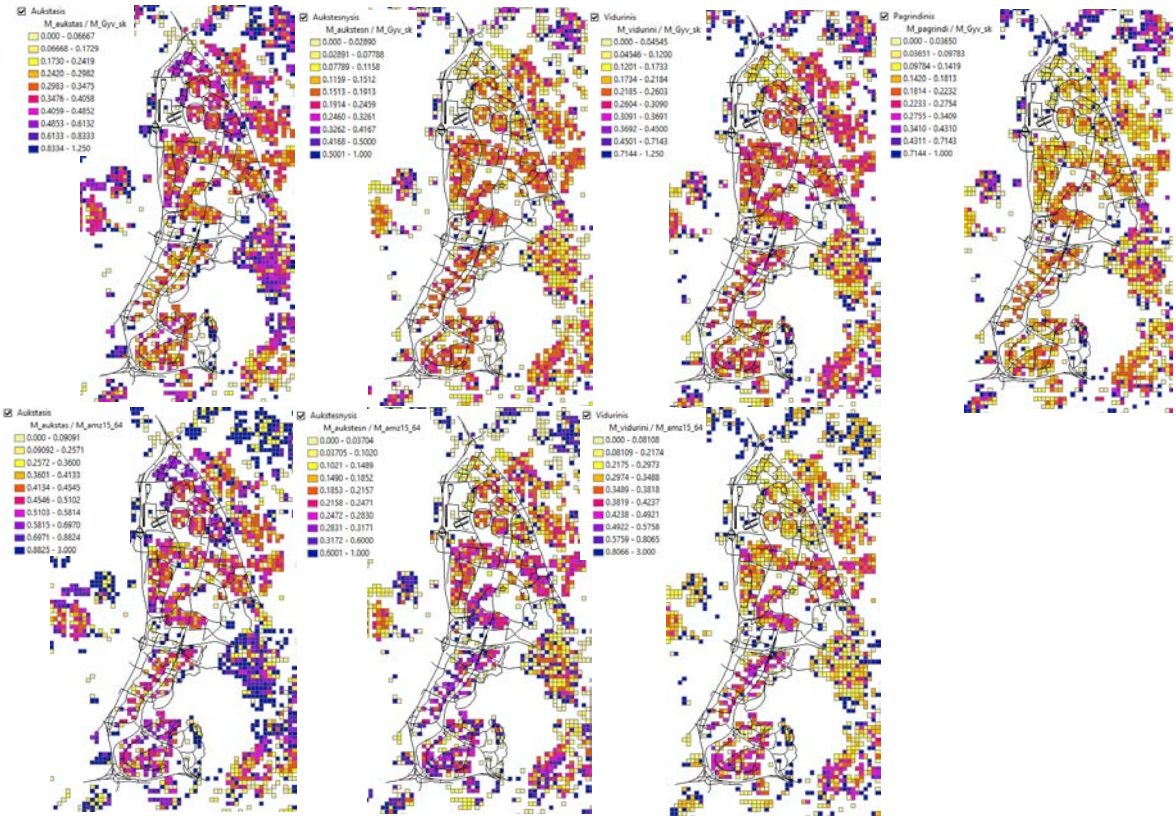


Fig. 4. Maps of the education level distribution

Suggestions for improvements

- to make opportunities for higher-educated residents in Karoliniškės and to use the potential of Lazdynai to invite more high-educated residents
- to develop social places that are desired by high and higher-educated residents
- to develop social places that are desired by lower-educated working-aged residents

Distribution by income source (Fig. 5)

Around 40 % of the residents in the southern Modernist districts acquire their income as *employees*, with a few high (value above 85 %) outliers in Karoliniškės. This percentage is a little lower, compared to the northern Modernist districts (55 %), but looks similar to the core of the city. Only up to 2 % of the residents from the southern Modernist districts have their own *businesses*, while residents of Karoliniškės have even less self-employed (1 %).

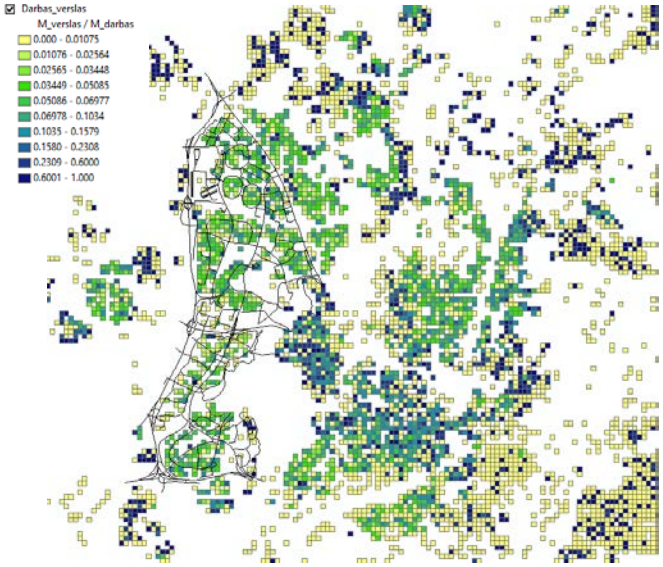


Fig. 5. Map of the employers vs self-employed proportion

The highest proportion of the evenly distributed clusters of the number of residents that gets their income from business, divided by the number of residents that are employees, appears in the centre of the city and Žvėrynas district. Businessmen residents tend to live in the suburbs as well. The proportion in Modernist districts is only around 0.3 and even lower in Karoliniškės.

More working residents have to be attracted to the southern Modernist districts. This could be done by creating more working places inside them. The increase should be possible overall, as the amount of working residence is higher in the northern Modernist districts and Pilaitė.

The overview

The residents of the northern Modernist districts are mostly self-upholding with a few clusters of a very high ratio of working divided by benefits-getting residents, while the *southern Modernist districts is one of the weakest areas* in the city core overall, where around the same amount of working and benefitting residents are living. Stronger social groups have to be attracted to the southern Modernist districts.

Income from benefits

The northern Modernist districts is the territory, standing out in the map as providing the most government support to seniors, while the southern Modernist districts, together with Žirmūnai, are not so bright in the same map. 1 support goes to around 20 working-age residents (15-64 years) in the northern Modernist districts, while 1 support is provided to 4 residents in the southern Modernist districts. The southern Modernist districts is one of the socially weakest areas in the city core overall. *Seniors* is the largest weak social group, but these districts are vulnerable because of others benefitting residents as well.

Upheld by others

Around 30 % of the residents are upheld by others in the core of Vilnius overall. In the western part of the city the distribution is more even. The majority of none-dependent residents are living in the suburbs. This positively correlates with the map of children (0-14 years) distribution. The majority of the upheld persons in the southern Modernist districts are 65 years old or older. The majority of the self-upheld residents of the senior age are living in the northern Modernist districts. Seniors, compared to the other age groups, are most often upheld by other.

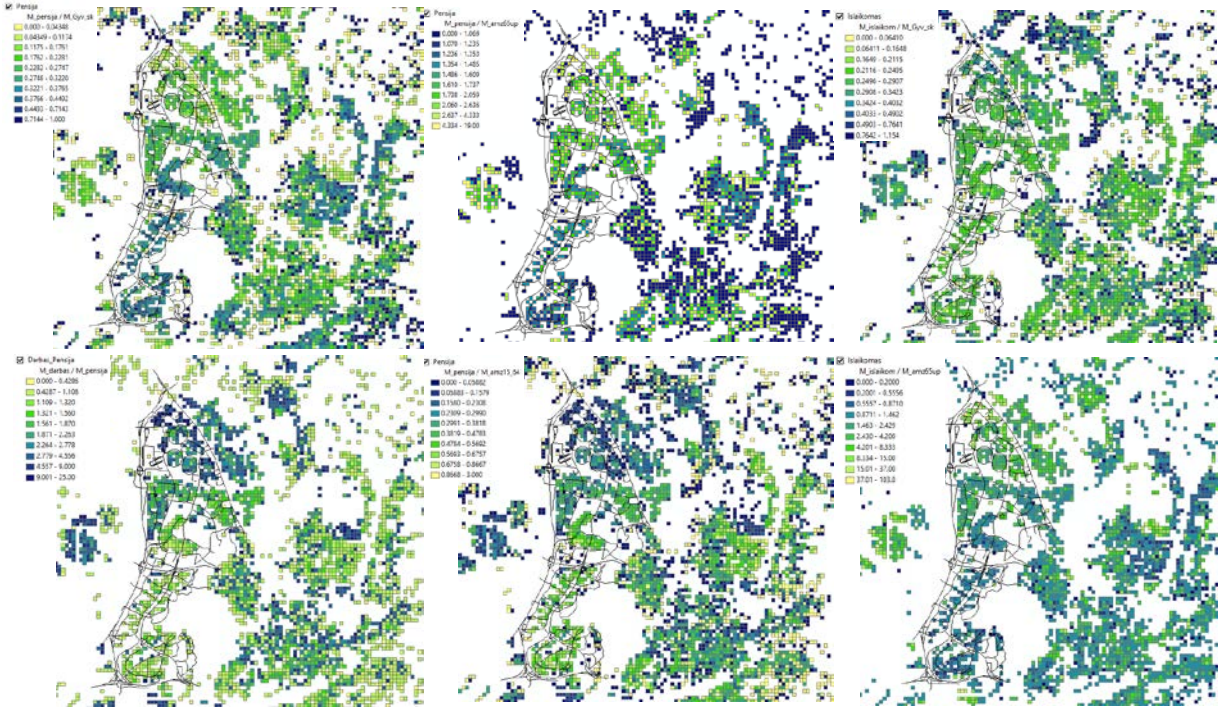


Fig. 6. Maps of the income source from benefits

Distribution by marital status (Fig. 7)

Married residents

The majority of the married people are living in the suburbs (60 % of overall and 80 % of the working-aged), while the least are residing in the city centre. The southern Modernist districts look similar to the city centre in the overall map, while they differ, if compared to the working-age population, with 60 % of the married working-age residents in these districts. *Lazdynai* and Viršuliškės stands out of all of the western Modernist districts in the *married working-age* group with the highest rate, thus *urban solutions should be made for families* there.

Unmarried residents

The majority of the unmarried people are living in the city centre and the suburbs overall. The least unmarried resident could be noted in the southern Modernist districts in the overall map (20 %). Despite that, the ratio becomes similar to the northern Modernist districts (30 – 35 %) in the map of working-age group.

Divorced residents

The least divorced (1 %) residents are living in the western Modernist districts overall. On the other hand, when comparing only with the resident of working age, the numbers in the southern Modernist districts jump and these districts become similar to the districts of the city centre, with 20 %. This does not happen to the northern Modernist districts. *Urban solutions could be adapted for divorced people, as was explained before.*

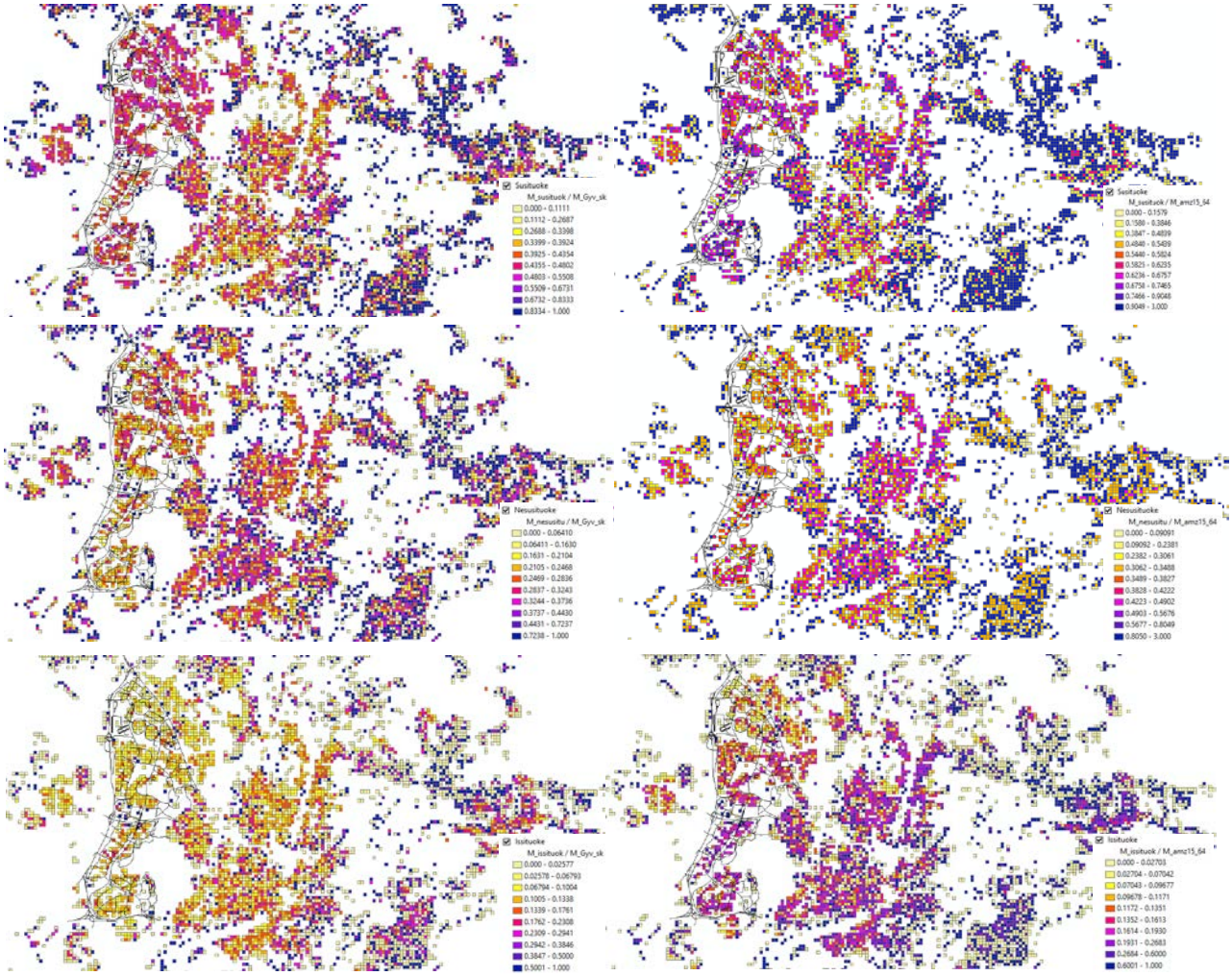


Fig. 7. Maps of the marital status

Distribution of accommodation units

The Modernist districts are *the most densely occupied* by accommodation units overall and Karoliniškės peaks the most (Fig. 1). A similar situation is in the map of distribution of flats in the building (Fig. 9), with all of the Modernist districts standing out and Karoliniškės especially strongly. The core of Karoliniškės should not be more densified. The existing high vertical structure of apartment-buildings is evident both maps. The surroundings of these apartment-buildings, on the other hand, should be intensified by amount and strength of diverse social values to compensate this peak of population density.

Most of the flats in the southern Modernist districts are accommodated with *2 residents*, and only some flats in Lazdynai are shared by 3 (Fig. 8). This number is a little higher, compared

with the city centre, but lower, if compared to the northern Modernist districts. It looks like the flats in Karoliniškės are smaller than anywhere else (because density of the overall units is high, but the number of residents that are accommodating them is low) and could be *reorganised by joining to larger flats***.** This *could enforce larger families* (more than 2 people) and *could bring residents of higher in* come to reside there.

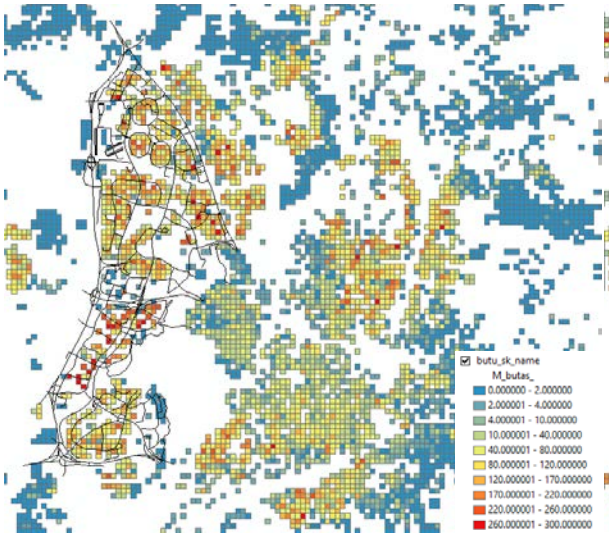


Fig. 9. Map of the apartment amount in a building

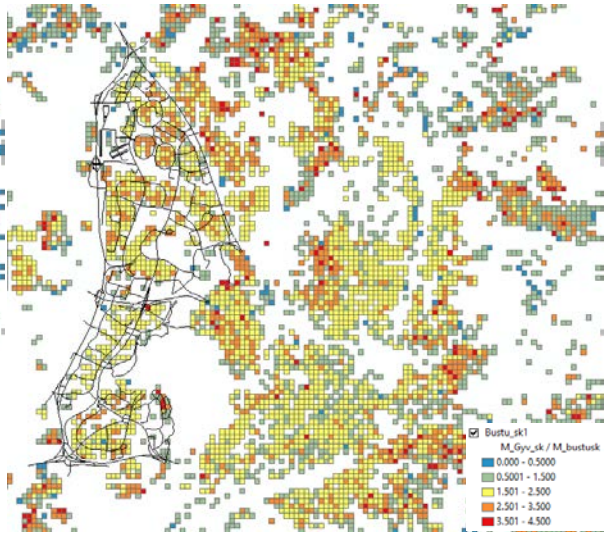


Fig. 8. Map of the residents' amount in an apartment

Appendix 9. Space syntax maps of the evaluation of the experimental project

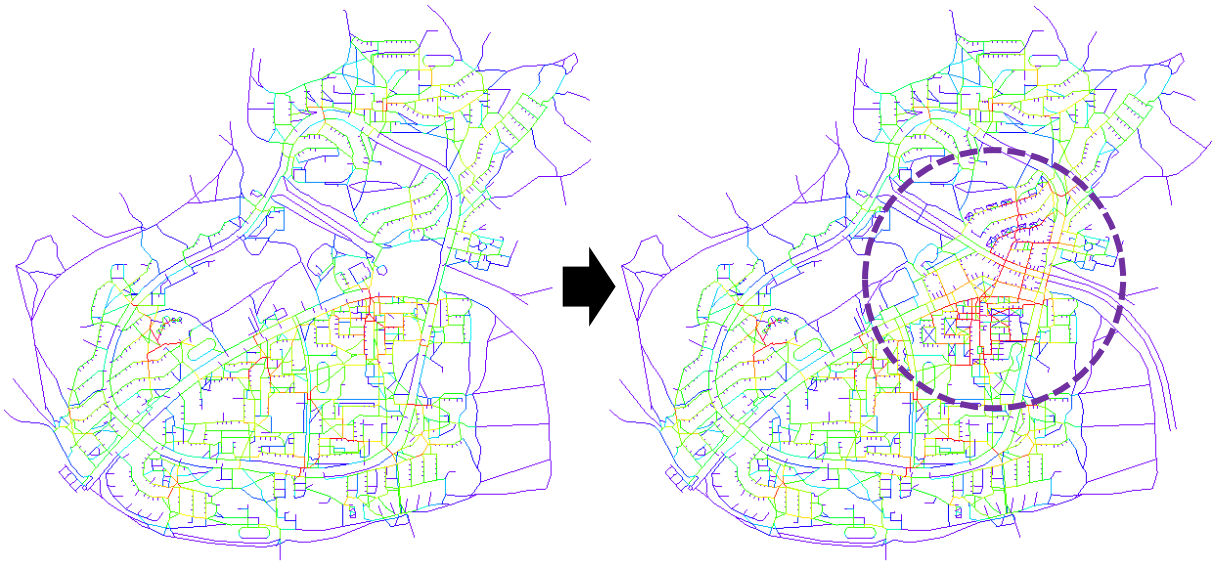


Fig. 1. Segment analysis of the existent and proposed pedestrian paths: Ch R200, colour-corrected

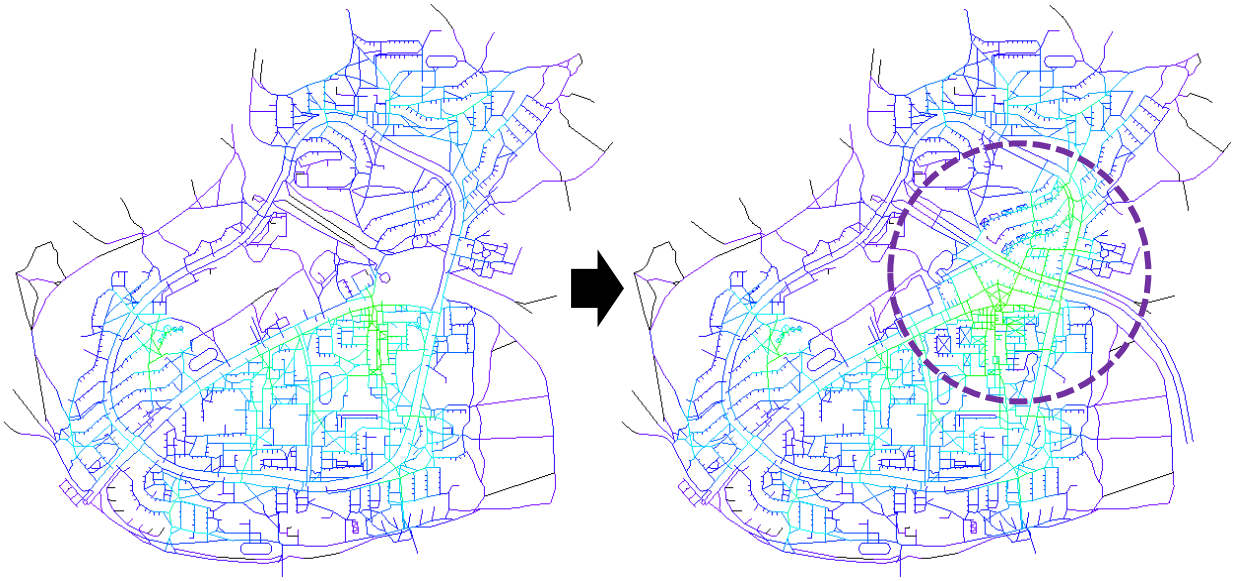


Fig. 2. Segment analysis of the existent and proposed pedestrian paths: Int R200, colour-corrected

Segment analysis of the pedestrian paths with the radius of 200 meters represents instance usage of the network. Instance usage, as was described in the empirical part of the thesis, means the instant needs of the residents, while basically not going anywhere (staying in the yard). The choice R200 map (Fig. 1) proves that the entire design elaboration area became intensively used (red colour) by the instant users, and the integration R200 map (Fig. 2) shows that the planning solutions made the local centre well reachable (green colour). The most important aspects that these maps reveal are that the existent pedestrian alley in the southern side of Lazdynai district was strongly connected with the northern part through the newly developed

local centre. Moreover, this connection made the newly developed commercial boulevard very active that is crucial for the commercial function.

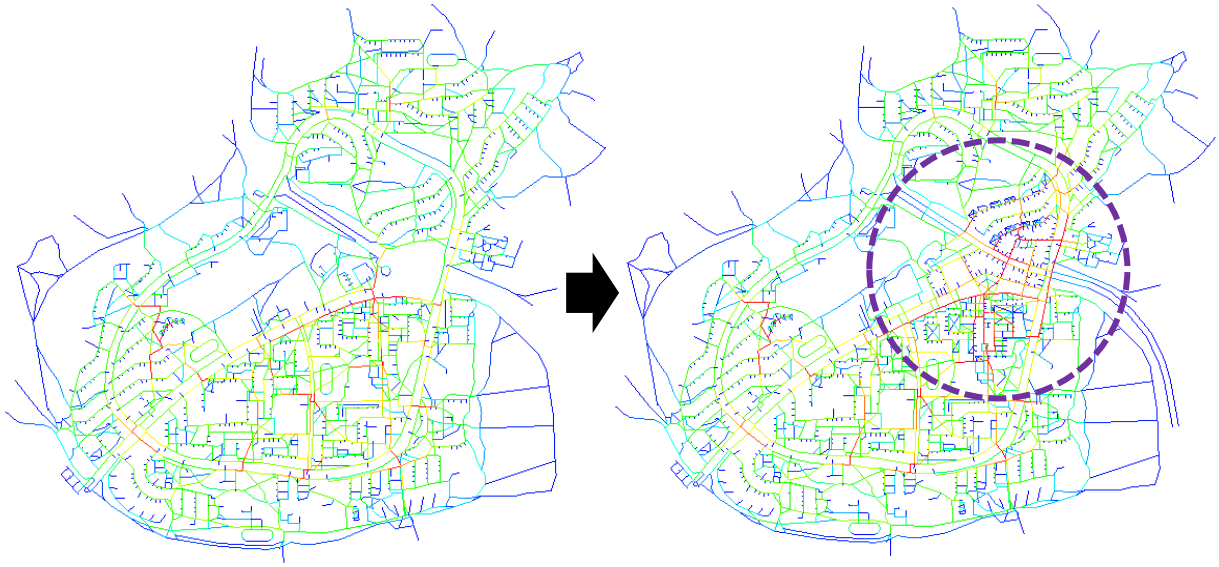


Fig. 3. Segment analysis of the existent and proposed pedestrian paths: Ch R400, colour-corrected

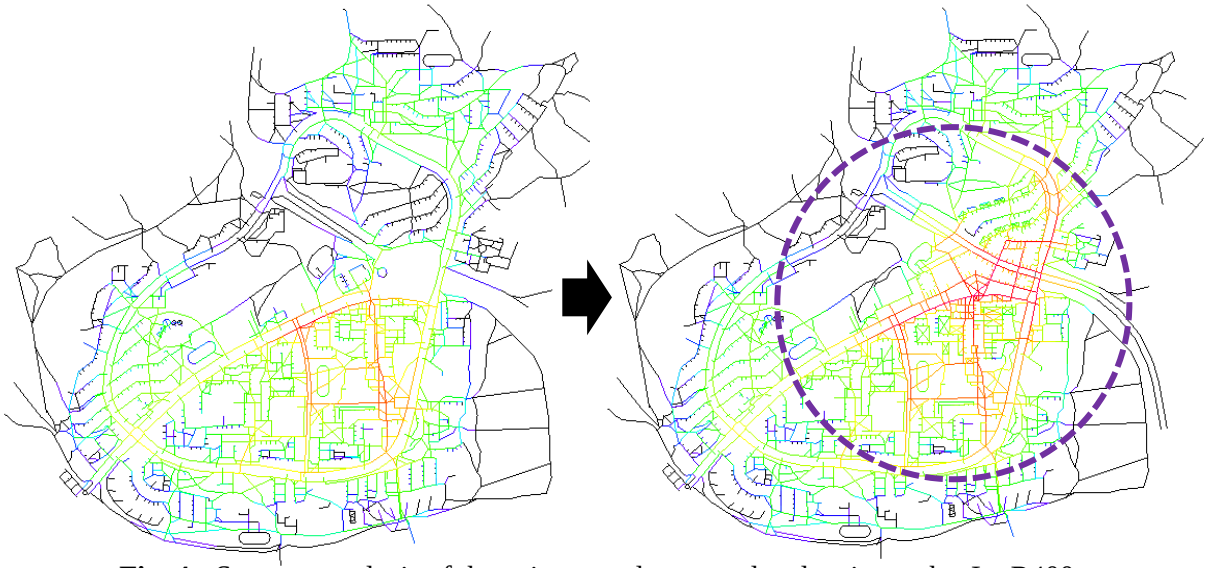


Fig. 4. Segment analysis of the existent and proposed pedestrian paths: Int R400, colour-corrected

Segment analysis of the pedestrian paths with the radius of 400 meters represents local usage of the network. Local usage represents the daily need of the residents, such as shopping for groceries or the homey places for their free-time. Both, choice (Fig. 3) and integration (Fig. 4) maps R400, prove that the newly developed urban centre became active and well reachable for local users. Moreover, the commercial boulevard became much better integrated, while all three of the re-developed streets (the commercial boulevard, the green ring and the transformation street) became much more active by this type of users. The centrality is mainly focused on the newly developed central square, proving that its location and configuration helps reaching the goal to connect the presently fragmented urban fabric. Furthermore, these

two maps especially strongly confirm that the design solutions of the experimental project made a great influence not to the territory of the elaboration itself, but also to the surrounding area.

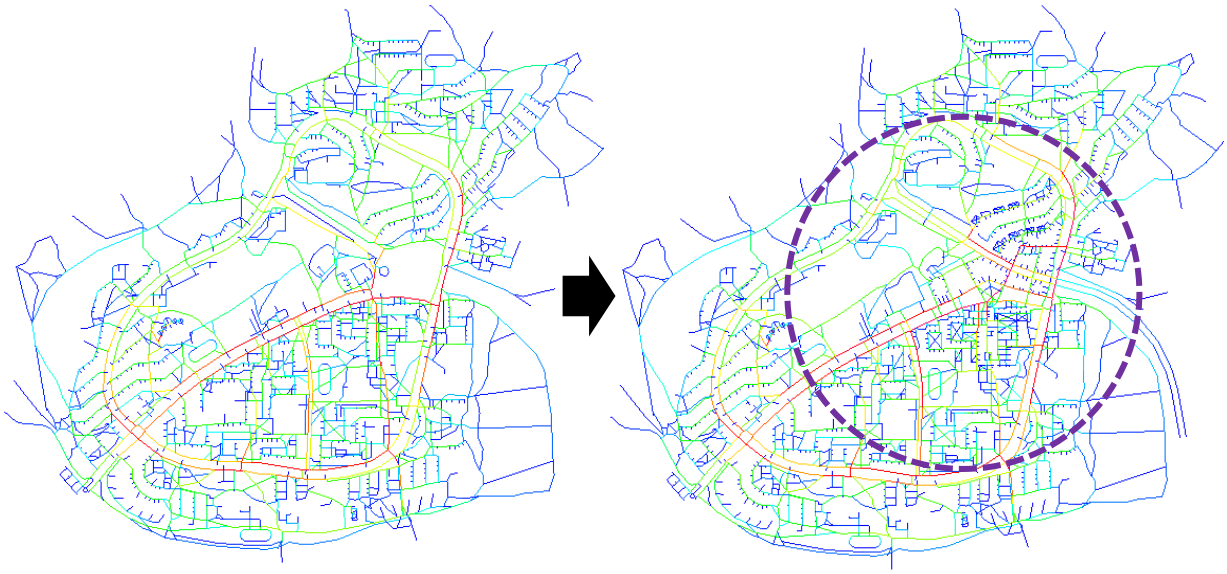


Fig. 5. Segment analysis of the existent and proposed pedestrian paths: Ch R1000, colour-corrected

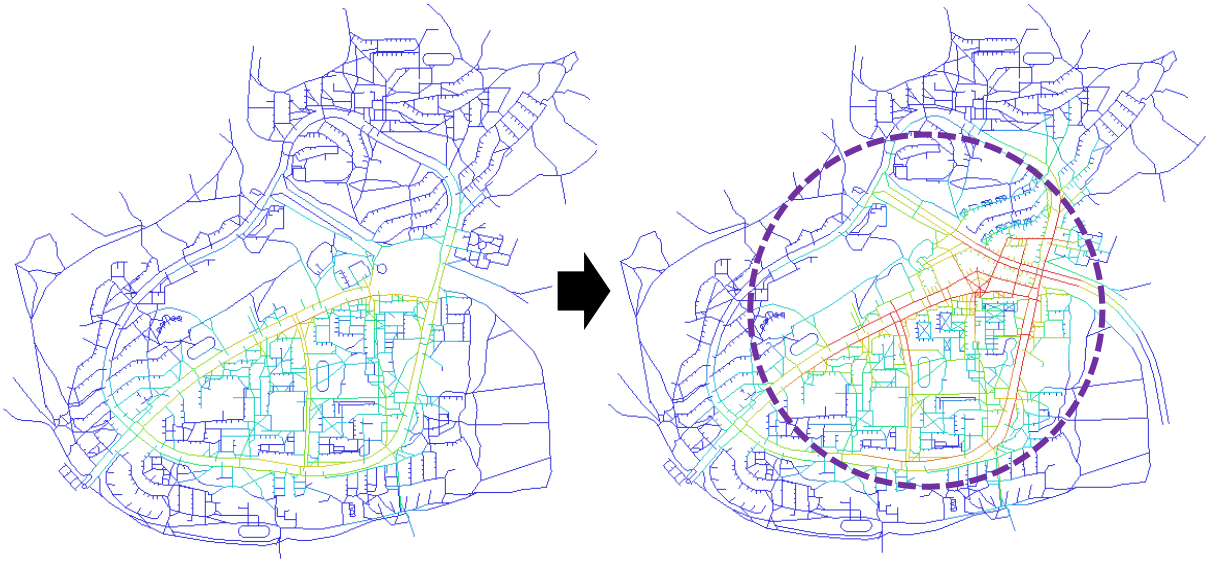


Fig. 6. Segment analysis of the existent and proposed pedestrian paths: Int R1000, colour-corrected

Segment analysis of the pedestrian paths with the radius of 1000 meters represents global usage of the network. Global usage is understood as the special or bigger goals of the residents either their longer walks. The transition street and the newly developed urban centre becomes more often chosen (Fig. 5) by these residents, while all of the three re-developed streets gets the presently absent integration (Fig. 6). This proves that even the users from the outside of the district that are not well familiar with the territory, should be able comprehend and to reach the entire re-developed public urban structure with an ease. This is especially important for a strong local centre that could become of a city-significance.

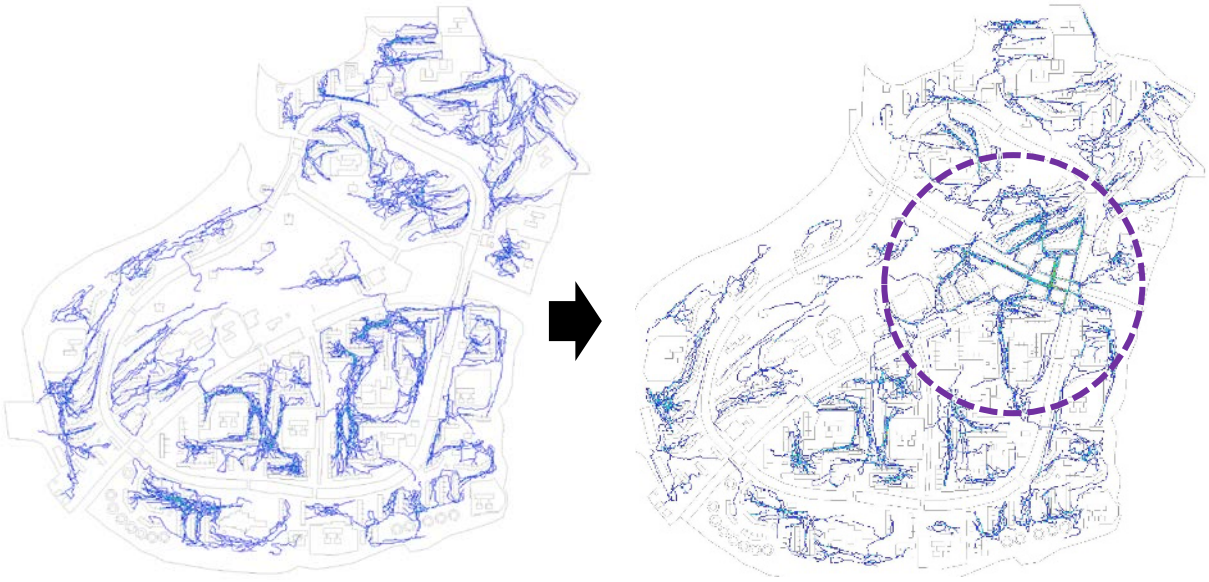


Fig. 7. Agent-based analysis for pedestrian movement in the existent and proposed open space, M200, colour-corrected

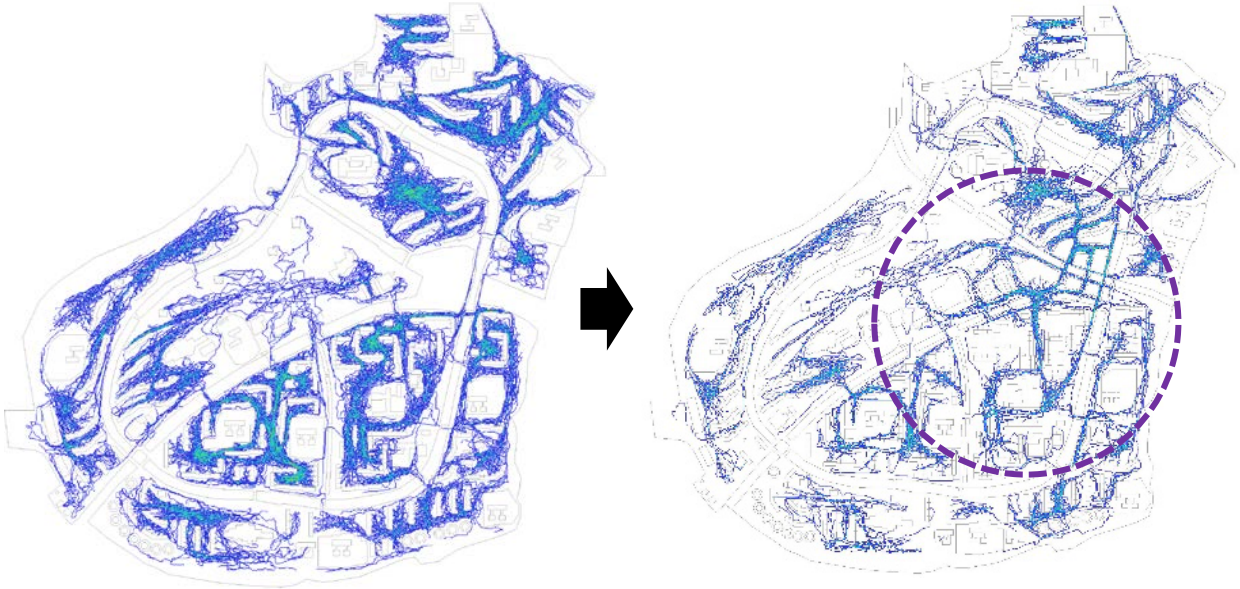


Fig. 8. Agent-based analysis for pedestrian movement in the existent and proposed open space, M400, colour-corrected

Agent-based analysis represents pedestrian movement in an open space and by this supplements Segment analysis (movement in a network). The map of 200 meters (instant usage) (Fig. 7) confirms, similarly as Segment analysis, that all of the three re-developed streets became active, the newly developed local centre got especially strong attraction, the movement in the active neighbourhood became more concentrated and the southern pedestrian alley became much more popular (as the private neighbourhoods were enclosed). The church square became got more interest as well. The map of 400 (local usage) (Fig. 8) shows similar insights. The most important additional information is that the new central square, same as in Segment analysis, becomes a major connector of the urban fabric overall.

Revitalization of Modernist Urban Neighbourhoods
Using New Urbanism and Urban Network Models

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