



Participatory Mapping of Citizens' Experiences at Public Open Spaces: A Case Study at Bologna Living Lab

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1 ABSTRACT

In recent years public open spaces (POS) are considered as potential settings for urban regeneration strategies. A POS is successful when it is incorporated into the activities of the citizens, is accessible to people from different social and economic backgrounds, suitable for recreation and also supports people's security and comfort (Eyles, 2007). Thus, planning process should include citizens' experiences, opinions and needs. The aim of this paper is to gain insights on the citizens' experiences and opinions during their presence in POSs by using global positioning systems (gps), geotagging techniques and participatory approaches, while experimenting in the living lab of Bologna established within the framework of the European Union Horizon 2020 project "Regeneration and Optimisation of Cultural heritage in creative and Knowledge cities" (ROCK). For that purpose, a participatory data collection was conducted in Bologna, Italy. The participation of 42 residents was facilitated via Bologna Urban Living Lab (U-Lab). Via Zamboni, Via delle Belle Arti, Via S. Giacomo are the most visited routes in the area. In total 273 subjective experiences were registered, mainly at Via Zamboni, Piazza Verdi and Piazza Scaravilli. 75% of these experiences were associated with positive feelings while 25% were associated with negative. Respondents reported that problems/issues at POSs occurred mainly due to insufficient accessibility and neglect of POSs. U-Lab exploited the results of data collection and organised participatory meetings in order to co-create solutions to transform negatively experienced POSs into positively experienced ones. The paper concludes with the discussion of how this approach can be used as evidence-based design tool for regeneration of POSs.

Keywords: participatory mapping; experiences; public open spaces; accessibility; living lab; gps; geotagging; place-specific data

2 INTRODUCTION

Due to the population growth in urban areas, policy makers and planners are paying more attention to the attractiveness of the urban environments to contribute to the quality of life of citizens. In that sense, public open space (POS) is a vital element of the urban environments as it covers over fifty percent of our cities. POS offers space for social and/or leisure activities (Madanipour, 1999) and can be defined as freely accessible open space (i.e. urban parks, squares, plazas and pedestrianised streets), usually located in an inner city (Zamanifard, 2019). In contemporary cities, POSs usually face the risk of deterioration due to misuse, insufficient facilities and neglect that originates from design, management and regulation issues (Hajer & Reijndorp, 2001). In cities that fail to tackle the rapid growth rates and societal changes, the maintenance of POSs become a public burden (Gehl & Svarre, 2013). Due to deterioration of POSs but also their potential to improve city's attractiveness, in recent years POSs are considered as potential settings for urban regeneration strategies.

According to Carr et al. (1992), to avoid their deterioration and to ensure their regeneration, POS should be planned as responsive, democratic and meaningful. Planning process should include citizens' experiences, opinions and needs. A POS is successful when it is incorporated into the activities of the citizens, is accessible to people from different social and economic backgrounds, suitable for recreation and also supports people's security and comfort (Eyles, 2007). With such qualities, POSs can be experienced positively, and can contribute to the quality of life in urban environments.

Knowing how environments evoke subjective responses provides a basis for understanding the interaction between people and places (Roe & Aspinall, 2011). This comprehension can lead to better design and management of POS. However, existing studies usually focus on the use of POS and the condition of its

physical attributes, rather than its relation with citizens' experiences (Zamanifard, 2019). In recent years, citizens' subjective assessment of cities and their participation in planning practices has gained more importance as people are reclaiming their right (Harvey, 2008) to be included in urban planning processes. For exploring citizens' experiences in POS, it is necessary to actively involve citizens for data collection and knowledge production. Produced place-specific data can reveal perceived spatial facts about citizen experiences that can be mapped, which otherwise could remain as tacit and social knowledge (Pfeffer et al. 2013).

The aim of this paper is to gain insights on the citizens' experiences and opinions during their presence in POSs by using global positioning systems (gps), geotagging techniques and participatory approaches. For that purpose, a participatory data collection was conducted in the urban living lab of Bologna, Italy. This study was done within the framework of the European Union Horizon 2020 project "Regeneration and Optimisation of Cultural heritage in creative and Knowledge cities" (ROCK). ROCK project aims to develop an innovative, collaborative and circular systemic approach for the sustainable regeneration and adaptive reuse of historic city centres. In this project, the City of Bologna focuses on the regeneration of a highly dense historic district in the city centre which also hosts the University of Bologna. The participation of 42 residents was facilitated via ROCK Urban Living Lab (U-Lab). ROCK U-Lab exploited the results of data collection and participatory meetings in order to co-create solutions to transform negatively or less experienced POSs into positively and more experienced ones, especially focusing on the accessibility issues. With this mixed approach, we contributed to the demand of comprehending the complex relationships between spatial structure and people's experiences and opinions, and also how this approach can be used as evidence-based design tool for regeneration of POSs.

The paper is organised as follows. First a background is given to clarify the citizen experiences, quality indicators of POSs and participatory mapping practices of citizen experiences. Then the case study area and methodology is explained. After that the results are discussed. The paper concludes with a discussion on the effectiveness of the participatory mapping of citizen experiences in a living lab setting and with future ideas.

3 BACKGROUND

Experience has two dimensions: objective and subjective (Cele, 2006). Objective experience relates more to an individual's use of place (i.e. where people go and which places they visit) and this is the type of experiences that can be observed and visible to others. Subjective experience relates more to the interaction process within an individual triggered by the individual's physical and social environment (Dane et al., 2019). Subjective experience refers to mental observations of individuals such as feelings, opinions and memories, and therefore they are difficult to observe by others. This paper focuses both on objective and subjective dimension of experiences of individuals.

According to the studies of environmental psychology, experiences that individuals associate with their environments influence how they evaluate places (Gifford 2014). When people develop positive feelings, images and opinions about a place, they are more likely to revisit these places (Lynch 1960). Mehta (2013, 2014) developed an index for evaluating the social functionality of public spaces. He proposed a Public Space Index in which the variables regarding individuals' perceptions on 'accessibility'; 'maintenance of the space'; 'safety from the presence of surveillance cameras, security guards, guides, ushers, etc.'; 'safety from crime during daytime/after dark'; 'safety from traffic' and 'attractiveness and interestingness of the space'; are taken into account. Zamanifard et al. (2019) further improved this index and investigated the image of a POS by considering its maintenance (i.e. dirt and neglect) and asked respondents to evaluate the likeability of a POS regarding its image. Moreover, comfort regarding the ease of access, safety, security, and walkability of a place were also explored in the same study. According to Carmona (2014), comfort refers to the feeling of safety and at ease to conveniently move around a place in a stress-free manner. In compliance with these studies, individuals' opinions regarding the state of POS can be determined mainly by its perception on accessibility, maintenance (dirt, bad smell, neglect) and safety factors. However, these studies focus only on the subjective experiences of individuals at predetermined POS locations, ignoring objective experiences.

In planning practices, participatory mapping is used to inform the planning processes with knowledge of the public, by inviting citizens to provide their opinions and experiences about urban areas. Citizens are usually intimately familiar with patterns and anomalies in their communities. Participatory mapping is a bottom-up

approach that gathers such local knowledge from citizens (Warner, 2015). Data that is mapped with such an approach can be both tangible (i.e. location of bus stops, roads) and intangible (i.e. perceptions of safety, accessibility). Intangible data are part of local knowledge that requires close interaction between people and place, therefore their subjective experiences. In recent years, with the advancement of geospatial technologies and citizenry mapping possibilities, the new (digital) ways of participatory data collection and integration of spatial knowledge into urban planning is being investigated. In that context, Martino et al. (2010) states that due to new technologies and platforms such as gps, wifi and social media, citizens can contribute actively or passively to spatial (place-specific) data collection and knowledge production. These technologies enable citizens' participation to be particularly on-site and empower them to respond to urban problems. When people actively join the data collection with use of new technologies, it is possible to capture and map their subjective feelings and experiences that are attached to places. In this regard, participatory mapping can be empowered with digital geospatial technologies within a given context and area, and therefore can support place-specific knowledge production. If such knowledge can be effectively gathered, it can also have a positive impact on research and planning regarding urban problems.

Active data collection with citizens entail participatory processes which enable to integrate the citizen experiences into urban planning process. In the literature, participatory approaches for generating place-specific data is usually employed with the use of methodologies such as surveys, sketch maps, interviews and walking interviews (Evans and Jones 2011). Surveys, sketch maps and interviews require participants to explain their "lived" experiences as they are not conducted on-site. However, participants might forget some of the previous experiences or the experiences might not be directly associated with the physical environment. According to Evans and Jones (2011) walking interviews is a place-responsive methodology that can generate both quantitative data on objective experiences (i.e routes taken by visitors) and qualitative data on subjective experiences (i.e. conversational exchanges). Walking interviews tend to be more spatially focused, engaging more with physical environment rather than with the autobiographical narrative of interviewees. However, interviews are risky as people might feel the urge to give suitable answer for the study or steered by the questions of interviewers. In that sense, new technologies (i.e. gps, wifi and social media) enable more efficient and less interfered place-specific data production.

4 METHODOLOGY

4.1 Case Area: Bologna Urban Living Lab (U-Lab)

Bologna is one of the ROCK project replicator cities which develops new models of urban regeneration in the light of successful implementation strategies of role model cities. In ROCK project, the aim is to transform the demonstration sites of replicator cities into a creative and sustainable districts with the planned interventions (i.e greening and changing use of public spaces).The City of Bologna focuses on the regeneration of a highly dense historic district in the city centre of Bologna which also hosts the University of Bologna. The demonstration site of Bologna, named U-Zone, is inside the Medieval city walls and it is composed around a major street, via Zamboni, where a multiplicity of institutional buildings, cultural facilities, heritage, gardens and other streets are linked. The transformation of U-Zone is aimed to be done together with citizens and not just for them. Thus, the collaboration between residents and the city is fundamental in actions. Figure 1 represents the U-Zone and its significant POSs.

The U-Zone has characteristics of a mixed and dynamic neighbourhood. The majority of the population of the area consists of students. There is a high presence of institutions, service facilities and linked jobs. Moreover, rich intangible and tangible cultural heritage is widespread in the area. It is a piece of a city that is constantly updated as a consequence of the actions carried out by those who live and pass through it, who are not specialists in the project but are nevertheless its actors and agents. Students, residents, shopkeepers, city users, creative and cultural forces interact in this part of the historic centre and contribute to the creation of value for POSs. Due to these characteristics, the university area, is crossed by processes of degradation and conflict between user groups that mostly involve the student community, causing phenomena that turn a positive and vital presence into a problem. The presence of the student community that inhabits public spaces over time has produced a single prevalent typology of commercial businesses - food, craft and otherwise - whose target are mostly students. This is summed up with the presence of widespread elements of physical and cultural inaccessibility, including architectural barriers at the entrances to historic buildings, failure to indicate routes of cultural interest and communication, poor lighting and consequent perception of insecurity

in some specific areas. Moreover, although it is among the areas most guarded and manned by the police, it remains a central place for many inhabitants who are represented as "excluded" (Scandurra et al. 2009) from the daily dynamics of the city.

U-lab is the tool (Living Lab) provided by the ROCK project and its partners to build knowledge from the experimentation area, to co-design priorities and requirements for its development and to plan detailed activities to be aggregated into the city schemes. It is framed as a transversal activity to the project, linking the localised experimentations in different spaces, public, private and collective, held together by the dimension of 'platform'. U-Lab of Bologna has been established and opened with the purpose of fostering the involvement of citizens, local communities, institutions and businesses to identify and solve urban problems. The path of U-lab within the ROCK project, is an attempt of methodological orientation to the co-design of a cultural district. U-lab starts from the themes of protection and enhancement of contingent forces, but aims to support the innovative drives (already present and not enhanced) that must necessarily intertwine with the users of these pieces of the city. For these purposes, U-Lab emphasises the integration of both expert and local community knowledge in order to make urban planning solutions more effective and socially acceptable. Living Labs' main role is to co-create urban transformation solutions in a sustainable perspective, (i.e. facing urban regeneration of under/misused spaces), to develop new ideas and new start-ups and services, and to increase the sense of belonging of citizens. The Living Lab, promoted by ROCK and installed in the demonstration site, is virtual and physical space for operational meetings that allow to share initiatives and decisions with the local participants to regenerate the demonstration area. The living lab has eventually constituted a first step in the definition of a process of mutual institutional learning (among the municipality, the University and the local stakeholders), during which it was possible to define objectives and priority strategic lines of planning action, political orientation and incremental and adaptive actions on POSs. For this study, U-Lab enabled the participation of residents to the experiment by announcing the experiment and also calling out for participants. The experiment aimed to connect the traditional cultural functions of the University area, with spaces for interaction, collaboration and co-design of new products and services. The intention of the Living Lab was not to provide an exhaustive solution of a complex topic, but to outline some discussion points and carry out some experiments involving the practices and cultural operators of the area in the construction of a medium-long term vision oriented to guide the implementation and transformative choices for the historical centre.



Fig. 1: Bologna U-Zone and significant POSs.

U-lab act in a laboratory logic, managing different ingredients and intercepting multiple resources, building networks and defining collaborations, broad partnerships, co-design methods to achieve a series of main objectives:

- to define a set of shared priorities for the university area, opening opportunities for meeting and exchange and helping to build the agency of the actors who use, live and work in the experimentation area;
- to build an ecosystem of stakeholders with whom to collectively promote a series of activities to promote the area. In this sense, all actions are aimed at facilitating development and consolidating relations at various levels;
- to envisage different development scenarios on which to orient planning tools and propose alternatives, helping to build new meanings for the public sphere, as an intermediate 'space' in which to experiment with solutions to global issues with a strong local impact;
- to experiment non-conventional uses of public spaces.

U-lab activities were carried out in two stages during 2018 and early 2019. This paper analyses the results of the second stage of activities, concerned with the experimentation and prototyping of the proposals that emerged from the previous participatory meetings.

The second phase of U-lab, carried out starting from February 2019, started from the knowledge base produced on the university area, with the aim of deepening some thematic axes that emerged from the meetings, through the prototyping of a service to be tested and then implemented as part of the offer for the area. The chosen theme concerned accessibility for all, understood as a holistic approach that takes into account the theme of accessibility from its various dimensions: physical, semantic, cultural, social and economic. Accessibility therefore becomes an approach to the design of the city, an opportunity to broaden its use by different categories and users. Accessibility became the umbrella topic from which to start analysing the area through urban explorations and participated data collection.

4.2 Data Collection Procedure & Sample

Data collection in Bologna was performed by employing the GPS logging devices and a geo-survey. GPS devices allowed tracking the participants in order to capture their objective experiences such as which routes they have taken and how much time they have spent at certain locations. Geo-survey enabled participants to geotag their subjective experiences and answer location related questions and add comments. Moreover, geosurvey enabled collecting background information on participants such as age and gender. Combination of both tools provided high-resolution data on the location of both objective and subjective experiences. The data was collected on 12 April 2019 from 42 people in order to investigate the experiences of people in the U-Zone. The participants are divided into three groups and each group visited the site at different hours (10:00, 12:30 and 15:00). For each group, the visit took between one to three hours.

The GPS loggers were distributed at Piazza Antonino Scaravilli, located in the core of the U-Zone. For the geo-survey, the link was shared with participants via quick response (QR) code. Participants were asked to walk within the U-Zone and record their experiences. Once a respondent had a feeling about a place, they were required to respond to the geo-survey. Geo-survey included questions regarding the experience that a location (POS) triggered which they would like to report about. Then participants could geotag the experience location on the map and indicate how they felt about the POS in general (interesting, fun, joy, inspired, relaxing, surprising, confusing, disgusting, irritating, boring, fear, other), and whether there is a problem regarding the accessibility, maintenance (dirt, bad smell and neglect) and safety of POS. In that sense, feeling triggering locations are considered as point of interests (POIs) and participants are asked to report any problems regarding these POIs. Participants were allowed to choose their own route within the given area. According to Kusenbach (2003), this enhances the understanding of participants' authentic interpretations. Because, predetermining the routes can lessen the informality of the experience.

The total number of participants in Bologna was 42. During data collection 42 people used the GPS loggers which enabled gathering their objective experiences. However, only the data of 36 respondents were available via geo-survey which enabled gathering their subjective experiences and background information. According to the geo-survey, 47% of the respondents were female while 53% were male. 56% of the

participants were between 18 and 30 years old, 17% of them were between 31 and 50 years old and 37% of them were 50 years and older. Regarding their occupation, 44% of participants were students, 33% were employed and 23% were retired.

5 RESULTS

In order to process the gps and geotagging data, a geoprocessing tool was developed by Eindhoven University of Technology. The development of this tool is accomplished within the ModelBuilder environment in ArcGIS software. ModelBuilder is a graphical environment with a user-friendly interface and helps to create, edit, and manage models. A benefit of ModelBuilder is the ability to improve the sub-models by developing python scripting. For this project, the designed GIS tool contains 14 sub-models, which were developed to a) read the GPS data and visualise them on a map; b) extract the data for a given area, and calculate the entrance and exit time; c) investigate the spatial behaviour of visitors in a given area; d) identify the Area of Interests (AOIs) which define the places that people spend certain amount of time and calculate the exact amount of time spent in different AOIs; e) count the number of experiences at AOIs; f) demonstrate the location of experiences specified by visitors (POIs); and g) visualise the most taken roads with the number of visits. The details of the models can be found in Derakhshan (2019).

5.1 Objective Experiences

42 people used the GPS loggers. On average, their visits lasted 76 minutes. The duration (dwell time) of participants' visits at AOIs are shown on Figure 2. On average 11.2 minutes were spent at Piazza Scaravilli, where the experiment started. This was followed by Giardino del Guasto, Piazza Verdi and Piazzetta Molinari pradelli. On these POSs, participants spent on average 6 minutes. In addition to this, the most visited POS was Piazza Scaravilli as all participants started the experiment at that location. This is followed by Piazza Verdi, Piazzetta Raviola, Piazza Rossini, Giardino del Guasto, Piazzetta Molinari Pradelli and Piazza di Porta Ravegnana. The amount of participants that visited these locations can be seen on Figure 3. Finally, the routes that participants took during the data collection can be seen on Figure 4. The thicker lines represent the higher frequency of visitation. According to Figure 4, Via Zamboni, Via delle Belle Arti, Via S. Giacomo, Via Marsala, Largo Respighi and Via del Guasto were the routes that have been taken the most by the participants.

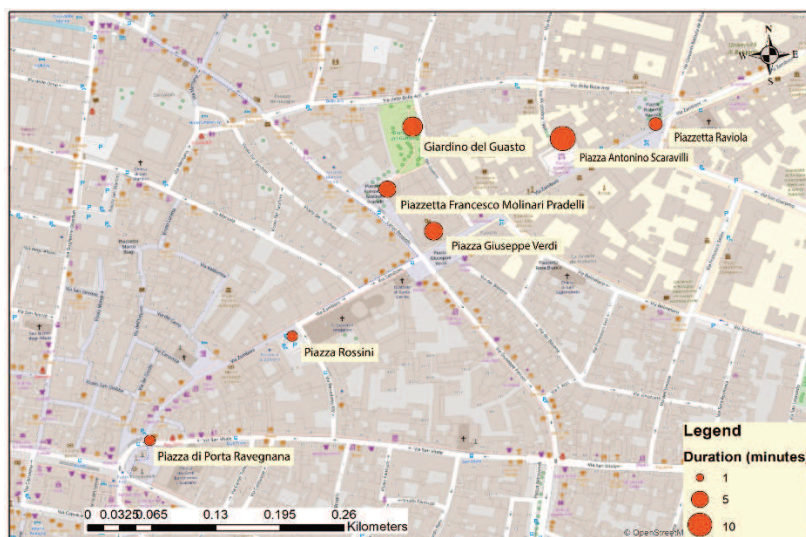


Fig. 2: Duration of participants' visits at area of interests (AOI).

5.2 Subjective Experiences

In total 273 subjective experiences were registered. Looking at the feelings of participants at POIs, 80% of subjective experiences were positive (interesting, fun, joy, inspired, relaxing, surprising) while 20% of them were negative (confusing, disgusting, irritating, boring, fear). Most feelings were registered at Via Zamboni, Piazza Verdi and Piazza Scaravilli. These places can be considered as the most feeling triggering places for participants. Figure 5 shows the location and the number of all experiences at POIs. Figure 6 represents the distribution and ratio of positive/negative experiences at each POI.

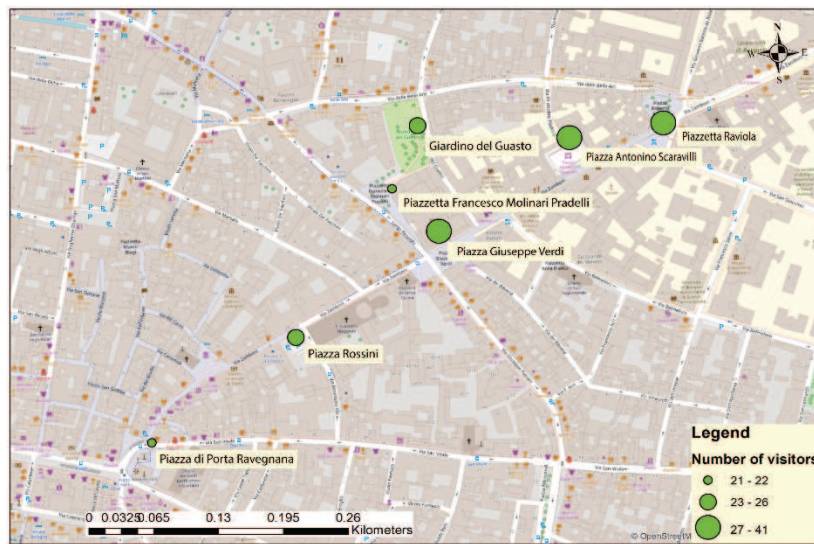


Fig. 3: Number of participants at AOIs.



Fig. 4: The taken routes by participants.

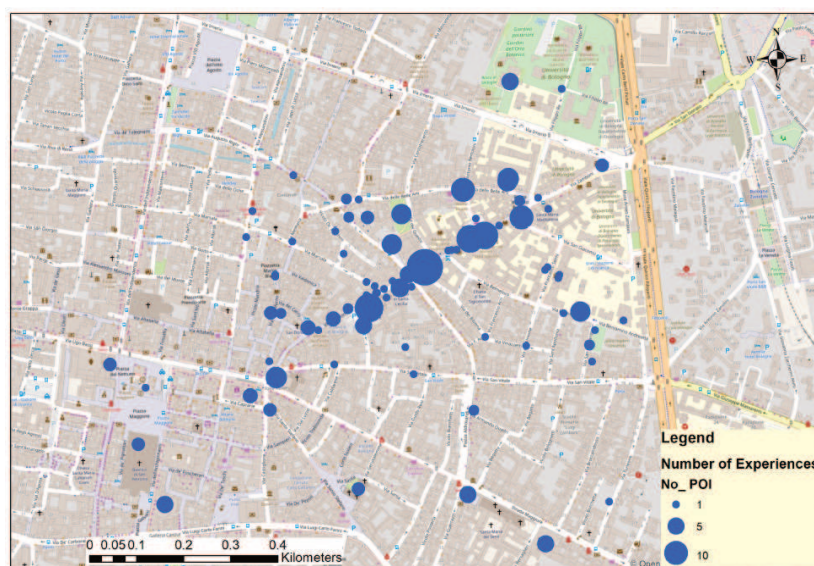


Fig. 5: Number of subjective experiences of participants at POIs.

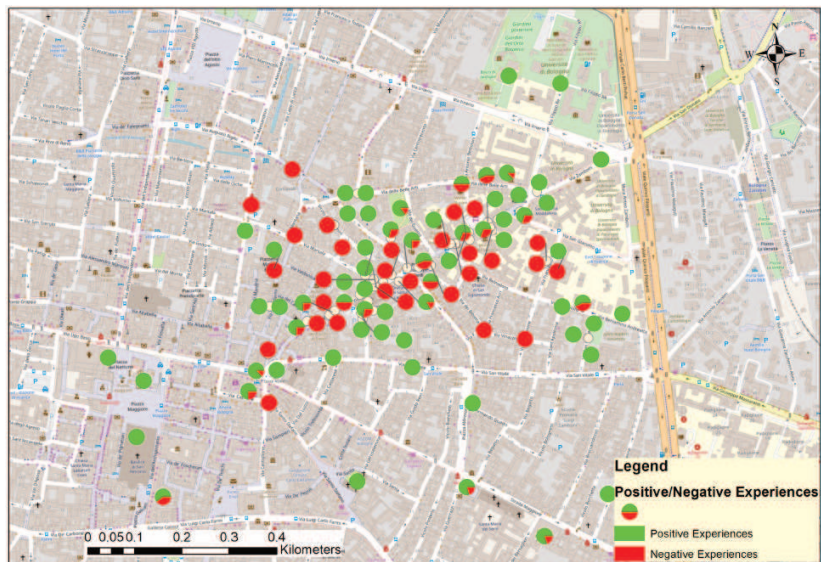


Fig. 6: Distribution of participants' positive/negative experiences at POIs.

At these feeling triggering locations, people were also asked to report the issues relating to accessibility, dirt, smell, neglect and safety. Each participant could report more than one issue at the location. In total 106 accessibility, 53 dirt, 21 smell, 75 neglect and 28 safety problems were registered. These problems were mostly registered at Piazza Verdi and Piazza Scaravilli. One interesting finding is that although participants had positive feelings at a certain location, they still reported problems/issues, as shown on Table 1.

Feelings		Issues				
		Accessibility	Dirt	Smell	Neglect	Safety
Positive	201	62	36	12	51	11
Negative	72	44	17	9	24	17
Total	273	106	53	21	75	28

Table 1: The comparison of the number problems/issues at POSs to the triggered feelings (pos & neg).

5.3 Discussions of Results at U-Lab

As mentioned above, the outcomes of the first phase of U-Lab were taken as an input for a two-fold strategy. After a series of participatory meetings on thematic tracks a public call for project was launched to finance a series of activities following the guidelines elaborated during the local participatory meetings. Among the forty-seven proposals received, sixteen projects were financed. Projects included theatre laboratories, events, public discussions, presentations and collaborative mapping activities, which constituted not only applications of the guidelines developed in the first phase, but also their verification, as well as new occasions to gather onsite data and insights. The experimentation narrated in this paper concerned an activity realised to support the follow-up phase of U-lab, specifically concerning the topic of accessibility. In March 2019, a new call for ideas was launched, with the aim of designing and prototyping a service to be tested and then implemented for the accessibility of the area. The gps mapping of April 2019, was the occasion of strengthening some preliminary assumptions and providing evidence on criticalities and opportunities related to the accessibility of POSs. In particular data related to accessibility and level of attractiveness of different POSs were the basis for defining a service concerning a series of suggested visits that are accessible to people with different disabilities and that connect different historic, cultural and scientific points of interest. The proptotype making of this service involved approximately 50 local actors that took part in two discussions and co-design U-lab meetings with a group of 7 accessibility experts selected through a public call. Prototypes of touristic guided tours and of a multi-accessible printed guide of the area were defined within U-Lab and are currently being tested by the local tourist office.

6 DISCUSSION & CONCLUSIONS

In recent years POS are considered as potential settings for urban regeneration strategies. In order to create successful POS, it is necessary to incorporate them into the activities of the citizens, make them accessible,

secure and comfortable. In that sense, citizens are the key component for designing and regenerating the POSs. Thus, planning process should include citizens' experiences, opinions and needs. Therefore, the aim of this paper was to gain insights on the citizens' experiences and opinions during their presence in POSs by using global positioning systems (gps), geotagging techniques and participatory approaches, while experimenting the living lab setting in Bologna.

42 residents participated to the data collection and their involvement was facilitated via ROCK Urban Living Lab (U-Lab). According to the data, it was seen that participants usually took the main axes of the area with prominent squares, and spent more time at the POS along these axes where lively facilities (i.e. cafes, restaurants, museums) exist. It is possible that the less visited areas are not part of a traditional route typically crossed by the participants, or the less visited areas might present some barriers and physical obstacles that they are already aware of. In total 273 experiences were registered, mainly at Via Zamboni, Piazza Verdi and Piazza Scaravilli which are prominent POSs of U-Zone. Regarding the feelings of participants at these locations, 75% of these were positive while 25% were negative. This indicates that most of the POSs in U-Zone that we visited triggered pleasant feelings. The reason might also be that people visited the POSs that are attractive to them. However, although these places were found to be pleasant, participants still reported issues mainly related to accessibility and neglect. The gps and geotagging method enables understanding the prominent locations and problems attached to them. However, more in-depth understanding is required in order to find solutions. Therefore, participatory meetings at the living lab setting were organised in order to discuss the issues represented on maps.

U-Lab exploited the results of data collection and participatory meetings in order to discuss the results and to find solutions for transforming negatively experienced POSs into positively experienced ones, especially considering the accessibility issue. The results of this mapping activity formed the basis for the definition of the pilot actions, such as small-scale experimentations, prototypes of services, events, temporary urban transformations. During their implementation, new needs and desires, as well as the presence of unforeseen barriers, emerged. Therefore, the process implied a constant need for reflection upon the results already achieved. The effectiveness of the pilot actions were then monitored through the evaluation framework which had been previously agreed upon. In turn, the outcome of the evaluation phase became a new input for the management principles of the local cultural assets and the development of future action plans.

With these first experiences, ROCK wants to start a permanent open laboratory able to define in time and in an interactive and collaborative way, appropriate spaces for listening, narration, representation and production of new urbanity for the university area and consequently for the historical centre.

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