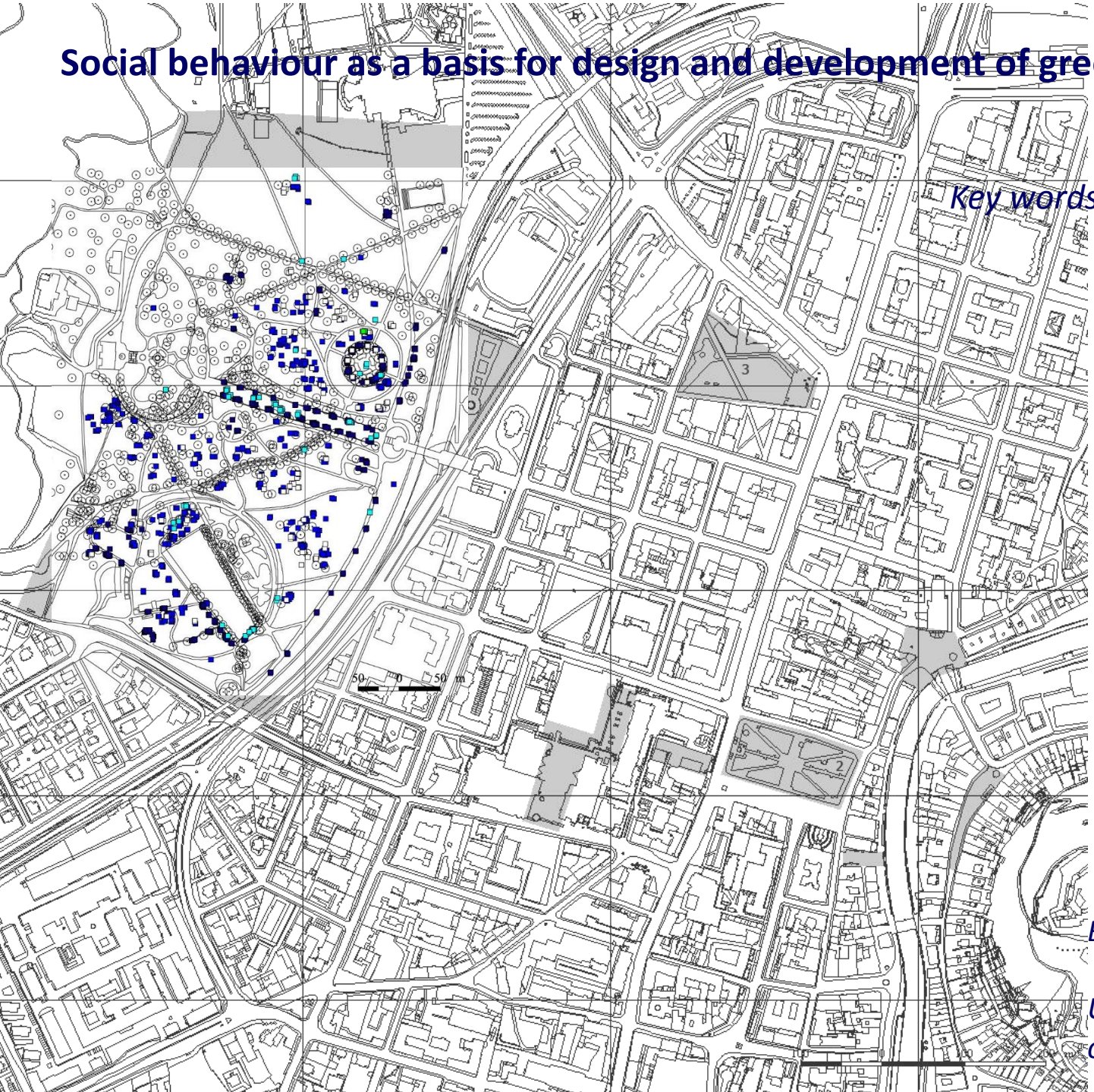
Social behaviour as a basis for design and development of green infrastructure



Key words: behaviour mapping
empirical knowledge
urban landscape

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STRUCTURE OF PRESENTATION

INTRODUCTION: Health & Urban Planning

BACKGROUND: Social science research: Urban planning – Public health connection

METHOD: Observation and behaviour mapping

CASE STUDY: Central parks of Ljubljana

RESULTS: Actual use of places

DISCUSSION: Empirical knowledge for social sustainable green infrastructure planning

- SPATIAL QUALITIES OF SETTINGS AND THEIR CORELATION TO USES
- CUMMULATIVE SPATIAL CAPACITIES OF PLACES
- INFORMING NETWORK OF PLACES FOR SOCIALLY RESPONSIVE GREEN STRUCTURE

CONCLUSION: Lessons learnt for Central, Eastern and South-eastern Europe

1. **In 19th century urban planning was recognised as an important tool to enhance social well-being and public health.**

2. **In the 20th century the focus of city planning and design within social well-being, including public health, waned.**

3. **Over the last few decades the awareness for healthier urban society is increasing, and the role which urban planning can play in making the impact of urbanisation on health beneficial for people, is recognised again, especially in provision of outdoor places and promotion of physical active behaviours.**

4. **It is important to understand cities as social processes, and aiming for informing planning and design via users' dimensions.**

BACKGROUND Social science research: Urban planning – Public health connection **THEORETICAL BASE**

SOCIO-ECOLOGICAL MODELS

Approaches in health research examining physical activity in which built environment plays an important level of influence, commented or assessed as facilitative or inhibiting for participation in physical activity.

Environments that support healthy behaviours and responses may have more permanent and population-wide effects than other forms of public health interventions targeted at individuals (Ward Thompson, 2013)

INFLUENCE OF ENVIRONMENTAL PSYCHOLOGY

AFFORDANCES (Gibson, 1979)

PERCEPTION
places to support human experience and activities

PREFERENCE STUDIES

BEHAVIOUR SETTINGS (Barker, 1976)

BEHAVIOUR PATTRENS
expected/predicted behaviours in places

BEHAVIOUR MAPPING

1. **Research examining associations between public open spaces and physical activity is increasing**

2. **Conceptual and methodological gaps are still limiting the research on public open space and physical activity.**

3. **In measuring physical activities in places, GPS devices, pedometers or accelerometers are often in use to collect evidence.**

4. **Such studies are usually limited to one type of activity and peoples' participation in study is conscious.**

5. **There is an applicability gap between social science research and place design; to bridge it, it is important to gain actual knowledge about usage-spatial relationships by observation and behaviour mapping, using the advantage of GIS e.g. exact spatial annotation and visualisation.**

1. **The paper challenges the issues of green infrastructure planning and design exploring social behaviour applying behaviour maps, a method and tool to provide empirical knowledge for planning, design and decision-making processes.**

2. **Mapping and map-making is related to physical aspects of places and imaging, two subjects with which planners and designers are usually quite familiar.**

3. **A body of knowledge represented in such way may help designers and decision-makers effectively when addressing design, evaluation, development and re-development of places, and by this:**
   - Helping designers be confident that layouts proposed for intended uses will, in practice serve those uses well and be likely to be used as predicted;
   - Helping planning and decision-making authorities to reveal restorative environments via peoples' attachment to open spaces and their recreational habits, and to interpret people's healthier lifestyles;
   - Helping planning and decision-making authorities to recognise variety of peoples' needs, habits and expectations in open spaces, via information addressing various user groups, age groups or gender referenced characteristics of place users.

1. **The sample: Tivoli park, Zvezda park, Argentinski park, Trg republike, Plecnikov trg, Dvorni trg, Mestni trg and Presernov trg.**

2. **May, 2003. The month of May was chosen as a time when the weather was likely to be warm and outdoor activity pleasant.**

3. **Time periods for observation: 10am – 12 noon; 12 – 2pm; 2 – 4pm and 4 – 7pm; to capture likely different patterns of use, weekdays, weekends**

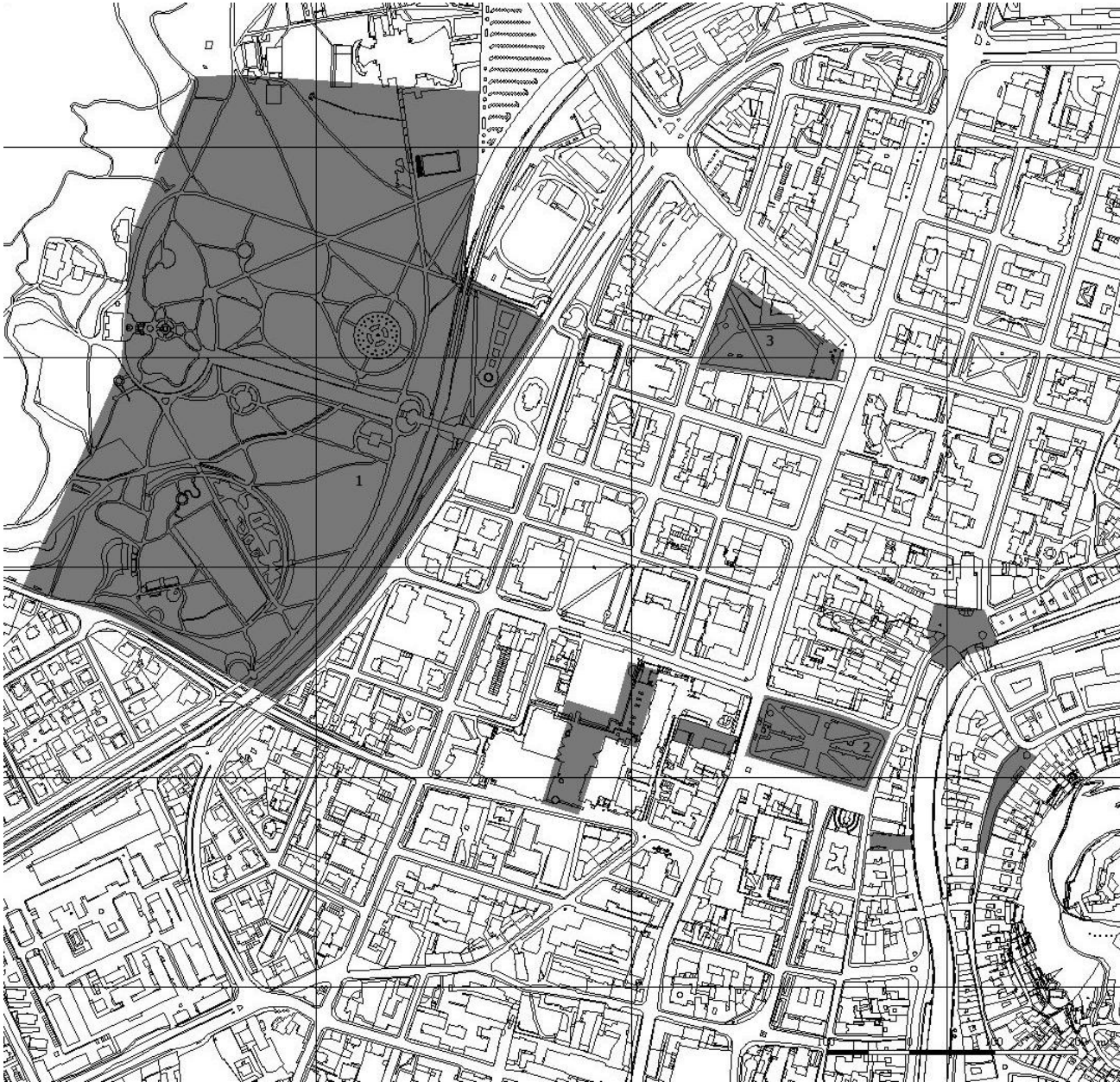
4. **The observation protocol involved a systematic walk through each place, visiting all sub-areas and taking a 10-minute visual scan of each sub area.**

5. **All users observed were recorded as point data on detailed maps of the sites (1: 1000 scale) using symbols corresponding to actual activities observed in places, and accompanied by additional data: duration of an activity, estimated age classes for each person, and weather condition.**

6. **Altogether 106 observations were made in Ljubljana.**

Entire study area:

city centre of Ljubljana
public open spaces
2 km2



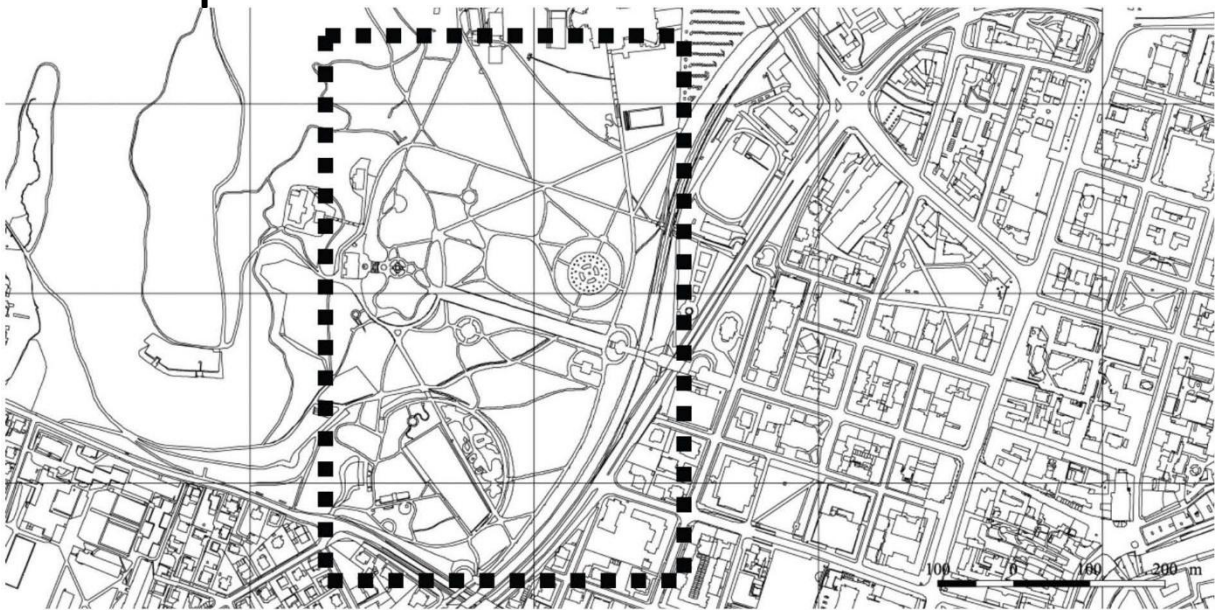
Selected cases for this discussion:

- **Tivoli Park**
- **Zvezda Park**
- **Argentinski Park**

CASE STUDY

Large central park: TIVOLI

1. **The largest public park in Ljubljana city centre**
2. **The last crucial changes in 60ies of 20th century – railway and road construction at the eastern edge – physical and visual dis-attachment from the city centre**
3. **The last visible changes in 90ies of 20th century – new children playground and renovation of the adjoining area at in the southern part**

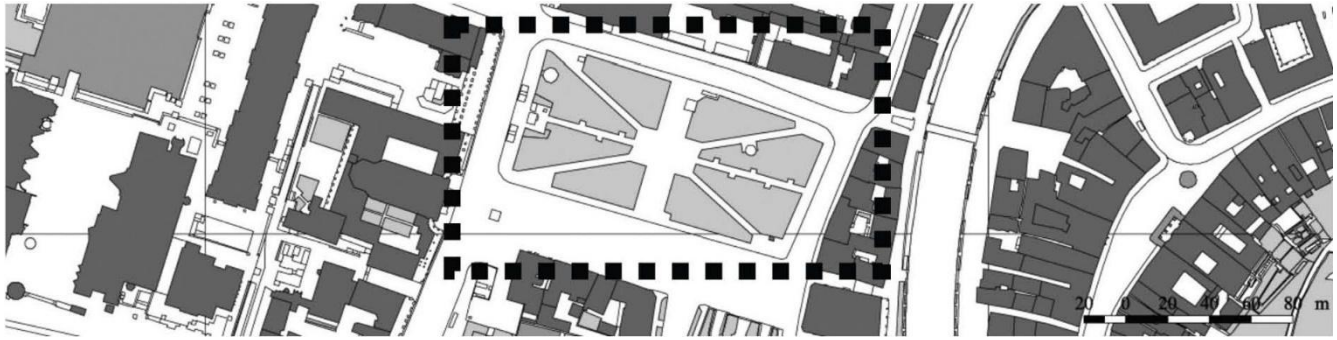


1. **Nearness of residential areas, including student accommodation, galleries, museums, outdoor cafes**
2. **Structurally, it is located between the railway corridor and the slopes of a hill (natural urban forest), having also inner articulations and some slopes in some parts**
3. **A distinctive area of green open space has been included in the study; 23ha**
4. **The park is equipped with amenities of traditional park features such as benches and fountains**

CASE STUDY **Square-like city centre park: ZVEZDA**

1. **Green part of the Kongresni trg – arranged for the meeting of the Holy Alliance 1821**
2. **The oldest public park in the city**
3. **The boundaries of the park are defined with compact built frame – buildings of various historical eras, representing mixed use**

1. **Detailed spatial articulation of the green part is characteristic for system of crossing paths forming a star shape**
2. **There are some symbolic-historic characteristics and other landmarks, e.g. fountain**



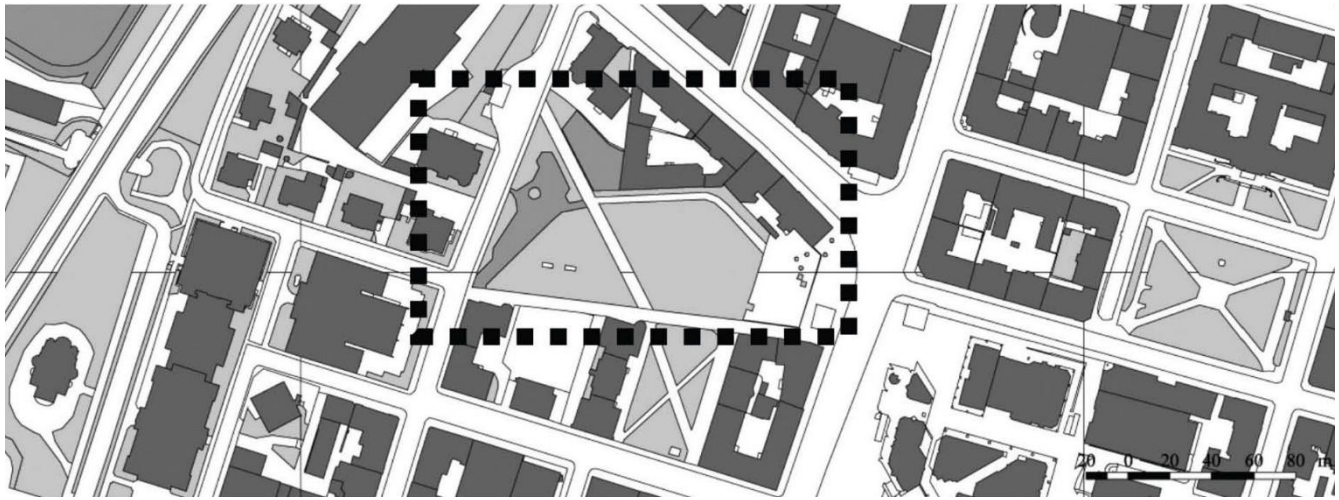
In the last decade Kongresni trg has been a subject of various changes:

- **Traffic regime has changed**
- **The entire square was renovated, green part became attached to the vast paved area, previously used as car-parking area**

The data about spatial usage of the green area was recorded in May 2003. However, there were observations carried out following the changes of the area proven that the changes in the area have not significantly influenced the usual patterns of uses there and confirmed the relevancy of the original data for the discussion.

CASE STUDY **Neighbourghood park: ARGENTINSKI PARK**

1. **Small neighbourhood park in the city centre**
2. **Residential area, nearness of primary school and kindergarten, various services, cultural institutions, administration and government offices.**
3. **The park includes children playground, open access**



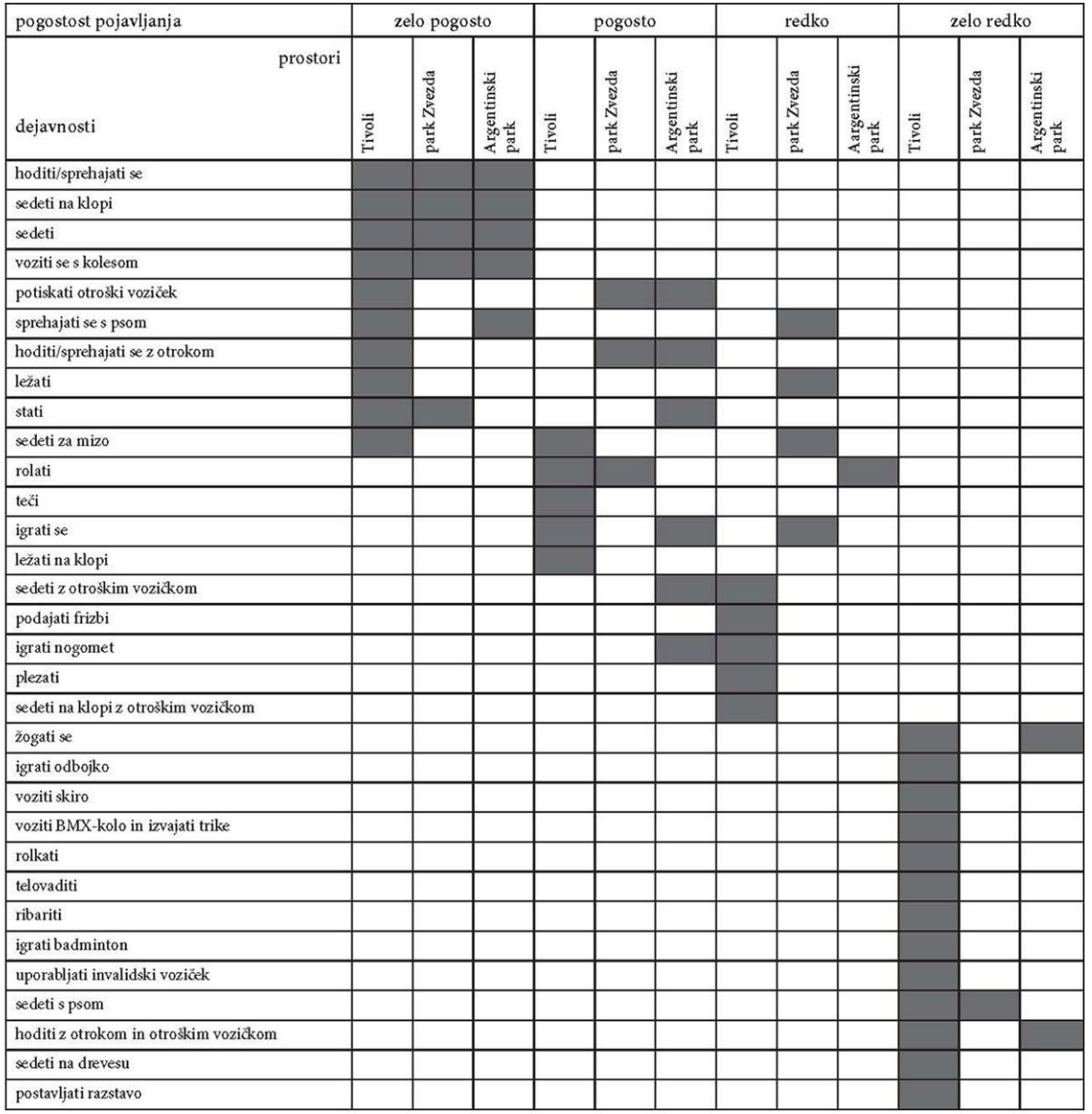
1. **Vast construction site across the street defining the park's western edge**

RESULTS

The examined parks differ from each other regarding their size, character and historic-symbolic values; however they all are places of variety of different uses

Number and frequency of uses

	Zvezda		*Tivoli*		*Arg. park*	
No. of people involved in activity per day	*all*	*%*	*all*	*%*	*all*	*%*
Cycling	139	**7,2**	330	**9,1**	53	**7,9**
Jogging/ Running	3	**0,2**	66	**2**		
Lying down	9	**0,5**	115	**3,2**		
Lying on a bench			10	**0,3**		
Playing	3	**0,2**	41	**1,1**	15	**2,2**
Playing in a playground (no fence)					29	**4,3**
Playing with a ball			8	**0,2**	3	**0,4**
Playing volleyball			5	**0,1**		
Playing football			25	**0,7**	42	**6,3**
Playing frizbee			14	**0,4**		
Playing badminton			2	**0,1**		
Pushing a parm	24	**1,3**	122	**3,4**	18	**2,7**
Sitting	117	**6,1**	459	**13**	18	**2,7**
Sitting around a table	75	**3,9**	457	**13**		
Sitting on a bench	304	**16**	485	**13**	32	**4,8**
Sitting on the tree			5	**0,1**		
Skateboarding			1	**0**		
Standing	194	**10**	78	**2,2**	7	**1**
Walking a child	22	**1,1**	197	**5,5**	7	**1**
Walking a dog	5	**0,3**	138	**3,8**	14	**2,1**
Walking - pass through	1015	**53**	885	**25**	422	**63,1**
Bmx acrobatics			1	**0**		
Climbing			7	**0,2**		
Pushing a pram + walking a child			2	**0,1**	1	**0,1**
Roller-skating	20	**1**	131	**3,6**	5	**0,7**
Propelling scooter			3	**0,1**		
Excercising			6	**0,2**		
Fishing			4	**0,1**		
Using a wheel-chair			4	**0,1**		
Sitting with a dog	1	**0,1**	1	**0**		
Sitting with a pram			4	**0,1**		
Sitting on a bench with a pram			8	**0,2**	4	**0,6**
	1931	100	3614	100	670	100

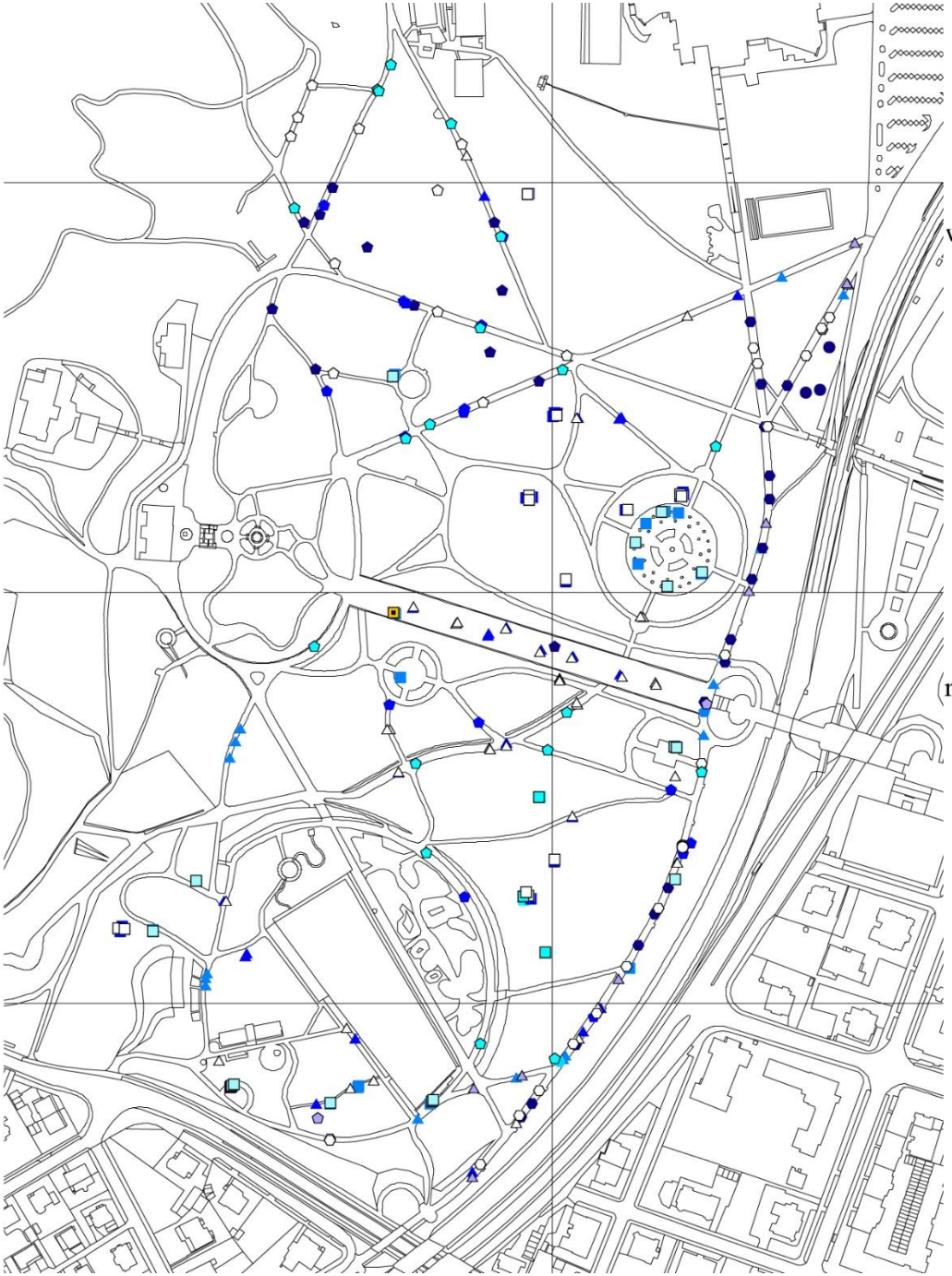


RESULTS

TIVOLI

Tivoli is characteristic for constant and diverse usage, represented mostly by passive engagements such as sitting in the grass or sitting on benches; and transitory active engagements such as walking and jogging.

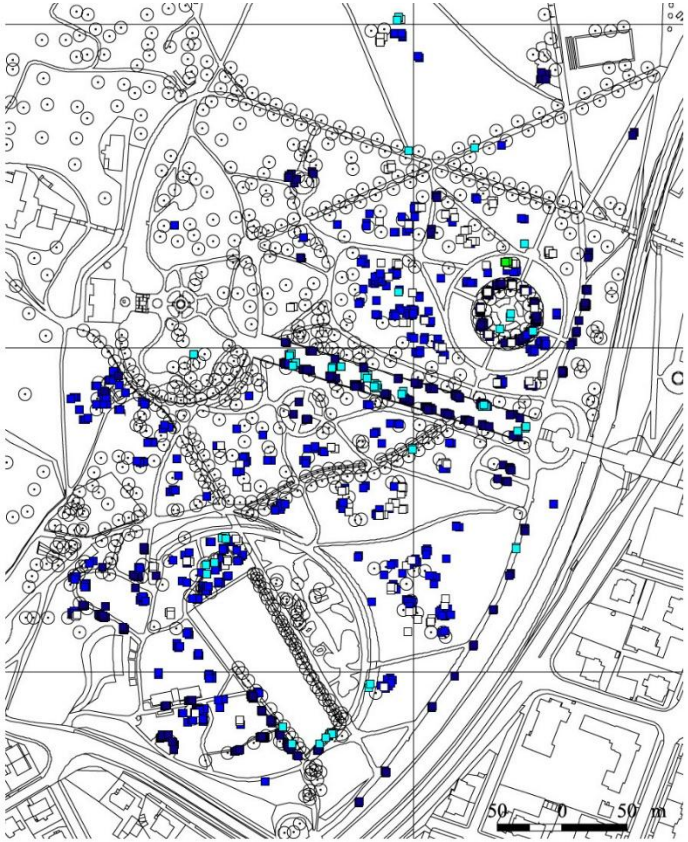
Active long-stay engagements, such as playing ball games were not observed often.



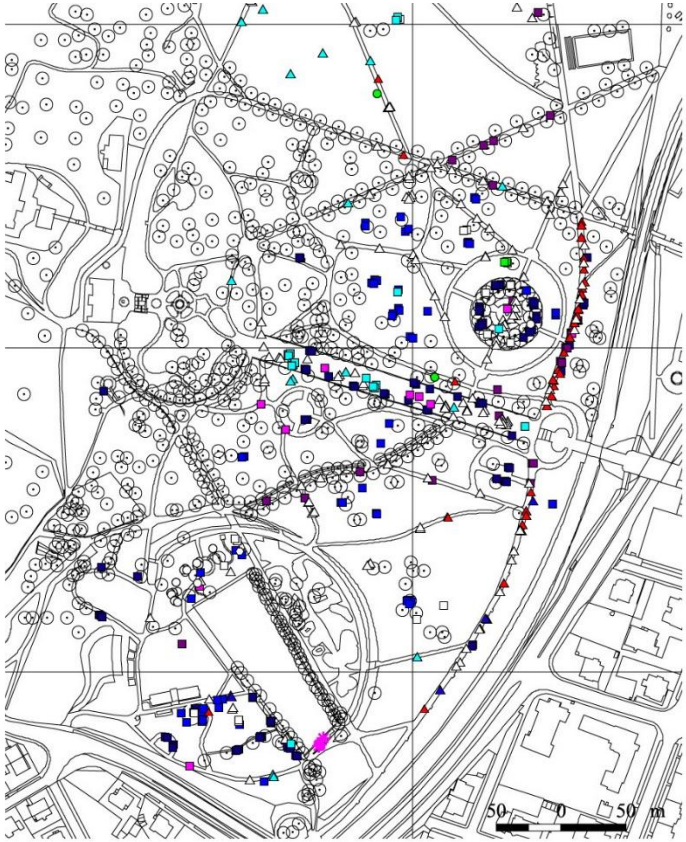
RESULTS

TIVOLI

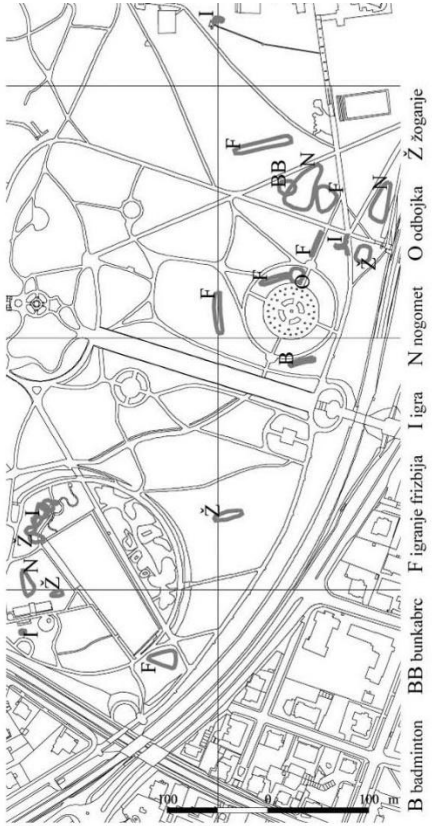
overall behaviour map for passive engagements



daily pattern



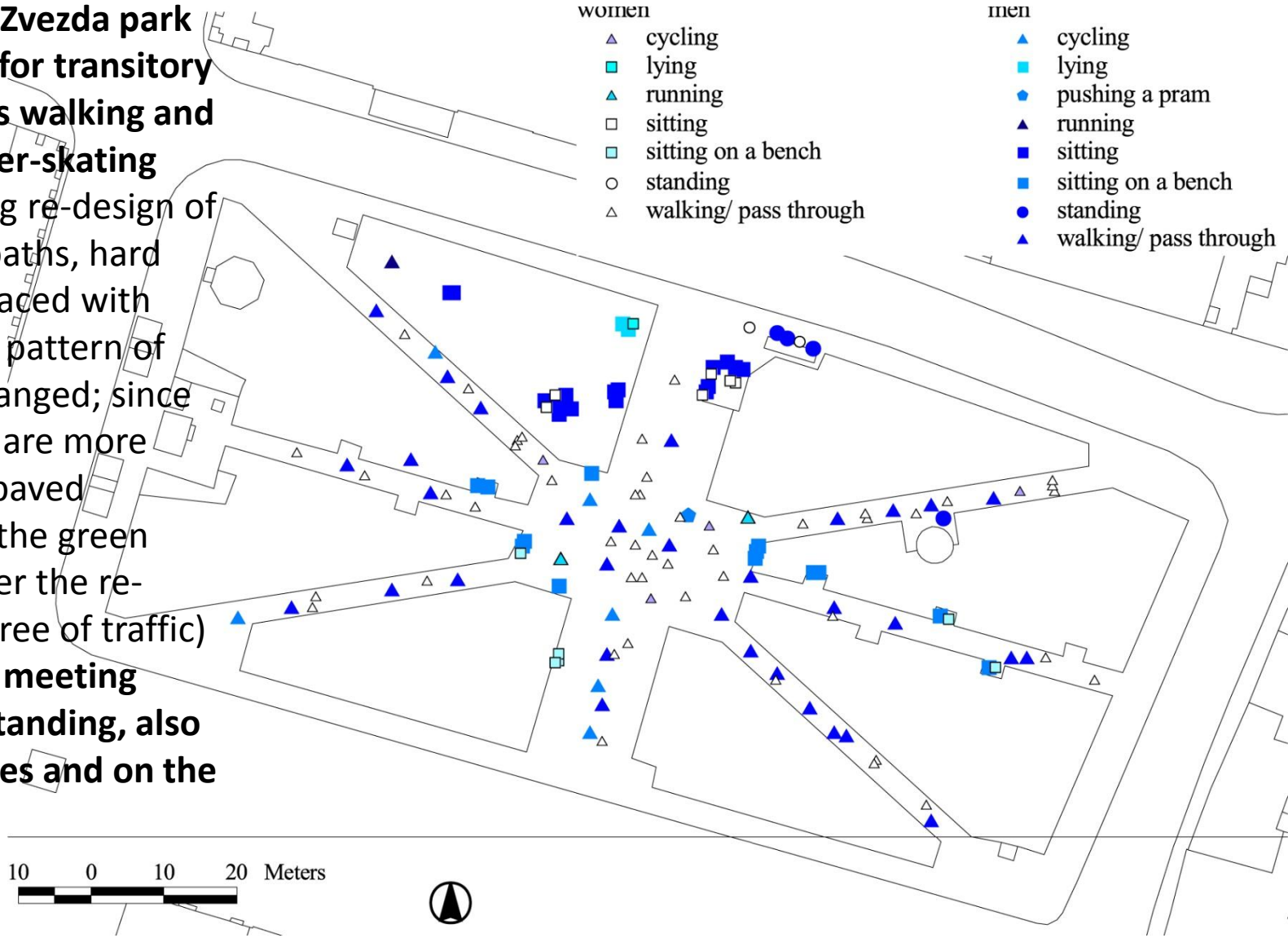
overall behaviour map for active long stay engagements



RESULTS

ZVEZDA

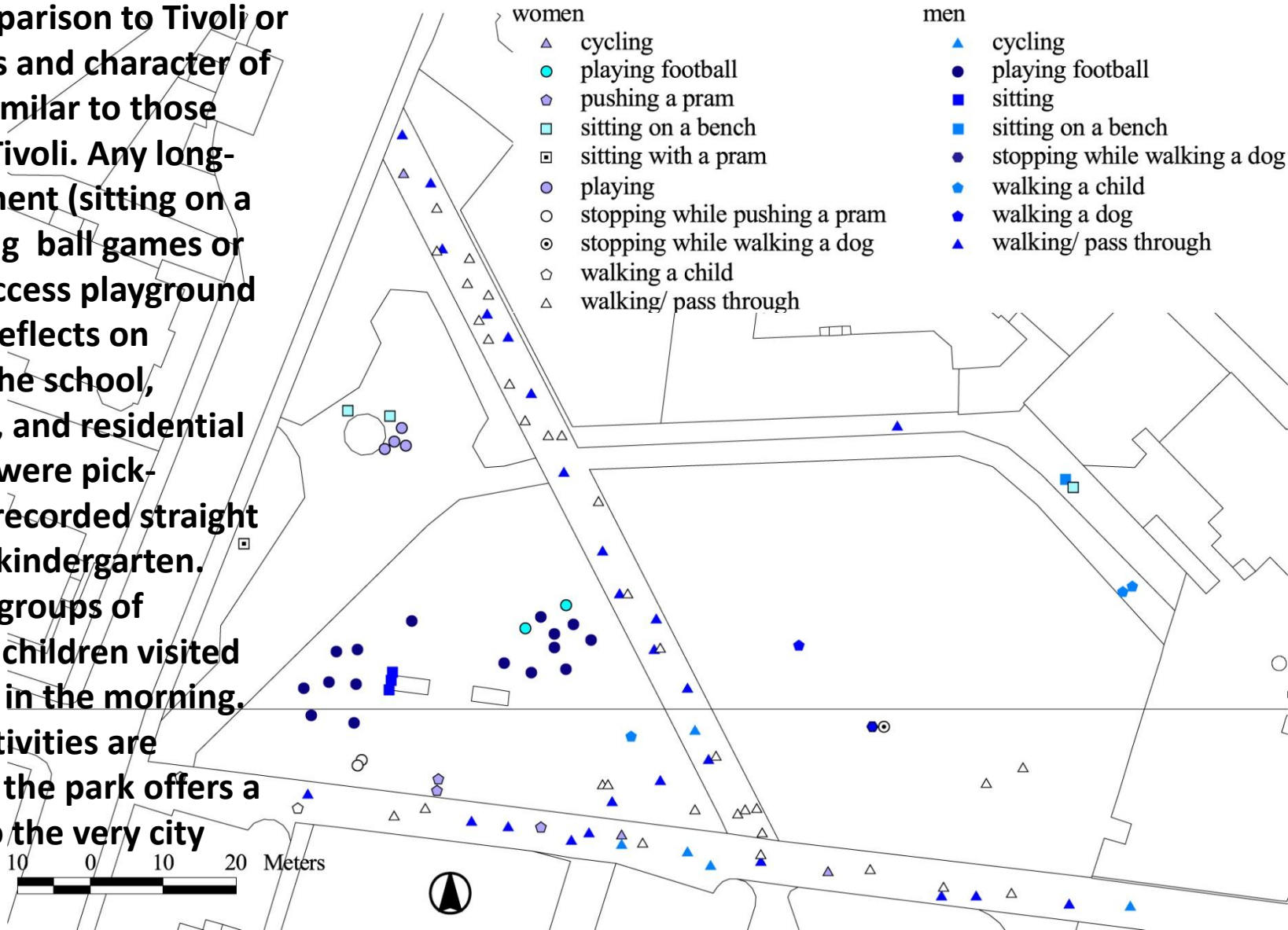
Daily routine of Zvezda park is characteristic for transitory activities such as walking and cycling, also roller-skating (after introducing re-design of paved crossing paths, hard surface was replaced with sandy cover, the pattern of roller-skating changed; since that these users are more often using the paved surfaces joining the green patch, which after the re-design became free of traffic) **and as place for meeting points, mostly standing, also sitting on benches and on the grass.**



RESULTS

ARGENTINSKI PARK

The intensity of use in Argentinski park is considerably lower in comparison to Tivoli or Zvezda. Types and character of activities is similar to those observed in Tivoli. Any long-stay engagement (sitting on a bench, playing ball games or using open access playground equipment) reflects on nearness of the school, kindergarten, and residential areas. There were pick-occupancies recorded straight after school/kindergarten. Occasionally groups of kindergarten children visited the park also in the morning. Transitory activities are significant as the park offers a short cut into the very city centre.



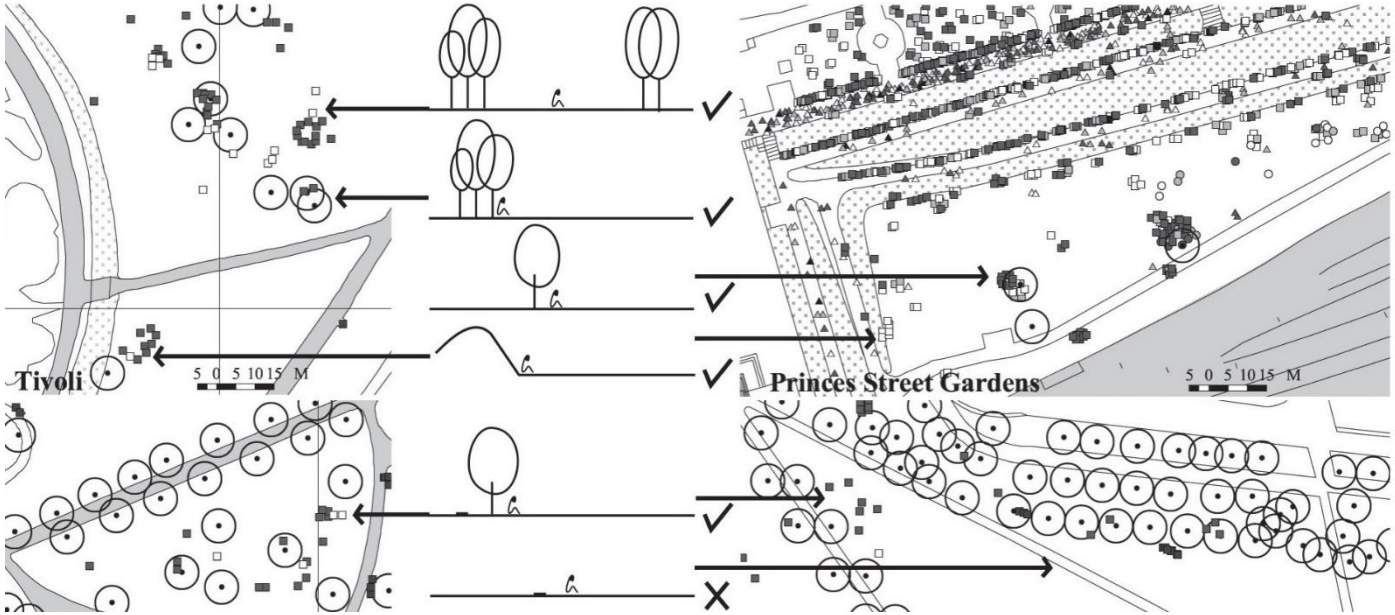
Spatial qualities of settings and their correlations to usage

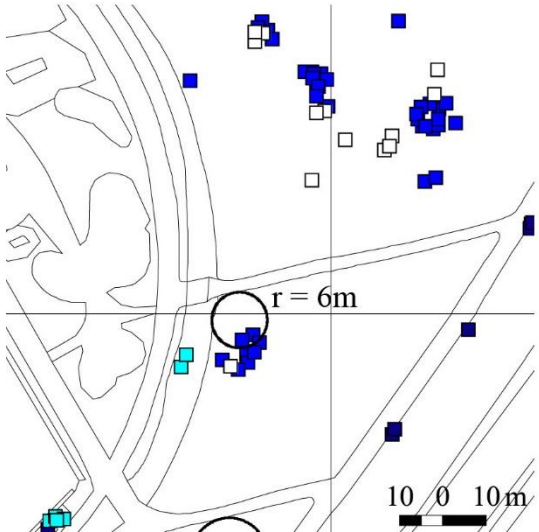
sitting

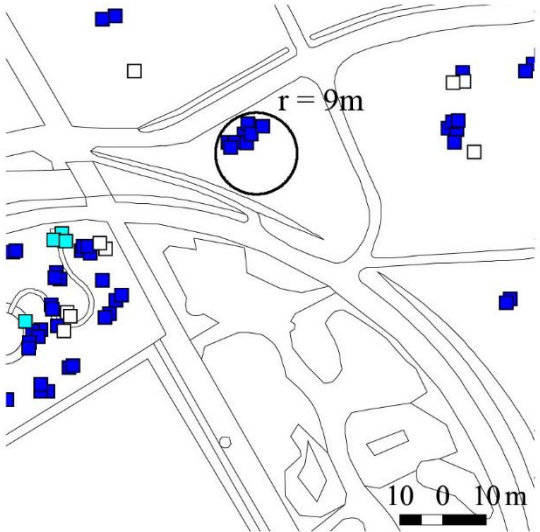
at least 5m away from transparent edges (15 in large grass areas)

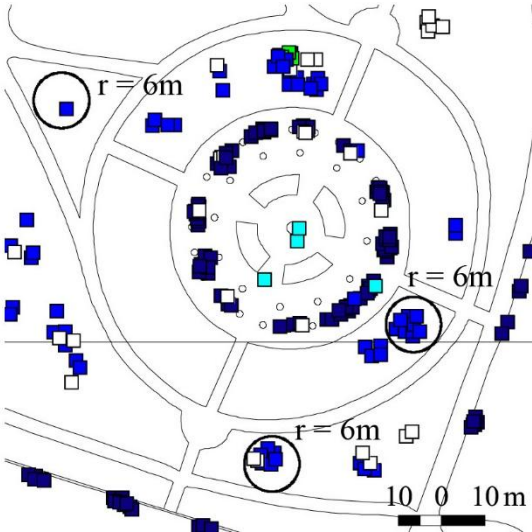
right up against a solid edge

in the areas of smaller groups of trees or solitaires









DISCUSSION

Spatial qualities of settings and their correlations to usage

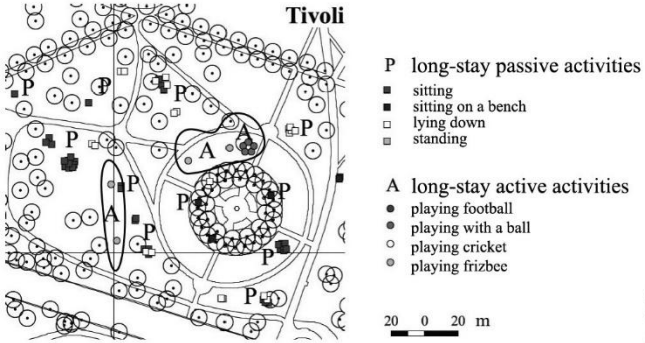
active groups

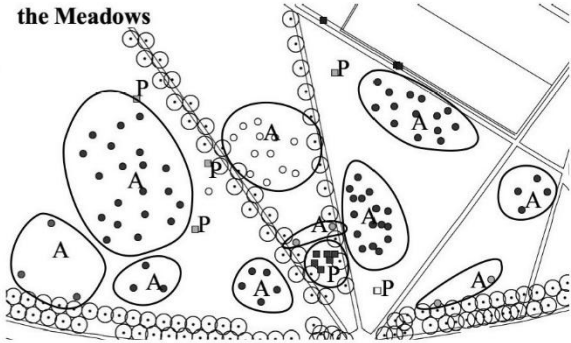
Many large groups of active participants articulate places and create room for themselves and for others

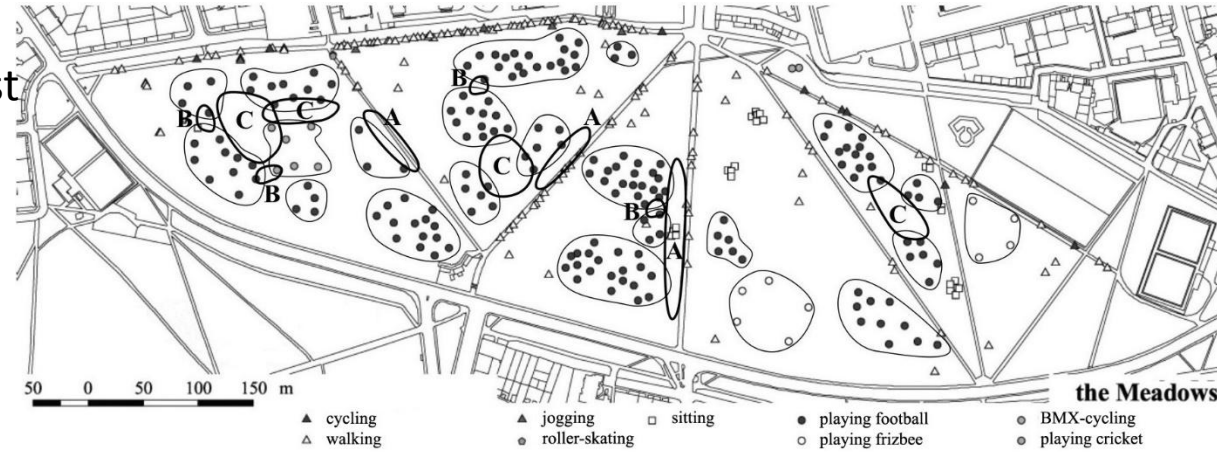
Point contact (B) between two long-stay active activities is almost always about 4 meters.

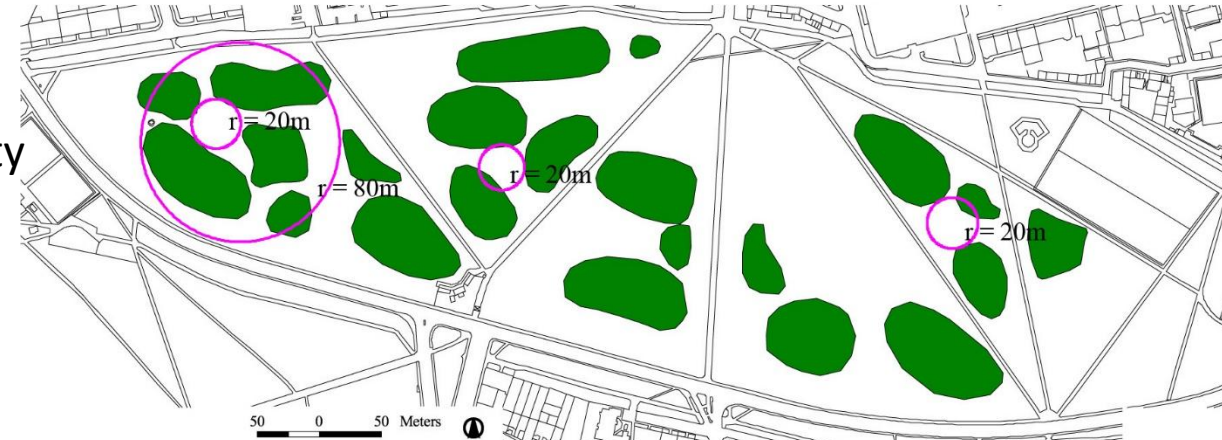
Activity buffer spaces between three or more active occupancies differ in shape, depending on the shape of the green patch (C).

However, an abstract form which can describe the minimum activity buffer space commonly needed between groups of activities is a circle of 20m radius







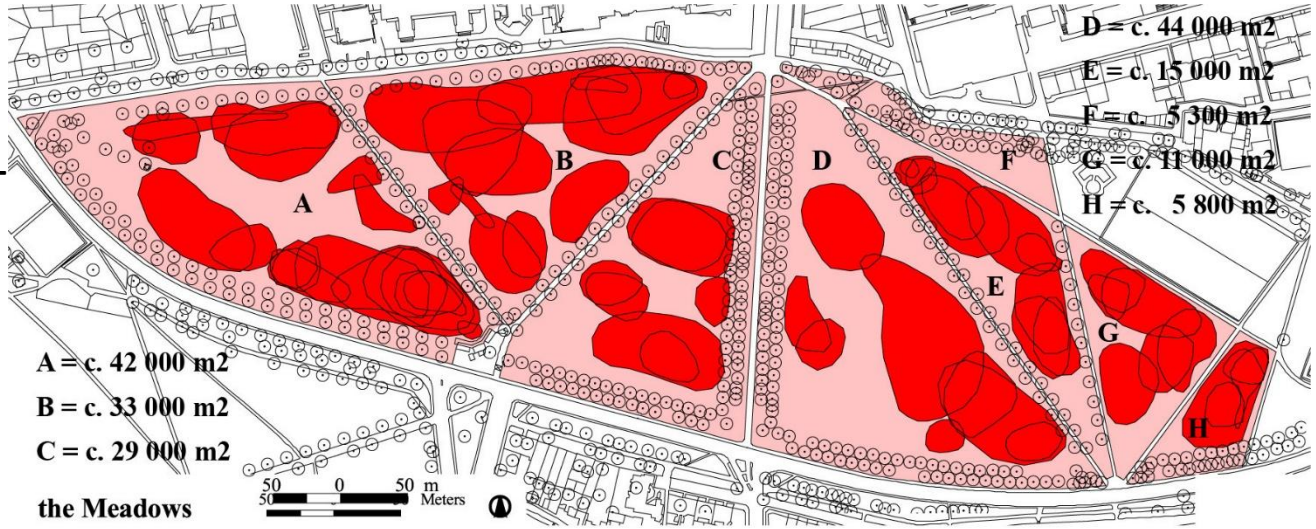


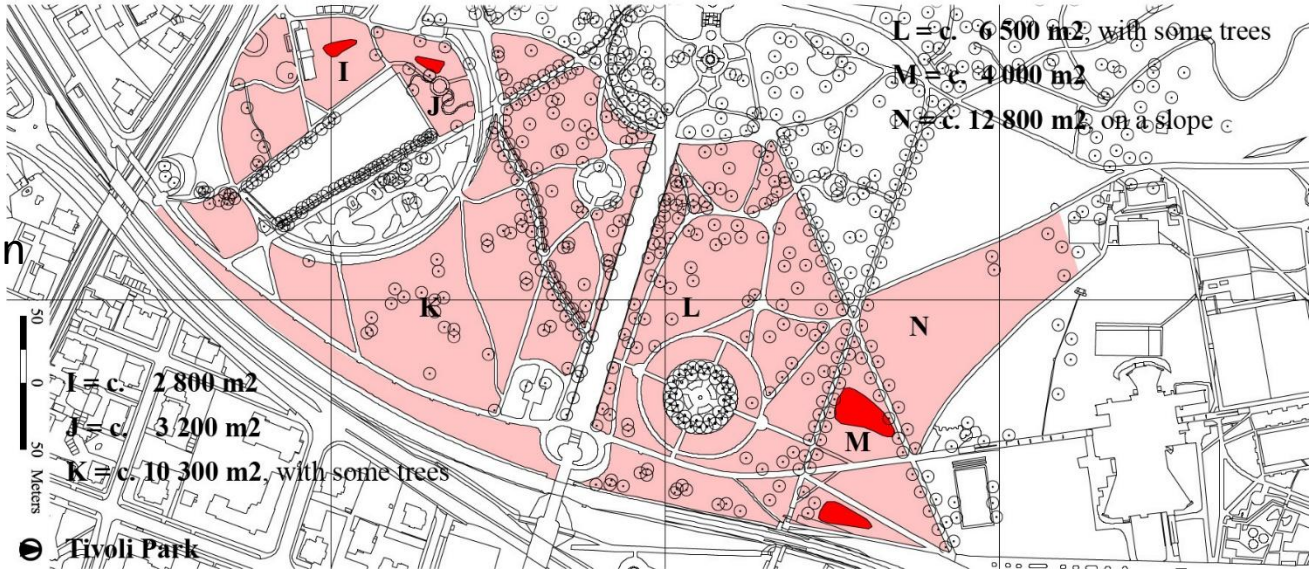
DISCUSSION **Spatial qualities of settings and their correlations to usage**

active groups

Large groups demand clear areas of at least 3000 m2 (informal football games, 15 – 20 people, need 3000 – 5000 m2 and a longitudinal shaped space, informal games other than football require 1000 – 3000 m2 spaces and, in addition, both some buffer areas around it).

Referring to these discussed empirical data, one of the reasons for low participation in playing football in Tivoli, especially the low adult participation, might be that there is simply not enough room for it to occur.





DISCUSSION

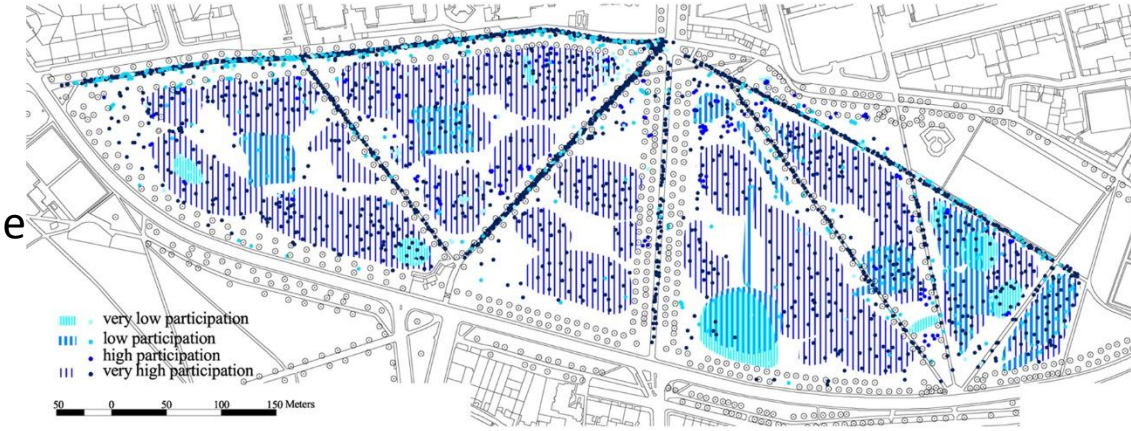
intensity of occupancy

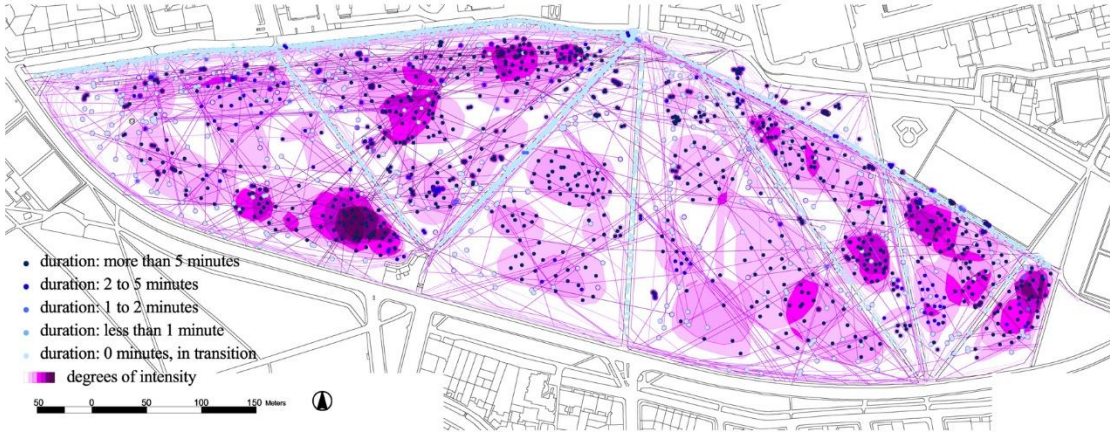
Spatial settings such as well-defined corners seem popular with all sorts of activities participated in by many people (sitting, playing football), as well as those participated in by a few, (playing with a ball, standing).

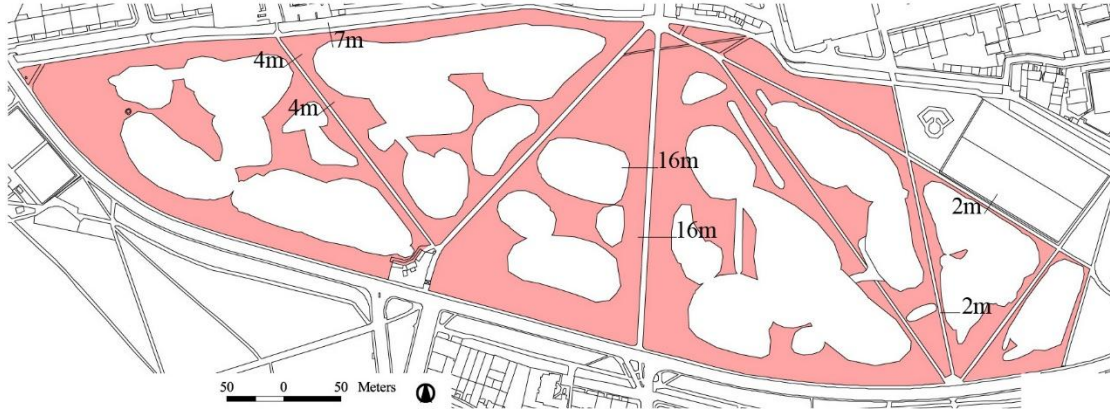
Cumulative intensity of temporal-spatial occupancy, from low to high degrees and from being in transition to prolonged stay in the park generates knowledge about levels of shared areas of uses, frequency of occupancy as well as intensity of usage by one or more different activities significant for particular setting within a place.

Minimum cumulative buffer zone of the park, an area which always remained unused: about 2m from inner edges, about 16m from outer open and about 7m from outer solid edges.

Cumulative spatial capacities of places







DISCUSSION Informing network of places for socially responsive green infrastructure

1. **Place: <u>Structure of loose-fit landscapes</u>**: Parks - negative or soft spaces, places of implicit limits (Trancik, 1986). In parks, where physical limits are well defined, environments suitable for occupancy are easily recognised and realised; where voids are larger and the physical limits are further apart, uses themselves structure the resilience of the potential environment to become effective for one or more of them. Thus, a structure is given to loose-fit spaces. Making a point about park design, Ward Thompson (2002) refers to Dovey's critical comments on La Villette, Paris, that, "the emphasis on static, visual qualities of space do not in fact make for loose and free use of space, but one where use is highly controlled and limited" (Dovey 2000 in Ward Thompson, 2002: 70).
2. **Connections of places: <u>Accessibility and proximity studies</u>:** From technical point of view there are variety of approaches calculating and evaluating accessibility. However, many methods ignore open space shape and size, which may lead into misinterpretation of proximity. At this point, references to the knowledge addressing sizes and shapes of places as functions of sizes and shapes of activities in places, are relevant to add value to evaluate green infrastructure also form qualitative dimensions of socio-spatial relations.
3. **For the future <u>socially responsive green infrastructures</u> of cities** it is important to upgrade proximity and accessibility studies with the studies informing about actual articulation of places and their supportiveness for any kind of outdoor activity. By such integral approach issues about public health and general well-being for the city population would become more comprehensively addressed and may come closer to the fact that urban and spatial planning would be able to provide specific and directed solutions for particular, territorially associated, public health issues.

CONCLUSION Lessons learnt for Central, Eastern and South-eastern Europe

1. **The paper provides socially informed concepts and measures for the green infrastructure and to show a potential which behaviour patterns and their characteristics can have on urban planning and design, not only to provide thresholds and evidence-based guidance, but also to connect public health research and urban planning and design in order to work towards quality of living in cities and towns.**

2. **If one of the goals for public health is to increase the amount of physical activity people choose to engage in, then provision of appropriate environments for physical activities is essential, and by doing so, understanding of usage-spatial and usage-usage conditions and requirements of particular activities to happen fully, is of key importance.**

3. **Referring to central, eastern and south-eastern European dimensions, cities of such capacities as Ljubljana and Edinburgh are very common there, therefore messages shown here can directly contribute to green infrastructure planning and urban design as an informative bottom-up approach.**

CONCLUSION Lessons learnt for Central, Eastern and South-eastern Europe

The value of the paper is in recognition of social dimensions of places and by this:

- **Helping designers be confident that layouts proposed for intended uses will, in practice serve those uses well and be likely to be used as predicted;**
- **Helping planning and decision-making authorities to reveal restorative environments via peoples' attachment to open spaces and their recreational habits, and to interpret people's healthier lifestyles;**
- **Helping planning and decision-making authorities to recognise variety of peoples' needs, habits and expectations in open spaces, via information addressing various user groups, age groups or gender referenced characteristics of place users.**

Thank you

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