SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

SPIN UNIT

PROJECT REPORT

THE HIDDEN LIFE OF 32 MONOTOWNS

REPORT SECTION 1

CLIENT

Strelka KB
6, BLDG. 3, BERSENEVSKAYA
EMBANKMENT, MOSCOW, 119072, RUSSIA
WELCOME@STRELKA-KB.COM
+7(495)268-06-11

SPIN UNIT

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

SPIN UNIT
ADVANCED URBAN RESEARCH

SPIN Unit is a transnational urban research group combining art and science to find new and creative approaches to urban studies and advanced data solutions

The SPIN Unit studies anthropic phenomena directly connected to the use and management of space. Spatial morphology is analysed at scales where human interactions emerge and can be studied. Established as a human-centric discipline, our approach considers the alterations of spatial features that emerge from human actions and interactions. Conversely, it also studies how the urban space influences humans and their behaviour.

Our academic background and experience in urban and regional planning has been growing towards an interdisciplinary approach in order to expand our range of research questions. By opening our practice to cross-pollination with art and design, we mean to enhance the fundamental scientific nature of our research practice to address questions that can benefit from a wider intellectual debate, lateral thinking, and unconventional lines of action.

SPIN prides itself on its communication and presentation. Particular attention is reserved for the way results, methods, and expert advice are offered to the client and the public at large. We provide a visual and organic outlook on complex data sets, planning strategies and dynamics through traditional techniques, good design, and a variety of artistic practices.

The practice of city planning and society at large can benefit from our work. We aim to hack the invisible city, leverage the secret strengths of urban spaces, and explore how the many characters, all the different layers of the urban fabric come together.

> **URBAN SPACES PROVIDE FOR PSYCHOLOGICAL RELIEF AND STIMULATION IN THE FORM OF BEAUTY, VARIANCE AND SURPRISE. THEIR QUALITIES ARE CENTRAL!**

TEAM

Following the team members who took part of this project under the coordination of Principal Investigator Damiano Cerrone

By combining art and science, SPIN Unit has coalesced into an international network of professionals. Born as an academic endeavour, it has built on the varied expertise of its members to find new and creative approaches to urban design, urban studies, and advanced data solutions. Although based in Tallinn, SPIN currently has ten members across Europe and North America.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

PRINCIPAL INVESTIGATOR

// 01

DAMIANO CERRONE
URBANIST

SPIN Unit - co-founder
FINLAND

CORE-TEAM MEMBER

// 02

RAUL KALVO
DATA SCIENCE AND SOFTWARE DEVELOPMENT

In Physica solution - SPIN Unit associate
ESTONIA

CORE-TEAM MEMBER

// 03

PROF. PANU LEHTOVUORI
URBANIST

SPIN Unit - co-founder
FINLAND

CONSULTANT

// 04

PROF. LEV MANOVICH
CULTURAL ANALYTICS

Cultural Analytics Lab
U.S.A.

CONSULTANT

// 05

DANIELE QUERCIA
DATA SCIENCE

Nokia Bell Labs
U.K.

TEAM MEMBER

// 06

LUCA MARIA AIELLO
DATA SCIENCE

Nokia Bell Labs
U.K.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

TEAM MEMBER

// 07

ROSSANO SCHIFANELLA
DATA SCIENCE

University of Turin
ITALY

TEAM MEMBER

// 08

DANIEL GIOVANNINI
DATA SCIENCE

SPIN Unit
CANADA

PROJECT RESEARCHER

// 09

JESÚS LÓPEZ BAEZA
CULTURAL ANALYTICS

University of Alicante
SPAIN

ASSISTANT RESEARCHER

// 10

HELEN PAU
RESEARCHER

SPIN Unit
GERMANY

ASSISTANT RESEARCHER

// 11

MARIA VALESE
CULTURAL ANALYTICS + OSM

Sapienza University of Rome
ITALY

ASSISTANT RESEARCHER

// 12

HERBERT NATTA
CULTURAL ANALYTICS + OSM

Sapienza University of Rome
ITALY

ASSISTANT RESEARCHER

// 13

SOPHIE GLEIZES
CULTURAL ANALYTICS + OSM

Centre for Urban Design
and Mental Health
FRANCE

ASSISTANT RESEARCHER

// 14

ZON SUTJARIT
CULTURAL ANALYTICS + OSM

Sciences Po
FRANCE

ASSISTANT RESEARCHER

// 15

ILARIA PIERDICCA
CULTURAL ANALYTICS

Marche Polytechnic University
ITALY

ASSISTANT RESEARCHER

// 16

KAISA LINDSTRÖM
CULTURAL ANALYTICS

Estonian Academy of Arts
ESTONIA

ASSISTANT RESEARCHER

// 17

IRENE COTRONEO
CULTURAL ANALYTICS + OSM

Tampere University of Technology
FINLAND

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

THE HIDDEN LIFE OF 32 MONOTOWNS

USING 1ML GEOLOCATED-PUBLICLY SHARED VKONTAKTE PICTURES TO REVEAL INTENSITY AND ACTIVITY PATTERNS.

ACTIVITY PATTERNS

ATTRACTIVE PLACES +

THE PULSE OF THE CITY

YOUTH

VK GEOLOCATED DATA

MACHINE LEARNING

PEDESTRIAN ACCESSIBILITY

GIS ANALYSIS AND DATA VIZ

COMPUTER VISION

//

‘WITHOUT PEOPLE, A CITY IS A RUIN’

TAINA RAJANTI 1999

INTRODUCTION

Monotown (monogorod) is a city or town whose economy is dominated by a single industry or company. The term is especially used in Russia, where the Soviet-era economic and military planning created hundreds of single-industry towns, often in distant locations and hard conditions. In an international comparison, rather similar ‘factory towns’, ‘mill towns’ or ‘company towns’ used to exist in many other countries, eg. in UK, US and Germany, during the early phases of industrialization. The rise of the welfare state and structural changes in economy made the company town model that united production, housing and welfare, gradually obsolete.

Russia has several hundreds of cities and towns that can be classified as monotowns. Quite significant part of the population, about one sixth, lives in these urban settlements, distributed across Russia’s vast geographic area. In Russia’s monotowns, the uncoupling of public service provision and industrial work has occurred during the last three decades; partly the process is still underway. Thus, the questions of monotowns’ future viability and their citizens’ quality of life are acute. While monotowns current economic and social situation is often problematic, the SPIN Unit team has established a cautiously positive view regarding the everyday life in monotowns and their future potential. While there are big differences from case to case, in general the aim to improve monotowns’ public space, amenities spatial opportunities for youth is a meaningful and important task.

In what follows, we will discuss:

1) the aim of the project,
2) the innovative methodology used to reveal monotowns’ invisible life for common good,
3) general findings relevant for all or many of the studied towns and cities and
4) possibilities to proceed from analysis to interventions and improvements. In the end, there is
5) a technical part regarding data gathering and analysis.

In three separate, rather extensive documents we give the data and results of the exemplary analysis of 32 monotowns, mostly in an attractive visual form as thematic maps, diagrams and large image collages.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

AIM OF THE PROJECT

In its expression of interest, Strelka KB stressed the importance to find spaces with high value for locals in general and youth in particular, the main social gathering places as well as abandoned or underused areas that may fall in decay. – Besides these tasks of the brief, a lot more has been observed, for example regarding tourism, seasonal rhythms and morphological characteristics. In our view, the solutions proposed should be cost-efficient, flexible to the place and scalable across the vast task of 300+ monotowns. Social equity should be a pervasive target, as well.

In improving quality, the organisation of urban space is very important. This involves planning, design and self-organised phenomena. From same natural, technical and human resources, we can produce widely varying sets of experiential urban qualities and measurable performances. Spatial organisation is a key element in this difference, together with societal institutions which have their own spatial embeddedness (Thomas Markus). While monotowns are centrally planned what comes to location and economic profile, they nevertheless represent a rich variety of 20th century planning styles. In many cases, there are older historical layers, as well. Furthermore, topography and natural setting diversifies the morphology of monotowns, making them as rich object of study as any set of towns and cities.

Thus, there is no one template for a Russian monotown. A serious, locally embedded and sustainable improvement of urban qualities requires a careful analysis that gives new insights to the invisible networks and perceptions of monotowns’ inhabitants. Improving the quality of life of one city is about shared benefits to produce a sustainable array of human activities, beneficial to the life in the city and it economic success. Urban amenities such as shops, bars or public buildings can offer services, activities and venues for social interactions and economic transactions. The more human activities a city can foster the more interactions will occur, generating a vibrant urban life both in indoor and outdoor space.

This report focusses on the analytic phase of the effort to improve monotowns, with two sub-aims:

A - How to get interesting data and achieve good analysis of a very large amount of cities and towns, simultaneously acknowledging the uniqueness of each city and the need to produce results efficiently, in a unified and comparable manner. Furthermore, the locals’ views and perceptions should be brought to the centre of analysis and agenda-setting.

B - How to present the findings in such a way that it invites a wide variety of readers to explore the invisible life of monotowns, the everyday routes and anchor points of millions of citizens, as well as their less-known local cultural resources and symbolic focal points.

INNOVATIVE METHODOLOGY

If there is no template for a monotown, the same can be said about its analysis. The project required innovation in all aspects of urban research, from conceptual foundations to data gathering and from analytical typologies to the practical execution of the analysis with the help of an international network of academics and students.

At SPIN Unit we have earlier conducted studies, workshop and consultancies to measure the quality of life of urban spaces and produced guidelines to improve the current condition through strategic planning in the cities of Turku, Tallinn, Glasgow, London, Turin and St. Petersburg. The state of art of indexing the quality of life depends on good data on the type of amenities present and their distance from the habitation. This very precise method is used to study activity patterns and measure which parts of the city offers more activities and a better quality of life.

In the case of INVISIBLE LIFE, this method was not applicable because the scale of analysis is too broad, the number of cities is too large and the time for pilot study is too short. Therefore, we have used an alternative method to allow for a quick inquiry that remains accurate, given the serious limitations, among which is the absence of any base data regarding those cities and their amenities. Even the street patterns have been drawn by SPIN Unit team in this case.

The challenge, thus, is to propose a method to study urbanity without visiting or surveying these cities. We use an approach that we first tested in the city of Turku in 2014 and that is currently developed through the cooperation between SPIN Unit and Nokia Bell Labs to study the quality of city life through Accessibility, Activity and Culture.

Accessibility will reveal which are the streets in the city that are most likely to foster car or pedestrian flow, revealing the current condition of the urban fabric and possible potentials for future development of urban amenities: location choice preferences. With this analysis we are also going to reveal how the industrial development of these towns have generated area of spatial segregation, generating segregation in the social forms of the city. For accessibility, we use Urban Network Analysis, developed in MIT by Andres Sevtsuk and developed and applied here by Raul Kalvo.

Activity in the city will be analysed through the objectual content of publicly shared social media images (often linked to text). We have used both a state-of-the-art machine learning system and a manual tagging ontology developed by Damiano Cerrone and SPIN Unit team. Machine learning works well to distinguish indoor and outdoor activities, while a more nuanced analysis requires human view and relevant, theory-based ontology. See the technical part 5 for more detail on these. The geolocated data on content of 45,000 images in this case is then projected on maps to visualise the use pattern of urban space.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

Culture is an important element that reveals the dynamics and concerns of a community. We have analysed culture through a qualitative visual analysis of publicly shared pictures. This analysis will reveal how people perceive one space and how they perceive themselves in one space. We have already developed and used this method together with professor Lev Manovich in the cities of St. Petersburg, Tallinn, Riga and Vilnius. The primary presentation requires large collages of hundreds or thousands of images, which then are studied and commented. For the three deeper cases a draft of such analysis is presented.

The method aims to catch the actual use of urban space, as well as hints of users' perceptions and valuations. The choice of images used – the data – is directly and collectively produced by citizens, not by the research team. Thus, the method provides for an unusually direct reading in the questions of which spaces are meaningful, and for which group. Clearly, analytic frame and conclusions are by the researchers, but still there is a major difference to interviews, surveys, participant observation, personal mapping, thick description, action research and many other qualitative methods, which all involve researcher's direct influence already in formulating the basic data.

After several iterations, we analysed the data both to meet the requirements of Strelka KB's brief, and also to further develop the scope of social media data analysis. In the attached data & visuals documents, there are some minor changes, but basically this data is available for each of the 32 case towns.

GENERAL FINDINGS

Having analysed and tagged for content large amount of social media images, drawn street patterns of the sample towns, executed Urban Network Analysis and familiarised with other sources of data and insight, we have cautious confidence to say that:

As it represented in people posts in VK network, the social life in most monotowns is positively traditional. There is a lot of attention to family and children, to birthdays, weddings and spending big holidays together. Also school parties, graduation ceremonies, and sports seem to bring people together. The flipside to the importance of these social institutions is the lack of non-traditional settings and commercial urban amenities. In our material, there is very little evidence of people eating out in restaurants, going to cafés, having nightlife or engaging in shopping. Cultural offer, such as concerts, art or civic meetings, seems rather limited. – Reasons for the observed lack of cafés etc. may lie in relative poverty of the population, small size of the town, voluntary / religious choice, or somewhere else. For our analysis this is not important, as we aim to catch the actual use of urban space, and then link that to a broader analysis of the (local) culture, done at this moment only for the three deeper study cases.

Youth prefers two types of location: Either they stay in the most urban and densely used parts of the city, or they focus on marginal and underdefined locations near the urban core and microrajons, such as bridges, small forests at the edge of an estate, railway lands and empty lots. In our sample, the ‘most urban or dense’ means either the central street and main square (often visible in Stalinist classical plans) or simply the microrajons that have the highest built density and population density (which appear in nearly every case city in some way). It seems clear and also surprising that youth do not go out in nature but stay in the built area. Lack of indoor gathering places may, thus, be a problem to be addressed. – Note that ‘microrajon’ is here used to refer to all built ensembles with multi-storey residential buildings in a semi-open courtyard layout, notwithstanding their service offer or administrative status.

Nature around the town is important, but in an overwhelming majority of cases the active use is not reaching far from the city. This means that there is a certain compactness, which may support resource-efficient solutions in the future. But it also means that in many monograds there might important untapped and easy potentials to improve quality of urban space by making the ‘near-nature’ accessible and attractive. In the sample, there are some cases where the urban structure very directly leads to nature. In these few monograds, we observe an unusually active use of the forests and lakes just out of town.

The local factory, in most cases, is not depicted in the social media data at all. Locals do not share images or other content regarding the factory. This may mean that the factory is closed and forgotten, that people do not take pictures while working, or that the connotations are negative. In some cases, however, the factory may be a landscape icon, a place of exploration and excitement or a site of renewal and new uses. In shrinking monotowns not much can be done to reuse the factory, but in stable and growing ones this might be an opportunity, following countless examples worldwide. Spatially and atmospherically, the factory often provides (could provide) an interesting alternative to the established urban environments.

In conclusion, for the SPIN Unit team – working from Italy, Spain, France, Germany, UK, USA, Canada, Estonia and Finland – the citizens of remote towns and cities have sent a positive signal that their place is not decaying neither hopeless. On the contrary, there is a clear point and even urgency in making the monotowns’ public realm better, while other policy measures are probably needed, as well. We believe that the following analyses, done in a comparable manner for all 32 cases, help in focussing in most important areas and topics in each city and starting to build on their hidden, invisible potentials.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

INTERVENTIONS & IMPROVEMENTS

Every monograd is unique. The analysis of the use of public space, buildings and natural areas, offered for us surprises and new findings in every single case. Our approach, which utilises social media images voluntarily uploaded by countless citizens, has a unique strength in avoiding professional and cultural bias that would wrongly direct the analysis of what locals value and where they want to spend time and socialise. At the same time, it is clear that social media data alone is far from sufficient. In all 32 cases, we have used other sources of information and insight, to achieve some 'triangulation', assessment and comparison of the social media data. In the three deeper analysis on Baykalsk, Kumertau and Naberezhnye Chelny, we include preliminary urban planning and design suggestions. (Note: these more detailed studies will be finalised by Dec 15, 2016.)

Architects, planners, developers and other actors can influence the evolution of cities as well through fostering new activities (temporary uses, activation programmes, events, social media activity) as through the more traditional spatial interventions (new developments, infrastructure, reconstruction, redevelopment). While the high-end urban projects tend to disappoint, we see alternative groups, local initiatives, temporary uses, informal activities and sometimes also unusually creative commercial developers succeeding in this social and urban task, transforming the image of the city and creating contemporary icons of urban life. Examples such as Telliskivi in Tallinn, Löyly and Suvilahti in Helsinki, Co-op Garage in St. Petersburg, EX Mattatoio in Rome, Bushwick in New York are to the point. We are witnessing a broad success of informal process in attracting people and businesses and the failure of formal planning.

While the Russian monograds cannot be directly compared with the examples above, they point to a fruitful dynamism between the known and unknown, old and new, planned and self-organised. In the analyses, we found signs of traditional social life and adherence to the planned, formal urban space. But we also found signs of alterity and self-organisation. Assessing possible interventions case by case, both dimensions should be kept alive. In some cases, we can very clearly propose the city to invest in a sports hall or a street improvement. In other cases, it might be better to harness the already active dynamism, which would require very different approach. In either case, urban policy should include both the visible and invisible, formal and informal, built and transitory. Youth, especially, would benefit from a focus on self-organised platforms, events and policies not tied to location.

In the West, our current practice of planning and building cities is out of sync regarding the preferences of the everyday users of urban space. We need more adaptable urban spaces to host new activity patterns. While it is crucial to plan for long term perspective, it is now essential to have a form of 'real-time' planning to satisfy contemporary needs. In monograds, this could be done without doubt through local collaboration and co-creation. Citizens, also in monograds, are the greatest resource.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

TECHNICAL DETAILS AND METHODS

MANUAL TAGGING AND ITS ONTOLOGY

The initial stimuli to study and classify activity patterns came from the idea to study the differences between what type of activities are performed by people (demand) and what type of activities are available in one city (supply). Human activities can be mapped by trained researchers that manually tag a set of photographs based on the activities they can recognise in one picture while activities offered by urban amenities can be mapped using a database of establishment and services such as Open Street Map points of interest. This method would allow us to study the supply and demand of one city at the scale of one street. For the scope of this specific project we will focus only on the manual classification of geolocated and publicly shared VK pictures. Due to the short time available we were capable to tag 45,000 of the pictures which we consider a very significant and revealing sample.

For this project, our goal was to develop a new method to classify activity patterns based on international practices and most acclaimed urban theories. Jan Gehl defines as the most essential activities as Necessary, Optional and Social but his studies were focusing on the use of public and semi-private space therefore a wider vocabulary has to be developed to map all possible activities in the city. Others have classified human activities with their own lexicon that is relative to the field of inquiry of their studies

In urban planning a widely adopted mobility based activities are classified into: 1. Home, 2. Work; 3. School; 4. Transportation and transitions; 5. Shopping/errands; 6. Personal business; 7. Recreation/ Entertainment; 8. Civic/religious; 9. Other (Ben-Akiva and Bowman, 1998; Axhausen et al. 2002). UN Habitat in the The Vancouver Declaration on Human Settlements (1976) defines the basic human needs as shelter; infrastructure; services (education, health, culture, welfare, recreation, nutrition).

The social media application Foursquare uses eight categories: Food, Work, Shops, Travel, College, Arts, Nightlife, Park. – A recent study (Exploiting Foursquare and Cellular Data to Infer User Activity in Urban Environments) 'aims to exploit cellular data to infer a mixture of activities in a neighbourhood rather than a single one. In addition, the prominence of user activities may change over time in a given area, thus exploring the temporal dynamics of urban activity evolution is another interesting direction to be explored in the future.'

Commercial buildings (other than residential or industrial) categorized by the U.S. Energy Information Administration: Office; Warehouse and storage; Service; Mercantile; Religious worship; Education; Food service; Food sales; Public assembly; Lodging; Health care; Public order and safety; Other. (A comprehensive list of building types at: http://www.cmdgroup.com/building-types)

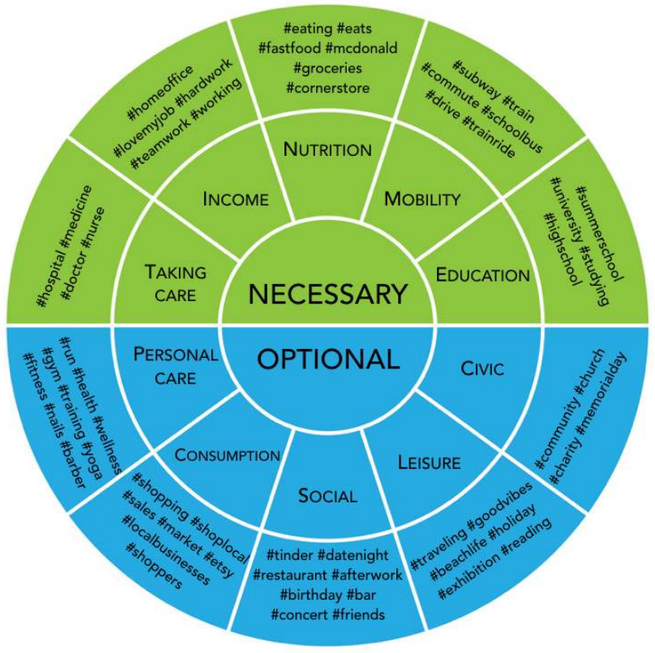
To summarise, our goal was to unify these different approaches into one simple set of categories to map activity patterns in 32 Russian monotowns.

Key sources:

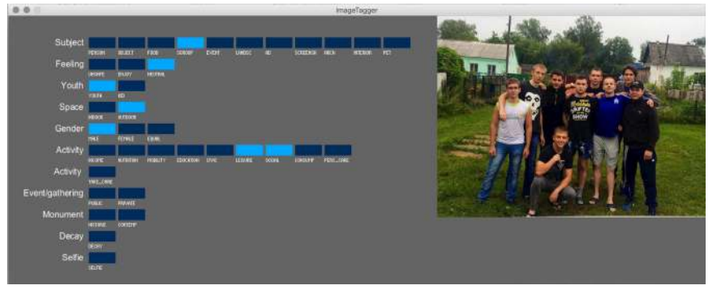
- Gehl (1971): Necessary; Optional; Social
- Chapin and Brail (1969): Work related; Socializing; Home working; Recreation/relaxation
- Francis (1991): Travel; Shopping; Interaction
- Simon (2000): Movement; Rest; Encounter
- Gehl (2002): Traffic; Commercial; Leisure
- Mehta (2006): Stationary and sustained activities; Lingering activities; Social activities

After reviewing all these widely used classification of human needs and activities we found relevant to first split what is essential from what is optional. These two main groups helped us to define the subsets of human activities based on the previously reviewed classification methods.

After the first step of fitting all precedent classification under the Necessary and Optional activities, we have refined our lexicon by studying the first 5000 most used Instagram hashtags in the cities of New York, Helsinki and Moscow. This operation helped us to list most the common activities carried out by people using the media and we used them to complete our lexicon under each category. From this operation we developed our wheel of activities that can be used to classify both human activities through semantic analysis of geolocated social media data and urban amenities such as retails, services and land uses based on which type of activity they can offer or foster.



To manually tag such a large amount of data we have employed and trained 8 assistant researchers and developed a new software at the Beta stage called “VKImageTagger“



This series of graphs is a statistical representation of all the major elements tagged in all the monotowns. It is a glimpse into the structure of the data we used later city by city. Overall we can read from the graphs that VK it is mostly used to share moments of one’s life related to leisure and social interactions but also there is plenty of information about one self, meeting people, doing sports, eating and entertainment, supporting our method of reading the life in the city.

MACHINE LEARNING

In addiiton to manual tagging of a sample of images, we asked the researchers from Nokia Bell Labs to use machine learning and computer vision techniques to automatically detect content in larger number of images. Using these two methods, we were able to identify content in 15% of the total 1ml VK pictures collected for all cities. The method to map activities using machine learning was first developed by Daniele Quercia, Luca Maria Aiello and Rossano Schifanella.

The first step is to identify a comprehensive list of words reflecting people's activities. To collect such a list, we gathered tags people used to annotate their photos. We counted the frequency of tags for all VK photos geolocated in all the 32 cities, and we manually parsed the 24k unique terms that occurred more than 100 times. A term was then included in the lexicon, if it met at least one of the following requirements. It i) was an action verb (e.g., cycling, singing, sing); ii) denoted a person who was performing an action (e.g., singer, cyclist); iii) was an object that was used to perform mainly one single action (e.g., bicycle); iv) was a place that is explicitly dedicated to a specific activity (e.g., concert hall); or v) was an acronym that denote some type of activity (e.g., DIY). We did not include potentially ambiguous words (e.g., the word "painting" could refer to the activity of painting or to a museum painting) and generic words that might encompass a variety of activities (e.g., traveling). When an eligible term was encountered, we further searched the whole corpus (including the words that occur less than 100 times) for common variations of that term; for example, if the term "cooking" was found, the term "cook" was also added, even if it rarely occurred. The result of this process yielded a lexicon of 527 terms.

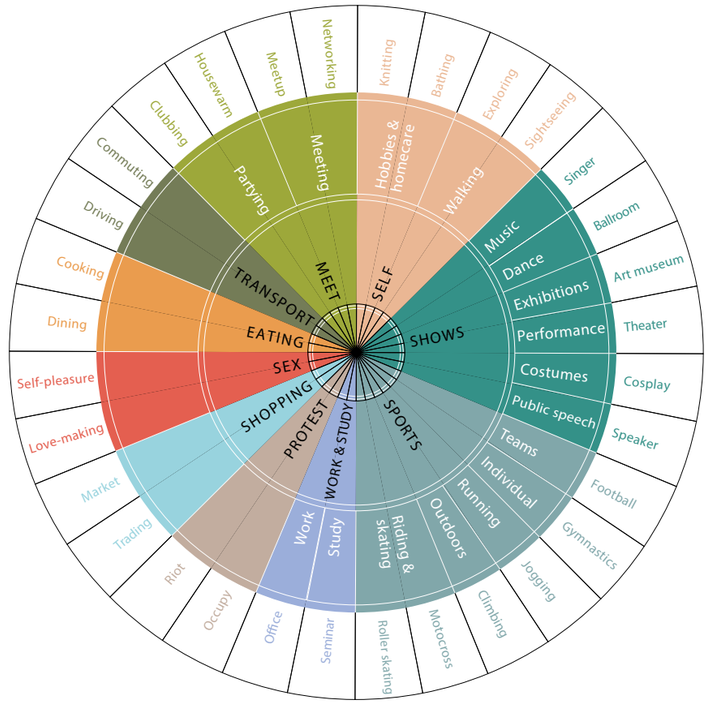
Flickr tags might under represent certain activities simply because those activities do not hold photographic interest. To augment the lexicon and make it more general, we considered three online sources, i.e., en.wikipedia.org/wiki/List_of_hobbies, www.notsoboringlife.com/list-of- hobbies, www.cci.health.wa.gov.au/docs/FunActivitiesCatalogue.pdf, that listed indoor and outdoor activities. We manually inspected all these terms following the above procedure on whether to include a term or not, and we obtained 677 unique activity-related descriptors. Unlike in Flickr, most of these descriptors were n-grams (e.g., stamp collecting). As a result, only 12% of this new set overlapped with the words from Flickr. The union of the two sets yielded a lexicon of 1,126 terms.

Despite this last addition of terms, the lexicon could still miss some terms. To gauge that possibility, we went back to the Flickr data and, for each seed activity term ta among the 1,126 in the last set, we computed the probability P(ta | ti) for each term ti that co-occurred with term ta at least in one photo. A high probability indicated that the term ti co-occurred almost exclusively with activity ta. We manually inspected the 2k word pairs with probability higher than 0.9. Most of them were existing terms in the lexicon enriched with temporal or spatial information (e.g., "NY marathon 2013"). As a result, we ended up adding only 16 new words that were sufficiently general to the lexicon.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

The next step was to give structure to the list of activity words through a systematic classification. To that end, we first built a co-occurrence network where nodes were activity words, and undirected edges were weighted with the number of times the two corresponding words co-occurred as tags in the same pictures. We built this co-occurrence network because the semantic relatedness among words naturally emerges from the network's community structure: semantically related nodes are those that are highly clustered together and weakly connected to the rest of the network. To determine the community structure, we used Infomap has shown very good performance across several benchmarks. This partition resulted in many clusters containing semantically-related words, but it also resulted in some clusters that were simply too big to possibly be semantically homogeneous. To further split those clusters, we iteratively applied the community detection algorithm by Blondel et al., which has been found to be the second best performing algorithm. This algorithm stopped when no node switch between communities increased the overall modularity. The result of those two steps was the grouping of activity words in hierarchical categories. Since a few partitions of words might have been too fine-grained, we manually double-checked whether this was case and, if so, we merged all those sub-communities that were under the same hierarchical partition and that contained strongly-related activity words.

Once we had the list of words and the corresponding categorisation we translated them in Russian for the use in this project.

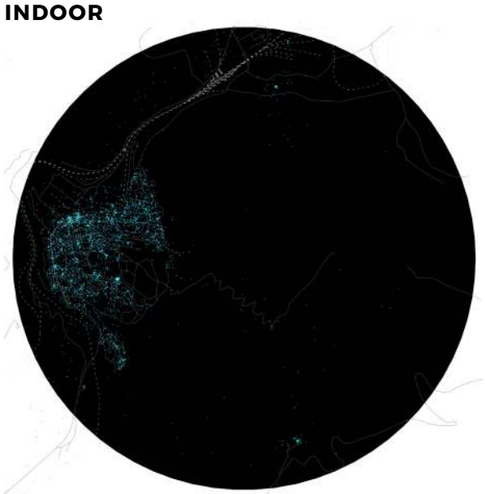


IDENTIFYING INDOOR/OUTDOOR PICTURES

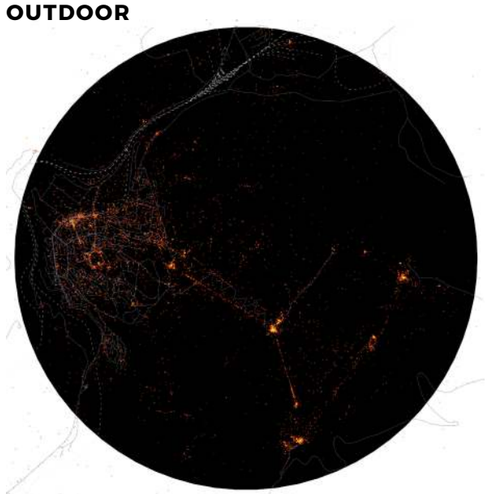
Scene recognition is one of the hallmark tasks of computer vision, allowing defining a context for object recognition. In this project we used a scene-centric database called Places, with 205 scene categories and 2.5 millions of images with a category label. Examples of scene tags are attic, auditorium, badlands, ballroom, bar, basilica. Using convolutional neural network (CNN), the system is able to learn deep scene features for scene recognition tasks, and establish new state-of-the-art performances on scene-centric benchmarks. The first step consisted in applying to all the images in our corpus the scene recognition algorithm that assigned to each photo a set of category labels with associated a confidence score. To assign to a picture the label indoor or outdoor we first associated each scene tag to the corresponding label, e.g., a park would be associated to the outdoor label while a ballroom would correspond to an indoor scene. Then for each image we took the 3 scene tags with the highest confidence score and we assigned to the picture the corresponding label if and only if all the three labels were equal, e.g., a photo with three indoor/outdoor scene tags was tagged as indoor. In case of a complete agreement was not possible, we tagged the picture as “unknown”.

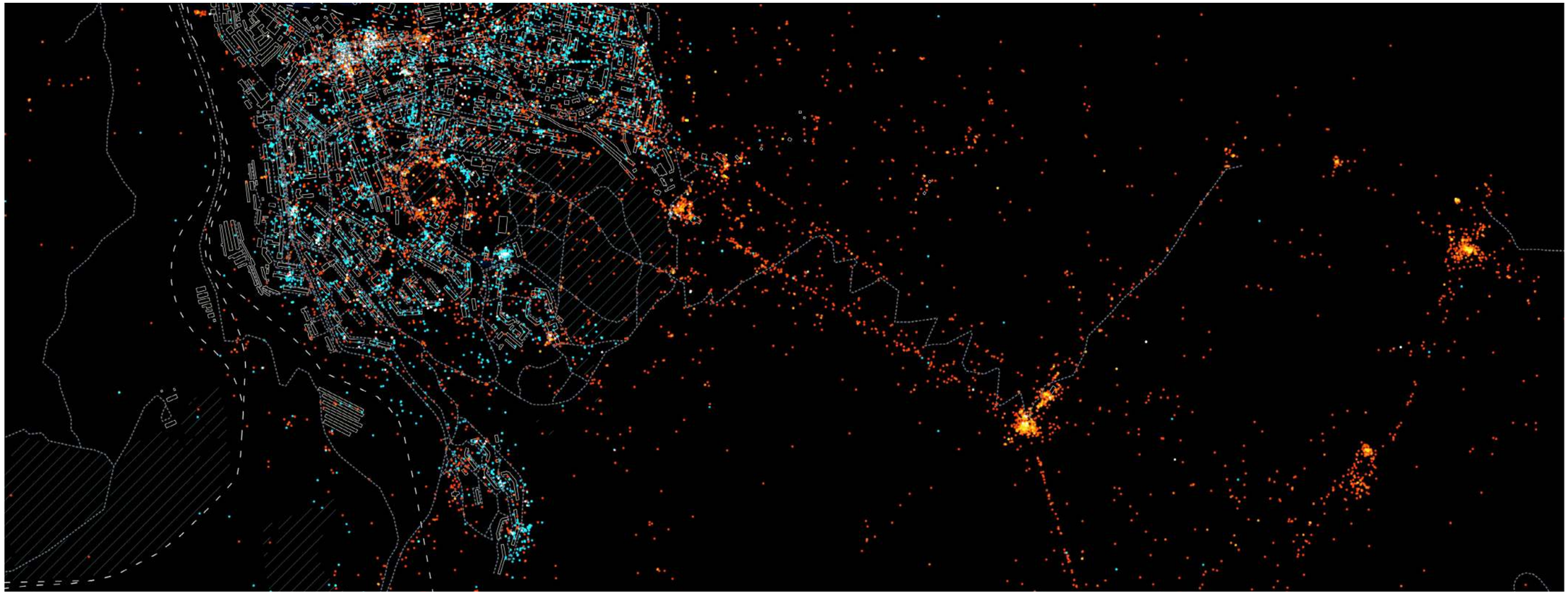
SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

INDOOR



OUTDOOR





ACCESSIBILITY

One of the most compelling task was assessing pedestrian movements in all 32 cities. Based on our experience and international practices, we have decided to use the Urban Network Analyst (Andres Sevtsuk, Michael Mekonnen, Raul Kalvo.) using the Betweenness index computed on the street network of al 32 cities which was hand drawn and updated by SPIN Unit based on Open Street Map data.

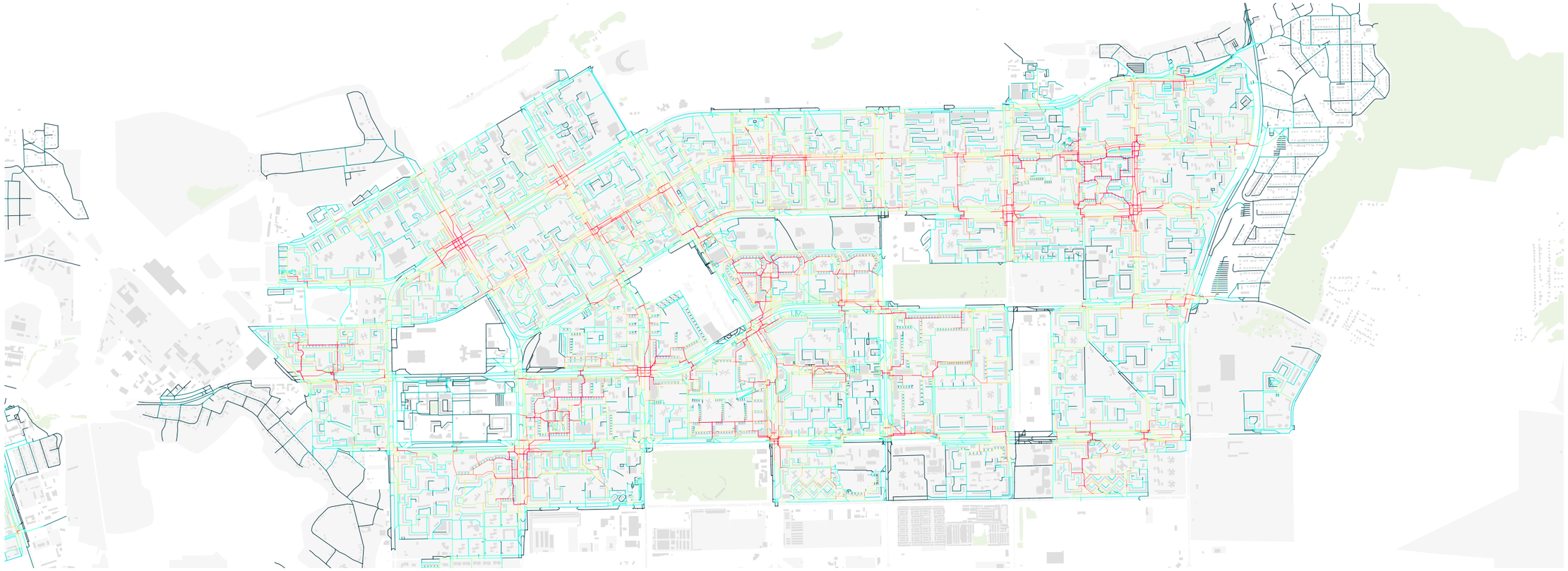
The Betweenness index measures the street segment that are most likely to be passed by pedestrians. There are many different uses one can make of this index but for the purpose of this project, and with the available datasets, we found relevant to use it to find the paths that are most likely to be passed by between all buildings. We have used all buildings as origins and all other buildings as destinations. To perform an ideal Betweenness analys we would need the population of each building, a map of all urban amenities (food and beverages, public services, working places etc) and the public transportation network. Due to the unavailability of this extensive data for all the 32 cities involved in this project, we have used the polling data to estimate population density. Usually this analysis can be enough to estimate pedestrian flow at such a wide scale and international practices and our own experience have show that these variables alone are good enough to estimate potential pedestrian movement.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

The resulting maps highlight all the pedestrian paths that are most likely to be passed by between residencies and public transportation, giving a clear picture of movements that occur within a certain district

Betweenness is calculated on street network from every point to every other point in the city weighted by population (each point represents fraction of population. For example if polygon contains 2000 people and there are 100 points in this particular polygone then each point represents 20 people.) using a radius of 600 m. The radius was estimated in the previous study we did in Moscow for Stelka KB using the average distance between residential buildings and public transport stops. Points are populated on street network every 100m and only under the polling polygons where population data was available. Streets represented with single colour or dashed-line are network segments, which did not received any betweenness or were outside the population polygons.

All accessibility maps are embedded in the reports “02 Maps section 1” and “02 Maps section 2“.



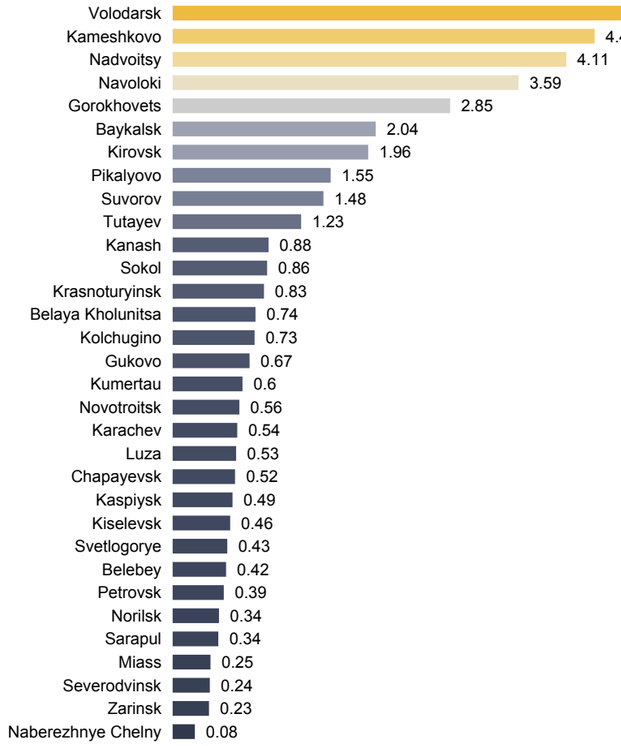
VK DATA STATS | 1.1ML VK PICS

NUMBER OF PICS

The graph show the amount of VK pictures shared in one city normalise by its population size. The higher one city is placed in this graph, the more pictures per inhaitants are shared.

This graph can have many different interpretations. Cities at the top could be very attractive places and full of interesting activites but it could alaso means that certain cities are highly influence by tourism or that population is younger in age or simply showing the populatiry of smart phones and social media.

So far we can only rise these questions. Further research with detailed demographic data of each city would be needed to draft conclusions.



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

PIC BY POPULATION

In this graph we present an alternative representation of the VK pictures shared in one city compared to the number of its inhabitants.

QUALITY OF LIFE

One of our main challenges was measuring the quality of life in the 32 cities without having any economic or demographic indicators available. Due to the geographic dispersion of the 32 cities, it is not feasible to survey each one of them or gather data locally. Therefore we conceptualised a method to map the quality of life in those cities by looking at their activeness. We speculate that the more activities there are in one city the more distributed they are, the higher the quality. To map the variety and the occurrence of human activities we used machine learning and visual analysis to recognise them and categorise them according to the activity wheel - as detailed in the previous paragraph. In other words, one city offers a better quality of life when there are many activities and these are more evenly distributed.

In each bar of the graph there are indicated the number of activities that are predominant in one city by colour and their distribution by the length of the coloured bar - activities that are found in less than 4% of the pictures are left outside the graph. The cities are ordered from top to bottom where the top represent the city with the estimated highest quality of life (Kumertau) and at the bottom the city with the estimated lowest quality of life (Svetlogorye).

The formula used to measure the estimated quality of life of the cities and ordered them in the graph is:

(Number of activities in the city / Maximum number of activities recorded in a city) × (Maximum variance recorded in the number of pictures across different activities in the city / Variance in the number of pictures across different activities in the city)

This metric favours both cities with a greater number of different reported activities and cities where the number of pictures is more uniformly distributed among the different activities there recorded.

In depth_____

A metric was developed to estimate the quality of life across the cities examined, and sort them in the graph above. This metric favours both cities with a greater number of different reported activities and cities where the number of pictures is more uniformly distributed among the different activities there recorded. This approach correlates quality of life with the variety of activities offered by a city, favouring those cities where no single activity dominates.

This metric, M, for a given city is defined as follows:

$M = N \times 1/V,$

where N is the normalised number of different activities observed in that city, defined as:

$N = N(\text{city}) / \max(N(\text{all cities}))$

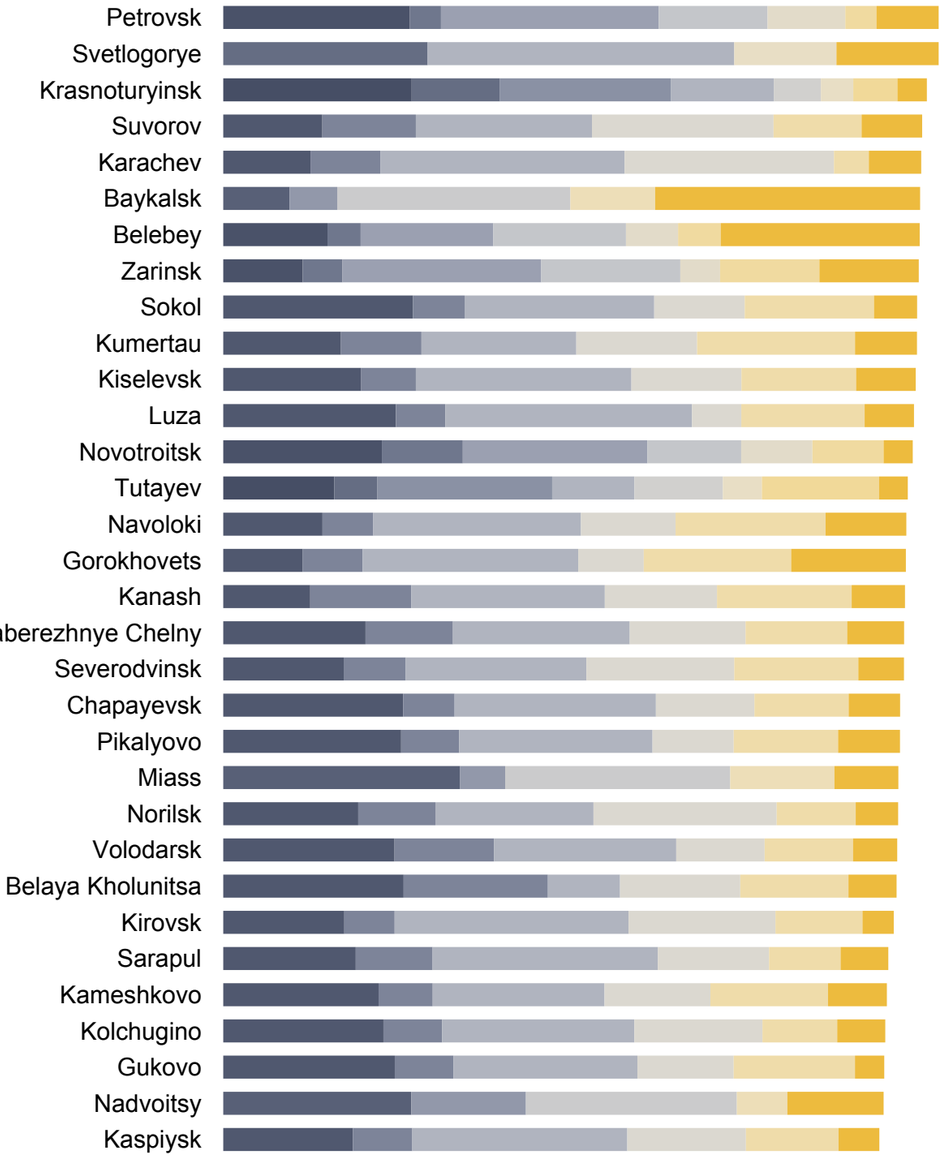
and V is the normalised statistical variance, for that city, of the number of pictures for each activity ({n(activity 1), n(activity 2), n(activity 3), ...}), defined as:

$V = V(\text{city}) / \max(V(\text{all cities})),$

where the variance is defined as the expectation value of the squared deviation of n(activity) from the mean number m of pictures across all activities for that city, i.e. $(n(\text{activity}) - m)^2 / (\text{number of activities})$.

With max(N(all cities)) and max(V(all cities)) we denote, respectively, the maximum recorded number of activities and the maximum variance across all activities (for the set of cities examined).

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

1 - BAYKALSK

The small town of 12,000 inhabitants is composed of three distinct neighbourhoods (microrajons), bisected by a main road and its buffer zone. The urban areas are characterised by rather low-densities and open or semi-open blocks. Baykalsk is framed by the lake and skiing-hills.

The central activity spine found by our analysis shows a clear potential for interventions in the future. These could include densification, re-use of empty premises, landscaping and improvements in lighting and amenities.

Currently, the built urban structure does not reach the lake, one of city's two main attractions. While it may be good idea to keep the lake-side as a park, the area would benefit from new social attractions and better landscaping.

Third important finding is that youth are attracted by informal places like bridges and forest between the neighbourhoods. It would be good policy to invite the local youth to a process of self-building and self-managing one or two activity spots based on their own wishes.

16 – KUMERTAU

With 60,000 inhabitants, in the monotown pilot sample Kumertau represents a medium-sized settlement. It is characterised by a clear centre with classical street-pattern, cultural centre and other urban buildings in Stalinistic style, surrounded by relatively compact post-war microrajons, dacha areas and other built elements. A microrajon to the East is separated by the railway.

Active outdoor use of public space concentrates on the North-South main street, extending to the cultural and sports area beyond the Southern end of the street. The microrajons are quite actively used, with scattered social gathering spots and youth spaces. Some social uses and markings of enjoyable space can be found in the underdefined Northern railway zone, which we find interesting.

These findings point to a three-stages strategy to improve Kumertau's public space.

Firstly, the city centre main street would benefit from small and organic improvements in paving and landscaping, combined with intensifying street-level uses in the buildings and temporary uses of the public space. Pedestrianisation might be considered. The perpendicular Ul. Karla Marksa that links the Eastern microrajon to the centre might carry some further public life.

Secondly, the Northern railway zone and the station area are promising for alternative, citizen-based developments, such as urban gardening.

Thirdly, the link between the northern end of the main street and railway zone should be articulated, with some changes to clarify routes in the Park Pobedy and possibly opening some yards for public use. – Finally, the scenic entry road gathers viewers of the lake and city, representing a small additional development opportunity outside of town.

19 – NABEREZHNYE CHELNY

Naberezhnye Chelny is a growing car-industry city of 0.5 million people, and the largest settlement of the monograd pilot study. It has a modernistic Corbuserian plan, with compact over-all form, strict zoning of main functions and very large scale of buildings and streets. A slightly mixed development extends from this core towards South-West, following the river Kama.

Public and social uses concentrate in very few locations along the main urban axis that culminates in the monumental park Area Azaklyk as well as at one spot on the river. Outdoor uses, especially, are unusually concentrated thinking the big size of the city.

Because of growth, Naberezhnye Chelny has realistic potential to develop new qualities. Tentatively, we propose a “landscape strategy” that would continue the modernistic planning tradition, not trying to undo it. In city scale, some new anchor points for image and social use should be developed. For example Hippodrom and the adjacent River Park could be activated. The riverside towards South-West of the city has great potential which should not be spoiled by excessive private housing development. Rather, a balanced plan of public parks and riverside attractions, mixed with well-designed “garden city” developments could be imagined, to complement the existing plan and its typologies.

Locally, the landscape strategy would involve improving green spaces and public amenities in all microrajons, taking in account the findings of accessibility analysis. In the few most actively used areas, the strategy would suggest new innovative cultural and commercial constructions “blending” in the landscape between the existing buildings. Sloping green roofs and other means could be used to direct flows and views, taking further benefit from our analysis of use and centrality.

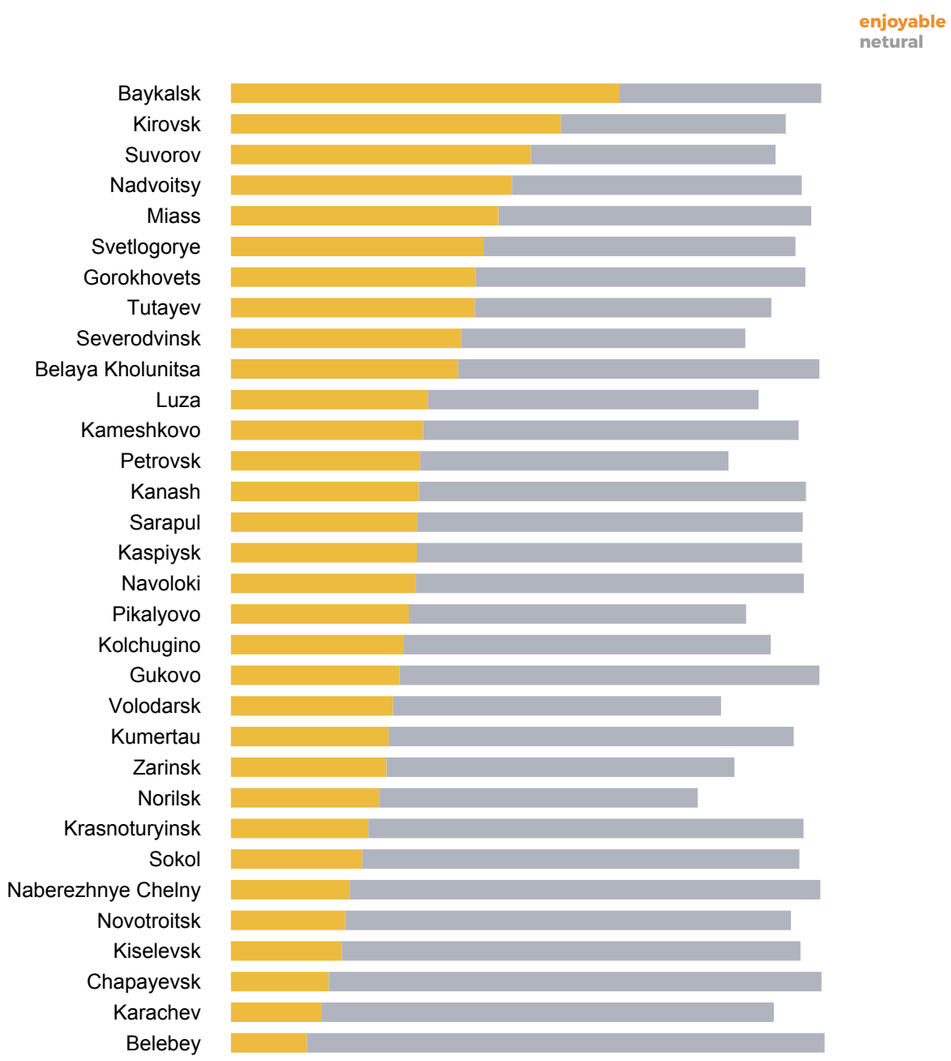
In building scale, the street-level fronts, access ramps, stairs, balconies and possibly roofs might benefit from innovative green treatment. Several benchmarks come to mind, for example that of the Bijlmermeer superblocks in Amsterdam South.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

QUALITY OF PLACE

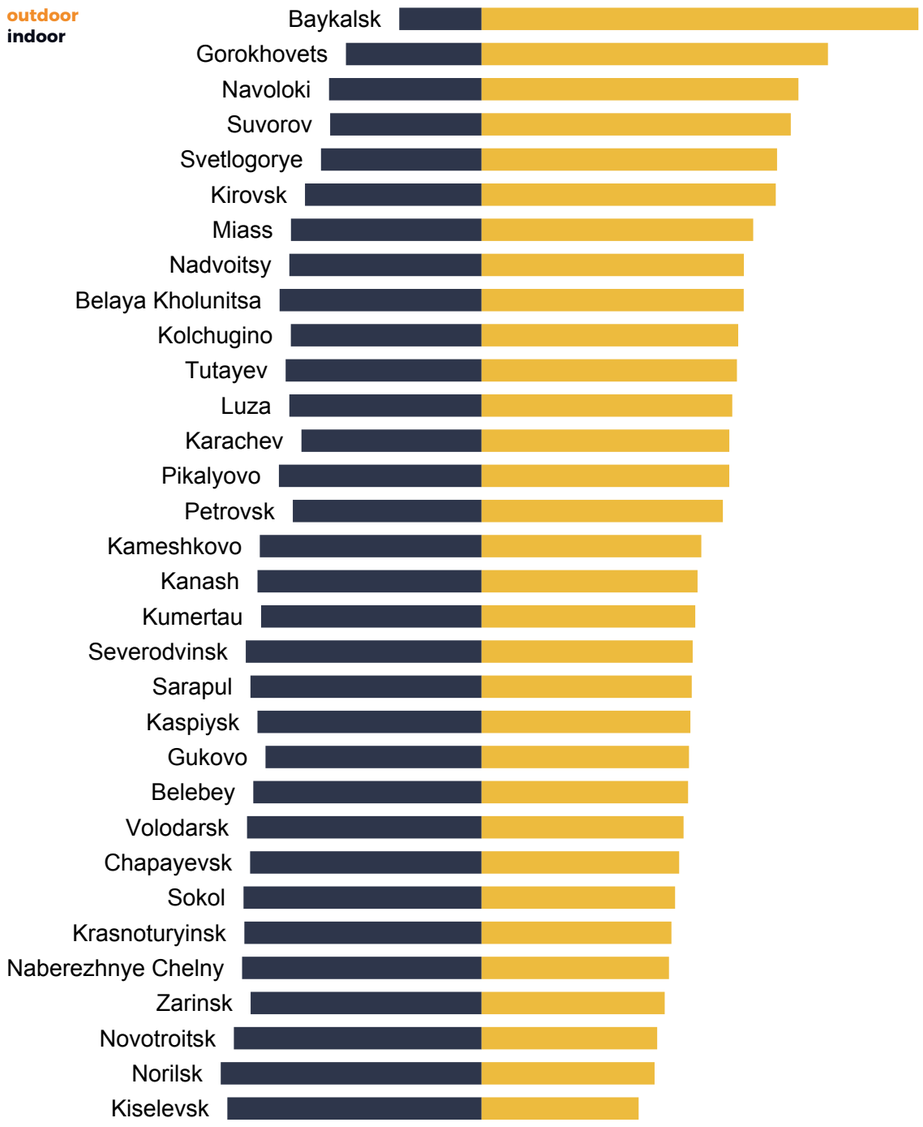
This series of graphs show the amount enjoyable place against the amount of neutral places found in each city. The higher one city is represented in this graph, the more quality spaces it offers. These qualities are commented in report secion 2 and 3 city by city as the use of this statistical element can be read only together with other qualitative aspects of the city and local knowledge about the activities and the character of one city. For example we may not know if the quality of space of one city is boosted due to the presence of touristi attractions or ski-resorts. Therefore we present this series of graphs for experts with local knowledge to learn about the differences between the quality of space of different cities. To gain new insights about one city, these graphs may be read together with other statistical indicators about one city (such as public spending on infrastructure, public space and urban development) to assess if the investements carried our are reflected by the perceptible qualities of space presented in these graphs.



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

IN/OUTDOOR

The graph shows the proportion of indoor and outdoor pictures for each city, which could be an indicator for activities and attractions in outdoor public spaces. The indoor / outdoor analysis maps (report section 02 / 03) show the general activity pattern for each city, ie. the spatial distribution of the intensity of activities people engage in, as well as their rough temporal (seasonal) dynamic. A deeper study of seasonal temperatures would help us drafting more precise conclusions but it seems that cold winters alone are not to be considered a negative factor. In fact, Baykalsk's high proportion of outdoor pictures is due to the presence of a popular skiing hill.



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

Mixity of indoor and outdoor activities

In the studied monotowns, we recognize highly varied patterns of mixity of indoor and outdoor uses in same location. In some cases, for example in Baykalsk, Kirovsk and Severodvinsk, we find one or two large and well-defined concentrations of outdoor uses. In closer view, these are skiing resorts or marine beaches. They are of course great amenities, sometimes even touristic attractions, but they give little to the actual city and its local urban life. Similarly, we may find concentrations of indoor uses that do not match with outdoor activities. This may be a sign of urban situations where the quality of outdoor public space is poor.
Thus, in general a mixity of indoor and outdoor activities can be considered an asset and a sign of positive urbanity. The mixity can occur in two scales: between adjacent morphological units, or inside one morphological unit.
In the first case, concentrations of outdoor uses in urban parks, boulevards and squares are flanked by active indoor uses in the neighbouring urban blocks. These configurations show potential to spread indoor uses, such as restaurants or cultural events, seasonally to parks, and to enliven the economies of interior uses through pedestrian flows nearby.
In the second case, the mixity can mean active yards or small kiosks in parks, features that show small-scale development opportunities for one actor, be it the municipality (parks) or a housing association (micro-rajons). However, active street-fronts typically require coordination between the city and shop-owners.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

Linear forms and gaps in intensity of use
In many cases, such as Saratov, we find clear linear patterns of activity. Linearity is a very general feature of the social use of space, well documented already by Hillier and Hanson in their early Space Syntax studies, as well as more recent work by Sevtsuk in commercial analysis. If a linear form is found, it is usually good idea to study possibilities to prolong it.
Especially important is to deal with gaps of linear activity patterns, increasing the linkages and connectivity of the actively used public urban space. A gap may be a physical barrier, such as rail line or highway, or simply an empty premise, warranting different measures. Linear patterns, thus, can involve both place-making place-shaping tasks.

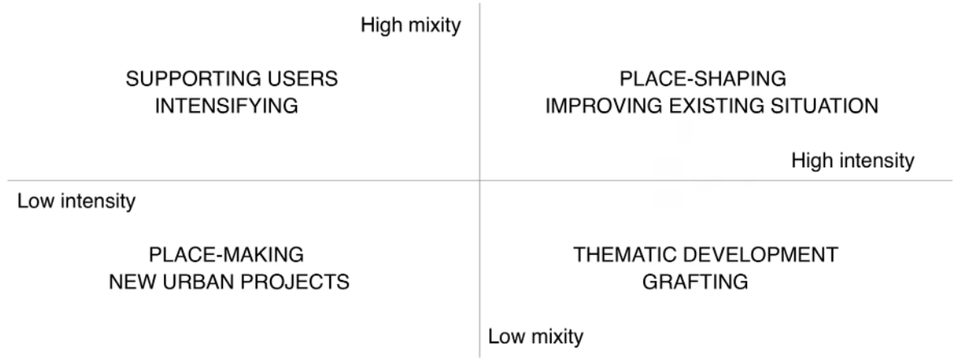


Diagram_____ A schematic proposal that links the intensity and mixity of indoor / outdoor pictures to possible planning and development approaches for urban places and neighbourhoods.

Indoor / Outdoor – conclusion____
The proportion between indoor and outdoor activities in one city alone is not very productive tool in itself, but should be combined with map-based readings of the activity pattern, as discussed above. As a concluding point of the indoor / outdoor comparison, we nevertheless would like to note that
the cities with a clear majority of outdoor uses, for example Baykalsk, would likely need to diversify their dominant outdoor uses through thematic development and grafting of new amenities;
the cities with a clear majority of indoor uses, such as Norilsk and Kiselevsk, would likely need to strongly focus on improving the quality of outdoor public and green spaces and sports facilities;
the cities with an even distribution would likely benefit from organic place-based development, varying between place-making and place-shaping case-by-case.

As we mention above in “Interventions and Improvements”, the current practice of planning and building cities often fails to meet everyday users’ expectations. The multiple analysis explained in this Report Section 01 and applied to 32 monotowns in Reports 02 and 03 do help to overcome this obstacle, thus improving planning and policy for the benefit of local citizens.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

IMAGE MONTAGE

A ZOOM-IN THE EVERYDAY LIFE OF 3 CITIES

BAYKALSK

KUMERTAU

NABEREZHNYE CHELNY

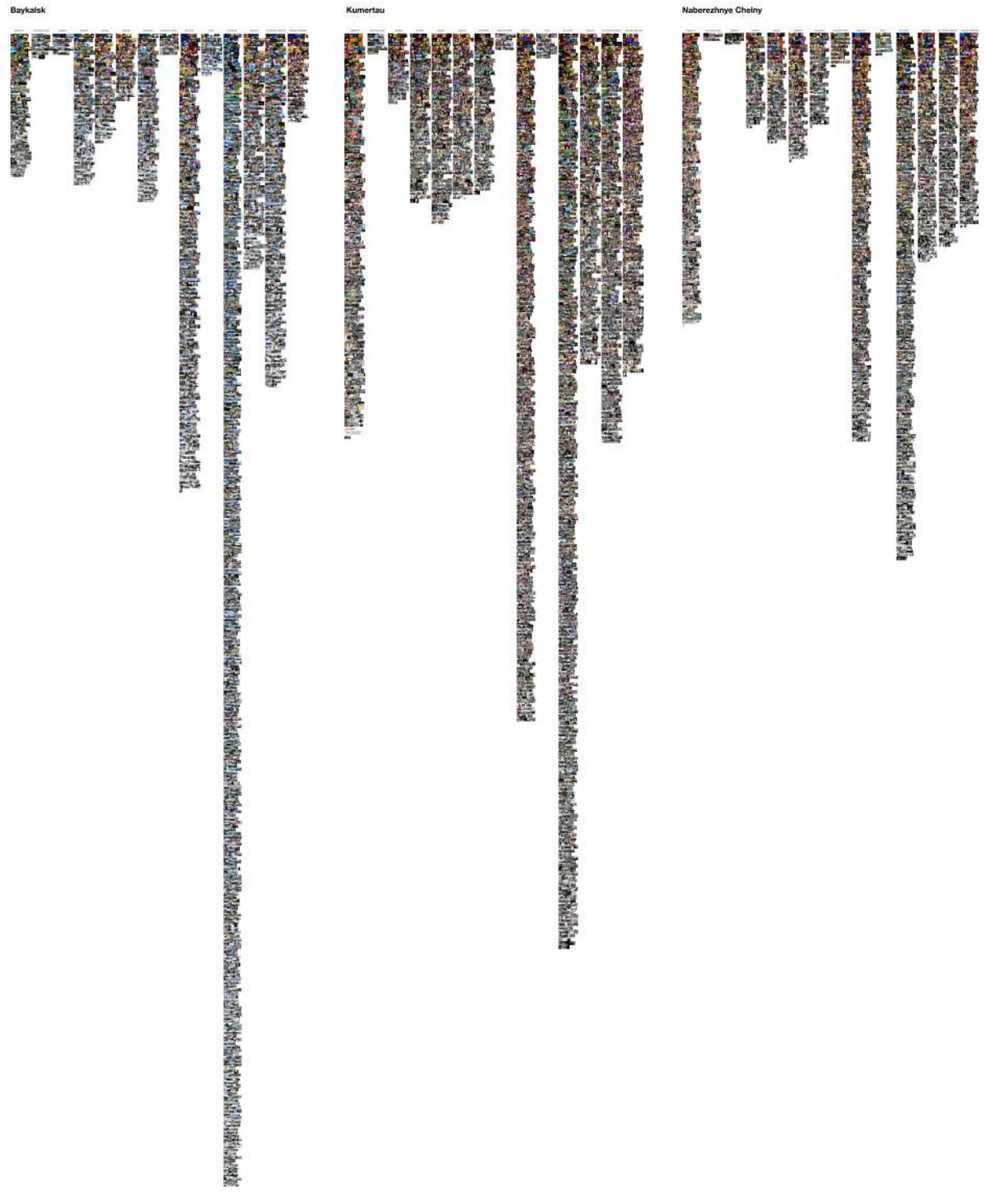
IMAGE MONTAGES
CULTURAL ANALYTICS

This section of the report is a small test we ran on 3 cities to assess the potentials of Lev Manovich's image montage technique to analyse the actual content of the images in more detail than the maps. This method allows to extract qualitative information from the data we collected and expert Cultural analysts or anthropologist could produce a better understand of the cultural practices of the selected cities.

We used this technique to study activity patterns in all different cities and support the commentary of the maps in "02 Maps section 1 " and "02 Maps section 2".

In this section of the report we will just show a few example of this technique with the purpose to illustrate one of the many steps involved in the reporting process of the Maps sections.

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //



3 CITIES - POLAR PLOT

OUTDOOR

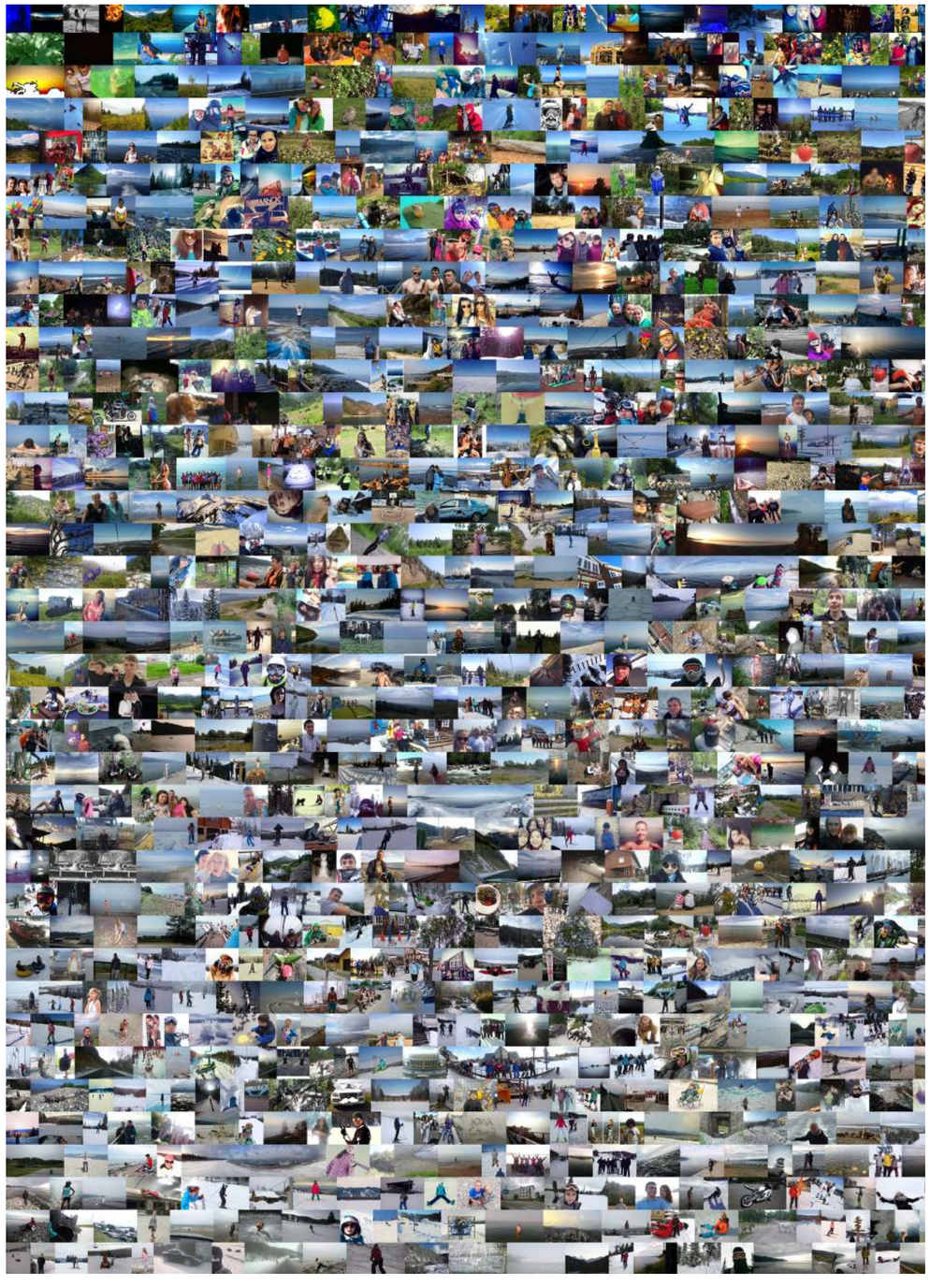
This plot represents all pictures taken outdoor in all the 32 cities. Pictures are ordered on a polar plot according to HUE and Saturation. The missing slice of picture from the polar plot correspond to images that have the tendency to be dark red and purple. These colours are usually associated to night outdoor pictures.

Apparently the reason why pictures falling into that colour category are missing is the lack of pictures taken outdoor at night. One possible conclusion is that in average all the 32 cities do not have an active night life outdoor but further research will be necessary to draw more precise conclusions.

Observations
This series of pictures montages are produced to give a visual outputs of the graphs presented above. All the elements we tagged in each city can be plot as a pictures montage to see, for instance, what outdoor activity look like in one city or another. We are presenting those montages as an example of possible continuation for this study, that so far was more focusing on the quantitative aspects of the information we gathered. Pictures montages can give new qualitative insights about the cities by making a visual comparison of activities or spaces from different cities. In this brief example we show the possibilities of pursuing such a study based on the visual analysis of pictures montage. For instance by plotting all outdoor pictures from different cities, we can see what are the types of predominant activities carried out outdoor across Russian monotones. In this brief example it is visible how Baykalsk outdoor activities are predominantly tied to skiing, while in Kumertau is the lake that attract more users. Also we noticed that teen agers are mostly skiing outdoor in Baykalsk while Naberezhnye Cheny they focus on sports. These pits can help up understand if same activities are missing important outdoor activities, such as sports, or they can support the decision making process of improving public space through new architectural intervention where activities are not present. This was just a small sample to show the possibilities of using pictures montage and it would be valuable to carry out a dedicated study to pictures by activities or place to reveal more qualitative information to support new architectural interventions and the decision making process.

BAYKALSK

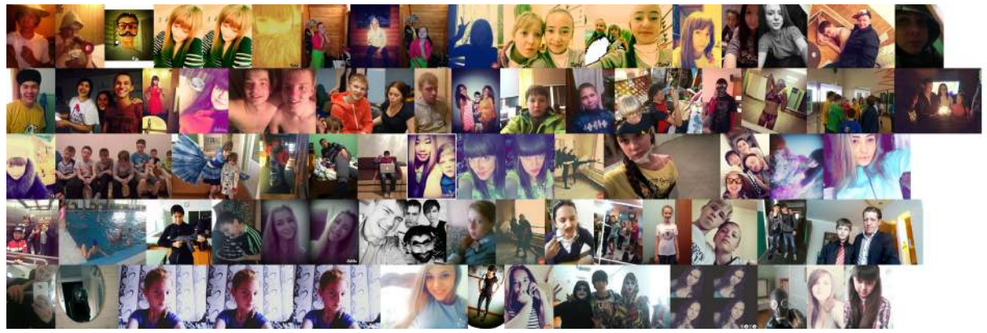
OUTDOOR



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

OUTDOOR | ZOOM-IN

TEENS INDOOR



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

TEENS OUTDOOR

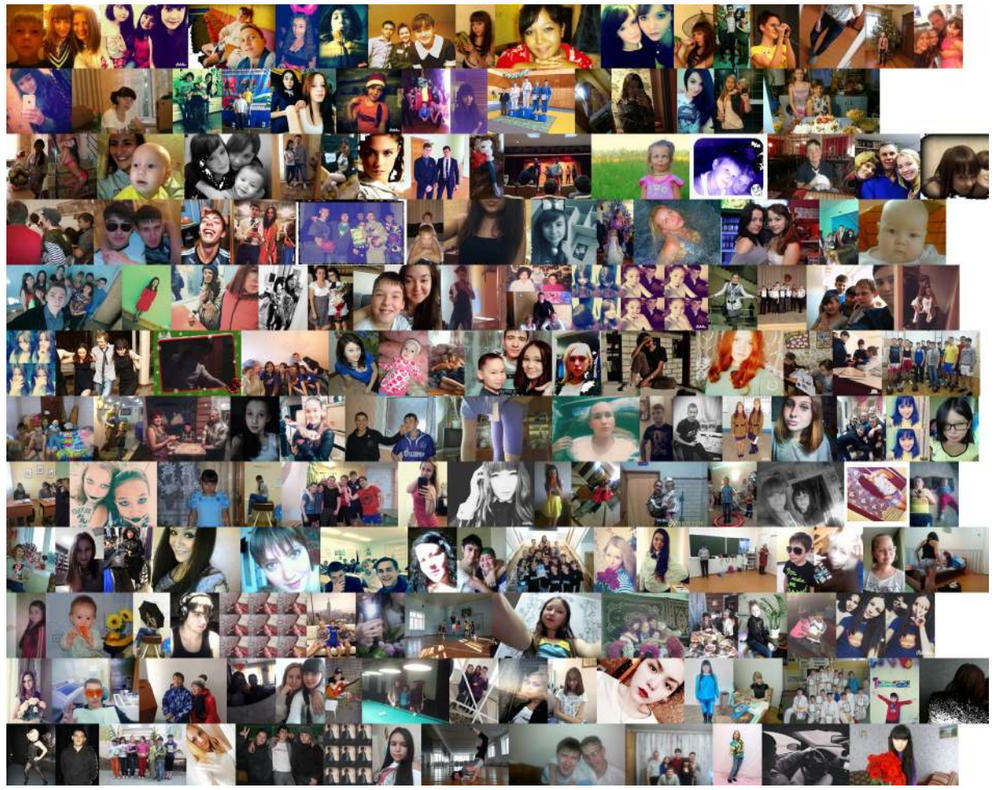
KUMERTAU

OUTDOOR

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

OUTDOOR | ZOOM-IN

TEENS INDOOR



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

TEENS OUTDOOR

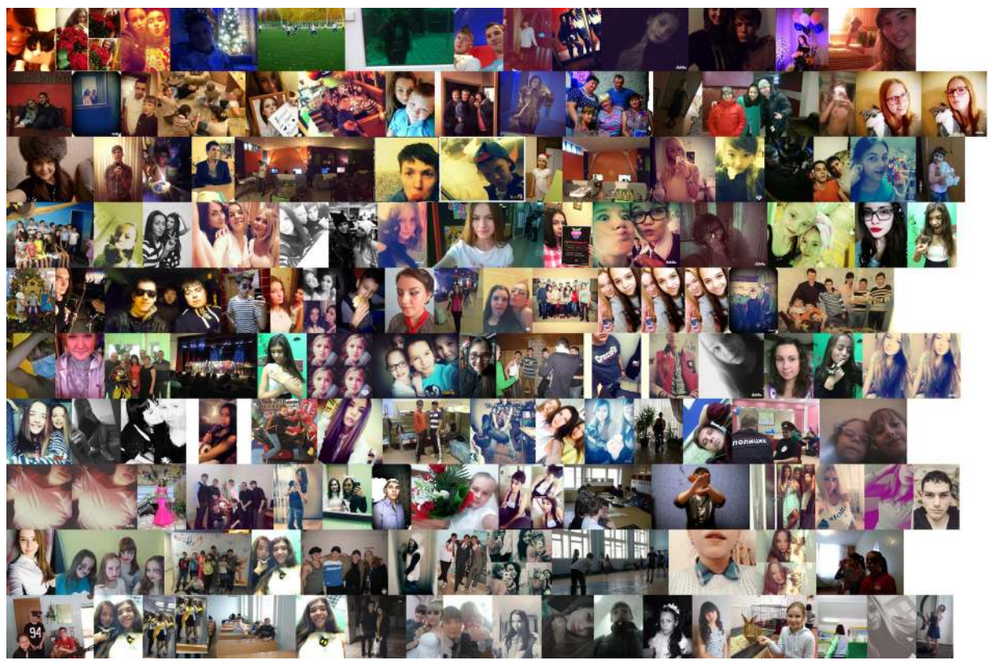
NABEREZHNYE CHELNY

OUTDOOR

SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

OUTDOOR | ZOOM-IN

TEENS INDOOR



SPIN Unit | The hidden life of 32 Russian monotowns
Report section 1 //

TEENS OUTDOOR