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New scenarios for safe mobility in urban areas

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Public spaces critical issues analysis for soft mobility

A methodology for the cognitive framework definition

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Abstract
Over time, one of the causes that led to the progressive reduction in the public space quality is the massive diffusion of private cars. The characteristics of quality, safety, and accessibility should be indispensable for the public space, and these needs should be met through targeted interventions, with particular attention to the integration between urban planning and mobility. Therefore, in this article, we study the public spaces criticalities to promote soft mobility. A methodology is proposed for the definition of the public spaces' cognitive framework. The methodology is based on three different phases: the urban context analysis, the analysis of the perception of space by the user, and some preparatory solutions for the subsequent design phase. Technical analyzes are based on on-site observations, measurements, data processing, and thematic maps. On the contrary, the perception phase is based on the direct involvement of citizens through a survey. The methodology is applied to the case study of the San Bartolomeo and Casazza districts of the city of Brescia. The results show a strong connection between the urban spaces geometric characteristics and their perception by users, useful for the design of a public space weighted to the needs encountered.

Keywords
Urban planning; Soft mobility; Public spaces; Citizen involvement.

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1. Introduction

At the end of the nineteenth century, the large-scale diffusion of the private car in cities and smaller towns led to a gradual decline in the quality of public spaces due to the intrusion of motor vehicles. In addition, the increase in vehicular traffic puts a strain on the road network, resulting in a reduction in the space available for pedestrians and cyclists (Muhlrad, 2000). Starting from the first half of the twentieth century, the conflict between vehicles and pedestrians began to receive attention. Initially, these solutions were based on the model of separation between vehicular and pedestrian traffic. Subsequently, the solution moved to models based on the concept of integration between different road users (Tiboni, 2004). The increase in pollution and space congestion problems has led to new urban policies that facilitate the transition from the use of private cars to a sustainable transport system. The orientation towards alternative modes of transport (for example, on foot, by bicycle, collective public transport, or electric micro-vehicles) introduces the theme of the redesign of public space. Therefore, sustainable mobility plays a central role in the regeneration of public spaces. A necessary condition for the development of a sustainable mobility system is that the urban environment is safe and accessible (Colarossi et al., 2007). Furthermore, these characteristics are the fundamental prerequisites for encouraging users to adopt sustainable mobility systems.

The requirement of public spaces accessibility raises a new technological design request: it is a question of reinterpreting urban space as an integrated spatial system, which adapts to the people's changing abilities (Angelucci & Di Sivio, 2018; Rossetti S., 2020). On the other hand, the safety requirement is expressed in guaranteeing the safety of the user and limitation of damage to the artificial environment. The pleasantness of a place derives partly from the sense of security concerning the risks to crime and vehicular traffic (Ghel, 1991). There is a correlation between accessibility and safety: actions aimed at increasing accessibility increase the context safety for everyone, and not just for specific categories of users (Tira, 1995). Therefore, transport planning and soft mobility networks should go hand in hand with more coherent urban planning (Bertolini, 2017; Tiboni & Rossetti, 2013). Therefore, the non-built public space has a specific role, not only because it connects the different functions that exist on the territory, but also because it is itself a social place and should be suitable for everyone, especially the weakest (i.e., children, the elderly, the disabled) (Mahapatra et al., 2021).

The redevelopment interventions should aim to connect the places that play a central role by discouraging vehicular traffic with traffic calming interventions and promoting soft mobility. The most significant example of these technologies' implementation is the Dutch woonerf, officially approved in 1976: the effect is to make public spaces more livable and shared, just as if the street became an extension of the private spaces that residents can use (Tiboni, 2010). The application of the concept of traffic calming involves a reduction in the average vehicle speed in built-up areas, the protection of pedestrian movement, and the promotion of the use of bicycles.

Introducing these new solutions is not just a technical issue but a broader process involving the entire community. Citizens can play an important role in identifying problems and helping to find possible solutions (Carra et al., 2018). Sustainable Transport Urban Planning (SUMP), encouraged by the European Union, provides for the direct and continuous participation of all stakeholders from the very beginning of the planning process (Wefering et al., 2014). Therefore, for the first time, public participation was included as an integral part of the planning process, with appropriate procedures and methods. Among the various tools available, focus groups, seminars, public meetings, or interviews can be mentioned (Ignaccolo et al., 2019). However, regardless of the method used, it is important that the public participates in the decision-making process and understand the issues under discussion and the potential impact of the proposed solutions (Giuffrida et al., 2019; Allegretti, 2011). The public involved is limited to those who are interested in the issues dealt with, usually groups of stakeholders or a small sample of citizens (Le Pira et al., 2017).

The awareness of the need to create quality urban environments, achieving better social, environmental, and economic sustainability conditions, has prompted some cities to promote the regeneration of public spaces. Therefore, this paper contributes to the existing literature by proposing a methodology for constructing a cognitive framework of public spaces, by studying the characteristics of the urban environment, the mobility network, and the perception of people living nearby. This method considers technical observations (i.e., road characteristics, user behavior) and spaces perceptive observation, allowing citizens to participate in the decision-making phase. Furthermore, the focus is on improving the quality of life in cities for the most disadvantaged (Gonzalez-Urango et al., 2020; Cecchini et al., 2018).
Furthermore, it is a further expansion of the urban environment research approach of Tira et al. (2018) and Rossetti et al. (2014) because it introduces and analyzes the theme of the perception of space by the user.
The rest of the document is organized as follows: Section 2 presents the methodology divided for analyses, Section 3 presents the results of these analyzes, while Section 4 discusses the limitations of the work and highlights some possible future research.

2. Methodology

Following these reflections, a methodology for the construction of the cognitive framework is defined. The methodology is divided into three phases (Fig.1):

- analysis of the urban context through on-site observations and technical analyzes;
- analysis of the perception of space by users through the administration of questionnaires;
- a combination of the information collected to obtain some preparatory solutions for the subsequent design phase.

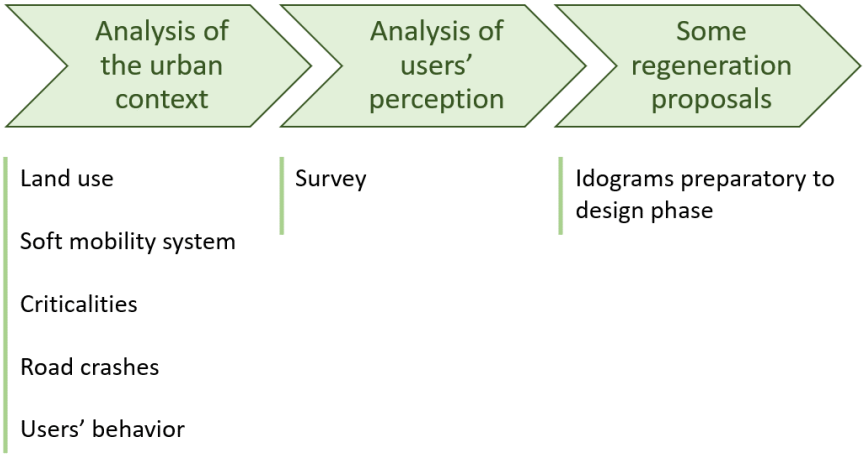

Fig.1 Methodology flow chart

2.1 Analysis of the urban context

The first phase involves five different types of studies. The analysis starts from the definition of land use, from the determination of the spatial connections between the different urban areas and from the mapping of the functions and types of social services in urbanized areas. Social services refer to all services available to citizens (such as school, welfare, healthcare, hospital, and security services).
Subsequently, the soft mobility system is analyzed, considering the study of different types of pedestrians, cycle, and public transport paths. This analysis aims to verify the continuity of the different networks present in the area, to allow the movement of different types of users. We start from the overall map of the different types of paths to determine where they intersect and where possible interchange areas are created.
Subsequently, more specific maps are created for the different paths. For pedestrian paths, the presence of sidewalks on the sides of the carriageway, dedicated paths within public parks, and the type of pedestrian

crossings are analyzed. The latter can be at the same street level, regulated by a traffic light, or on an elevated platform. Thanks to analysis, it is possible to verify the continuity of the pedestrian network obtained from the presence of pedestrian crossing or the discontinuity caused by the interruption of the sidewalk for the driveways. The different types of cycle paths are analyzed to determine their continuity in the urban space and in public parks. The cycle paths can be exclusive, in a reserved lane on the sidewalk or carriageway, in mixed routes with vehicles and/or pedestrians. In this network, the stations of the bike-sharing services are also highlighted. Finally, the lines of the Local Public Transport (TPL) are indicated with the relative stops. Given the important connection between soft mobility and public transport, the different types of bus stops were analyzed, investigating whether the passenger waiting area is on the sidewalk, pedestrian area, or quay and whether there are roof shelters, benches, and poles that indicate the times and the line.

To guarantee the accessibility and usability of the public space by the different users, the environment should have quality and safety characteristics. Therefore, the second analysis aims to verify if such characteristics exist in the area from a technical point of view. The analysis of road sections aims to understand the geometric characteristics of all road components and pay attention to their criticalities. All road components (i.e., carriageway, sidewalks, cycle paths, and pedestrian crossings) were measured geometrically to determine their characteristics and criticalities. Finally, all the criticalities found are directly mapped on the territory. As part of the criticality analysis, the data on road crashes are examined to identify areas where crashes occur most frequently., which users are most affected, and the severity of the crash itself. This analysis aims to understand if the interventions already implemented over the years have contributed to the decrease in the number of accidents and the protection of weak users. The literature research shows that the behavior of road users, especially pedestrians and cyclists, is variable and unpredictable. Therefore, it is necessary to analyze user behavior and create an environment consistent with the needs encountered. On the one hand, this analysis can quantify the extent of pedestrian flow, and, on the other hand, it can understand the behavior of pedestrians when crossing the street. Therefore, the goal is to represent pedestrian traffic (especially during road crossings) to determine which routes the user likes and improve them where possible to make them safe. The data useful for the analyzes can be obtained through direct observation on-site, using open databases such as Google Maps and Open Street Map, specific thematic maps, and requesting specific data from the competent authorities. Finally, with the help of a geographic information system (GIS), it is possible to link different analyzes and create graphical representations by superimposing the levels with the corresponding information. In this way, the advantages and criticalities of the territory are highlighted.

2.2 Analysis of users' perception

The analysis of the urban environment provides only the characteristics and criticalities of the area from a technical point of view. For the environment requalification, it is also necessary to define the user's perception of the surrounding environment, taking into account the quality, accessibility, and safety characteristics that it should have. Therefore, user participation is particularly interesting.

Some key problems, such as the vehicles' high speed, in this paper, are not detected from a technical point of view but only through the perception of the user. Neighborhood residents were asked to fill out a survey to understand better the hardships of those who live in the neighborhood and their needs. The survey is sent via "Google Forms" and is divided into three parts. The first section requests information such as age, sex, place of residence, interaction with the area, frequency and dwells time, reason, and travel arrangements, to determine the profiles of the users. The second section of the survey investigates the criticalities found in the area, both concerning physical obstacles and merit to the behavior of car drivers.

Finally, in the third and last section, some suggestions are asked for the redevelopment of the area and improving the public space. Tab.1 shows the outline of the questions posed.

First section – Users' profile	
Age	
Sex	M F
In which street of the neighborhood do you live?	
Do you frequent the small districts center?	Yes No Just passing through
If you only hang out with him in passing, where are you headed?	
What activities/services do you attend?	
How often?	Everyday Once or twice a week A few times a month Never
How long?	Less than 15 minutes 15 minutes 30 minutes 1 hour More than 1 hour
In what time slot?	Before 8:00 AM Morning Lunch time Afternoon Dinner time Evening
What means of transport do you use to get to the small center of the neighborhood?	By walk By bike Local public transport Moped Car
Second section - Criticalities	
Highlight the critical issues present:	Lack of space for the pedestrian Lack of sidewalk maintenance Sidewalk occupied by street furniture Vehicles parked prohibited Few and unsafe pedestrian crossings Lack of cycle paths Lack of parking for bikes Lack of parking Local public transport stops absent or far away (more than 500m)
How do you perceive the intensity of vehicular traffic?	High Average Low
How do you perceive the urban environment?	Pleasant Lack of green areas Unsafety for traffic Unsafety for crime No public lighting Too much traffic
Third section - Suggestions	
What aspect do you think are important to consider in the small center redevelopment?	Creation of multifunctional public areas for the community Creation of traffic moderators Creation of protected pedestrian crossing Creation of cycle paths Creation of green spaces (flower beds) Creation of mainly pedestrian paths Renovation of existing spaces

Tab.1 Outline of the questions asked in the survey

2.3 Some regeneration proposals

In the third and last phase of the methodology, information obtained from the technical analysis of the urban context is combined with the information perceived by the user. The goal is to create maps that show the first design prerequisites for the regeneration of public spaces to support soft mobility.
For example, the project can introduce traffic changes, introduce and/or cancel new parking lots, introduce cycle paths and reserved sidewalks, traffic calming elements, urban furniture, and green spaces.

3. Results

The disclosed method is applied to an urban regeneration project in two districts of the city of Brescia (Italy). The city of northern Italy (Lombardy) has about 200,000 inhabitants. In recent years, the municipality has launched a series of territorial renewal plans to align itself as closely as possible with the sustainable development policies of the most virtuous medium-sized cities in Europe.
The case studies that apply this method are the San Bartolomeo neighborhoods (about 5,500 inhabitants and density of 19 inhabitants/hectare) and the Casazza neighborhood (about 3,000 inhabitants and density of 57 inhabitants/hectare), both included in the reconstruction plan for the entire northern area of the city (Fig.2a). To be more precise, the municipality intends to redevelop the central areas of the neighborhoods, which over time have played the role of a small city center. However, this effect conflicts with the negative externalities affecting vehicular traffic in the study areas.

3.1 Analysis of the urban context

The analysis of the urban environment characteristics shows that the area of the two districts is very heterogeneous, with a good distribution of industrial, agricultural, residential, and commercial areas (Fig.2b). The main medium-large industrial areas are in the west of the study area, while the smaller ones are located inside, surrounded by agricultural and residential areas. The commercial areas are mainly in the east area, but the necessities shops are also found in the inner streets of the neighborhoods, located on the ground floor of the residential areas. The agricultural area is mainly concentrated in the north of the study area, except for an agricultural area located further east, supported by the presence of several agricultural companies.
There are various sociological services within the territory, such as schools (kindergartens, nursery schools, first and second-grade schools) and General Register Office. The parking areas are distributed evenly within the area, mainly the parking lots relating to the metro stops are underlined.
Focusing on the two small neighborhood centers, both for San Bartolomeo and Casazza, the main road is inserted in a residential context, with shops and services along both sides of the roadway. The analysis is carried out separately for the two centers.
The analysis of the soft mobility system within the neighborhood shows the presence of all three types of paths.
The main streets of the two districts are equipped with pedestrian paths, i.e., sidewalks on both sides of the carriageway. Differences are found about the cycle path, present in the Casazza district but absent in the San Bartolomeo ones, and in the local public transport line that crosses San Bartolomeo but does not travel along the main street of Casazza (Fig.2a and 2b).
In both districts, there are several stations of the BiciMia bike-sharing service. The two districts are well connected from the point of view of pedestrian paths, cycle paths, and local public transport.

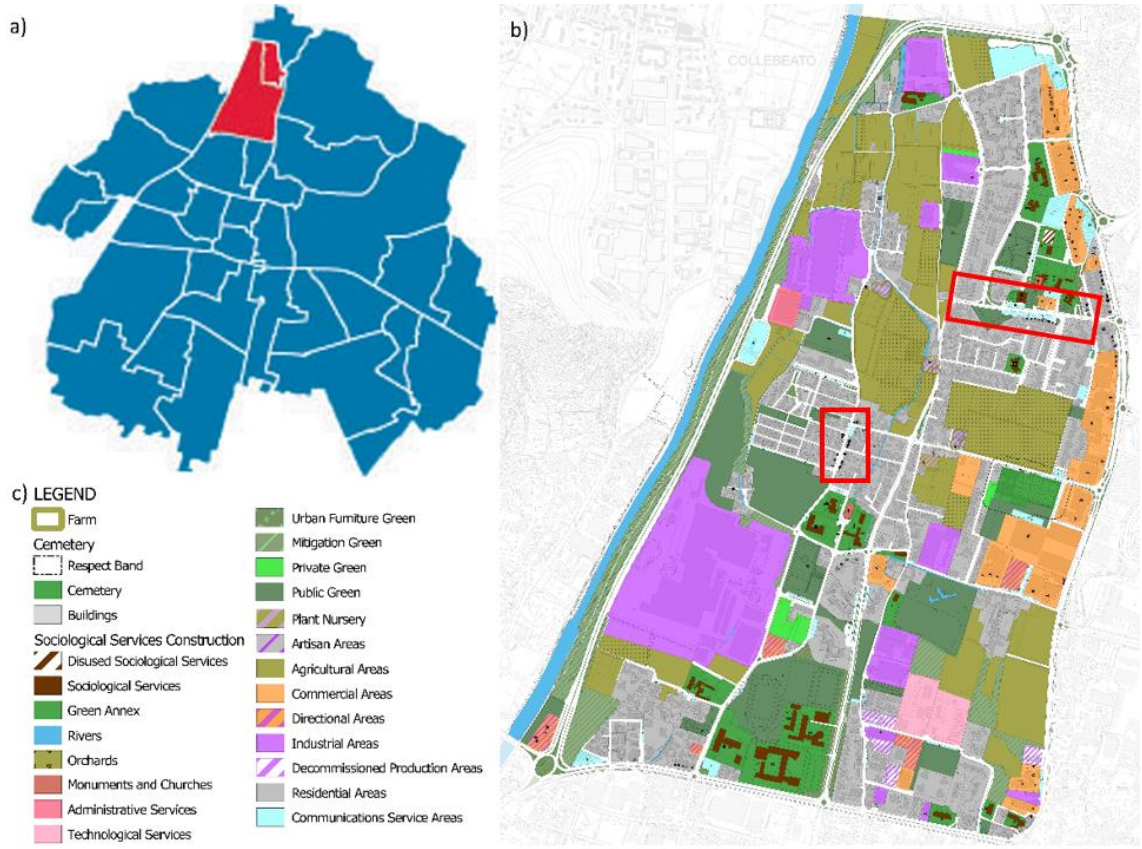

Fig.2 (a) districts location; (b) land use analysis; (c) legend

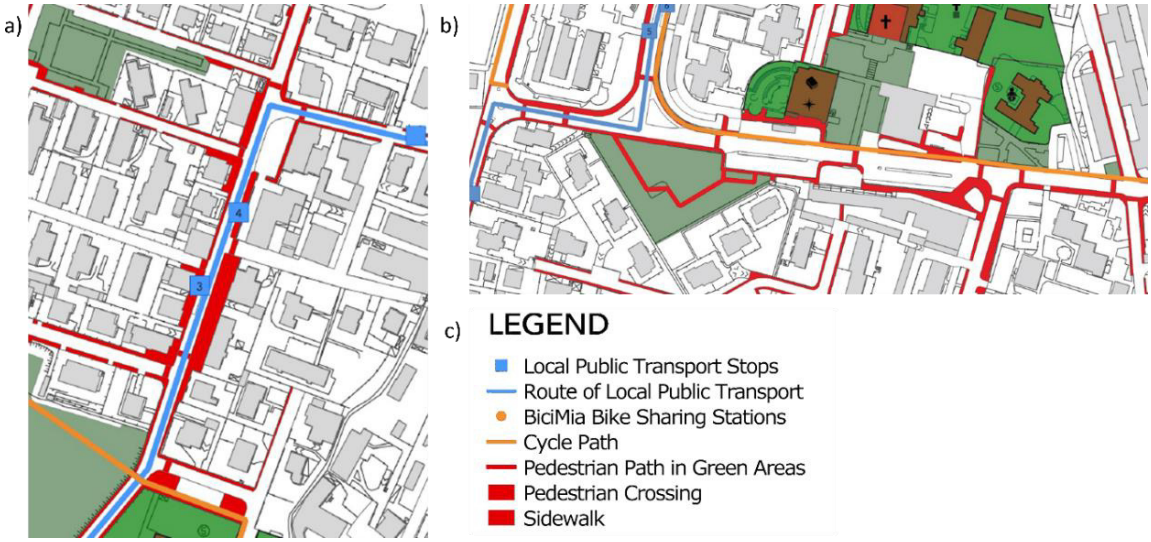

Fig.3 Soft mobility system analysis in San Bartolomeo district (a) and Casazza districts (b); (c) legend

The detailed analysis of the pedestrian paths shows how the pedestrian crossings are mainly at the same street level in the center of the San Bartolomeo district (Fig.4a). On the contrary, in the Casazza district, the pedestrian crossings are mainly with an elevated platform (Fig.4b).

Fig.4 Soft mobility system analysis: type of crosswalks in San Bartolomeo district (a) and Casazza districts (b); (c) legend

As seen from the general analysis, within the small center of the San Bartolomeo district, there is no cycle path which, however, we can find in the parallel street as a reserved lane on the sidewalk, one for each direction of travel (Fig.5a). Instead, in the Casazza district, the main street is served by a cycle path with a reserved lane on the carriageway, one for each direction of travel of lane (Fig.5b).

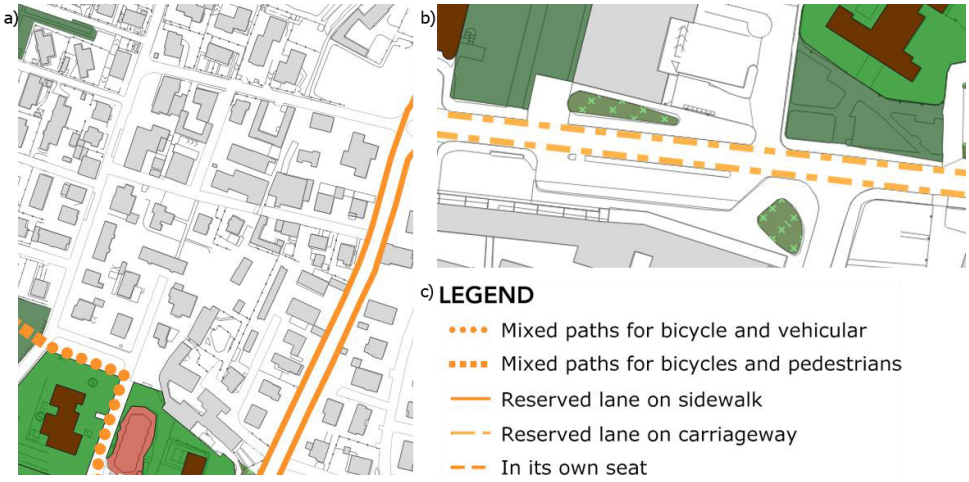

Fig.5 Soft mobility system analysis: type of cycle paths in San Bartolomeo district (a) and Casazza districts (b); (c) legend

Regarding the local public transport stops, the two stops in the San Bartolomeo district have a waiting area on the sidewalk, with the presence of the pole, but without canopies or benches to sit on. Public transport lines do not serve the main street of the Casazza district, but there are two nearby, both with a waiting area on the sidewalk, one with a pole, canopy, and bench while the other only with a pole.

The technical and geometric analysis of the road components defines their characteristics and identifies the critical issues for their use. Particular attention was paid to the lighting elements as one of the key features for the user's safety, both from a technical point of view of identification of the path and the user and from a perceptual point of view regarding criminal activities. The criticalities found by analyzing of the road sections are found on the map using special symbols for an overview (Fig.6). In neighborhoods, there is a lack of specific artificial lighting for pedestrian crossings. Architectural barriers consist of the presence of bins, telephone booths, and bus shelters that obstruct the passage. Only in some cases are they represented by the presence of sidewalks without descents for pedestrian crossing. Finally, the presence of holes and cracks in the ground indicates a lack of road surface maintenance.

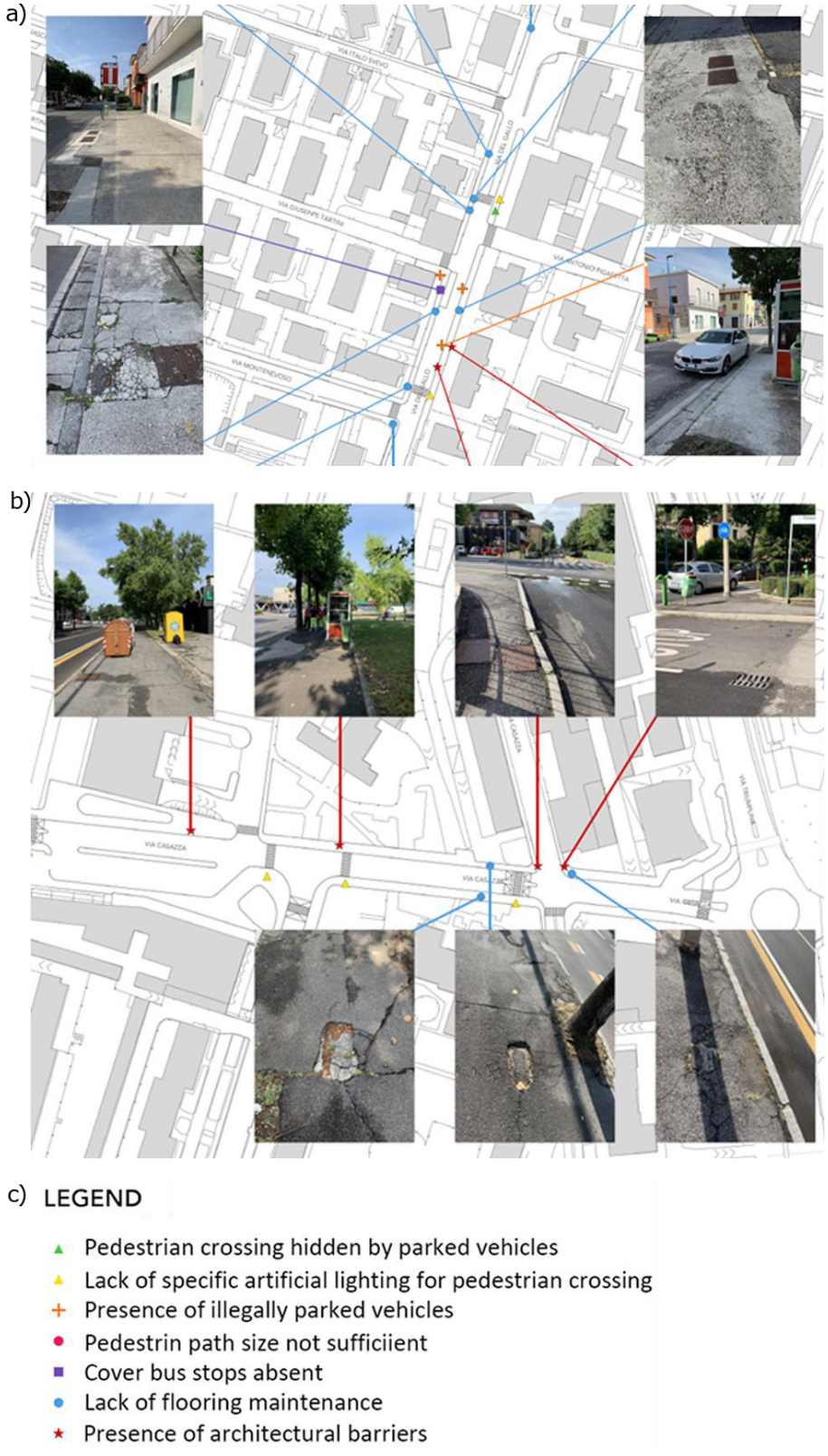

Fig.6 Some critical issues in San Bartolomeo district (a) and in Casazza district (b); (c) legend

The analysis of road accidents considered the accident data provided by the Municipality of Brescia, analyzed based on the surveys and the compilation of specific forms by the Local Police for the years from 2015 to 2018. Initially, the data are studied chronologically to identify the most critical areas and determine if, with the interventions implemented, the number of claims has been reduced. It is noted that over the years, the number of accidents has gradually decreased (Tab.2).

Year	Number of crashes in the study areas	Number of residents in San Bartolomeo	Number of residents in Casazza	Crashes/residents ratio
2015	62	5286	2750	0.77%
2016	76	5260	2775	0.95%
2017	61	5287	2785	0.76%
2018	62	5269	2793	0.77%

Tab.2 Crashes studied over the years in the study area

Subsequently, accidents are analyzed according to whether or not pedestrians are involved. Of the number of accidents previously analyzed, we note that most are without the involvement of pedestrians, while the number of those involved in the last four years is significantly lower (Tab. 3).

	Number of crashes in the study area	Total number of crashes in the study area	Ratio
Pedestrians involved	27	261	10%
Pedestrians not involved	186	261	71%

Tab.3 Number of crashes with pedestrians involved or not in the study area

Finally, the data regarding the severity of the accidents were examined, and it was noted that the greatest number of victims were injured, not sustaining serious injuries (Tab. 4).

Severity	Number of crashes in the study area	Total number of crashes in the study area	Ratio
Injured	166	261	63.6%
Hospitalized injures	6	261	2.3%
Dead	2	261	0.8%

Tab.4 Number of crashes severity in the study area

For user behavior, the analysis shows that pedestrians cross the carriageway differently between the two neighborhoods. The data were collected through direct on-site observations in person, for 30 minutes, 3 times a day (morning, afternoon, late afternoon), for a total duration of two days, one in July, one in August. For San Bartolomeo, pedestrians cross much more frequently outside the established pedestrian crossing (Fig.7a). The presence of shops on both sides of the road favors a continuous flow of users. Furthermore, the internal location and the less traffic are some factors that influence the choice of the pedestrian to cross the carriageway on a pedestrian crossing or not. On the contrary, in Casazza, the recent redevelopments invite users to use the pedestrian crossings available mainly, and therefore only a few cross outsides. All the shops are located in the south of the district, while the sociological services and residential areas are in the north. This involves a significant flow of users, but in a more controlled and regular way, without a "zig-zag" trend to move from one store to another (Fig.7b).

Fig.7 Analysis of user behaviour in San Bartolomeo district (a) and in Casazza district (b); (c) legend

3.2 Analysis of users' perception

With the support of the District Councils, the users' perception of space was analyzed. The District Councils are units to promote civic participation and consultation on matters of interest to the neighborhood. These units are responsible for promoting active citizenship and social responsibility improving the quality of life and activating social cohesion paths. They are made up of people who live in the neighborhood and regularly confront the other inhabitants. Also, the District Councils play a proactive role in analyzing and identifying the various local problems, providing a connection between citizens and the administration.
Following an illustration of the technical analyzes, a survey was submitted to the citizens. The survey found initial responses in a small sample of neighborhood residents active within the neighborhood council. We analyze separately the responses given by residents of the San Bartolomeo district and the Casazza district.
For the San Bartolomeo district, the age of the participants is variable (from 19 to 80 years old) and mostly women (61%). Participants mainly reside within 1 km of the district center, 73% frequent this space, while 27% are just passing through. Those who just hang out in passing are mostly headed to their homes, restaurants, bars, or shops. The area is visited every day by 62% of the participants, once or twice a week by 25%, and sometimes a month by 13%. The dwell time is about 15 minutes, especially during the morning or late afternoon. The most popular activities are the necessities shops (such as bakers, pharmacies, minimarket), bars, and restaurants. The places are mainly reached on foot or by car.
The section relating to the criticalities found in the territory highlights the lack related to the mobility of people. It is highlighted that unauthorized parking vehicles reduce the useful space in pedestrian paths and that crossings are few and unsafe. Also, the lack of cycle paths and parking spaces is underlined. 59% of participants perceive high vehicular traffic, high speed, and parking in unauthorized areas. Therefore, regarding traffic, the urban environment is perceived by users as unsafe. Concerning the quality of the territory, they perceive it as unattractive, highlighting the lack of greenery and maintenance. Finally, in the suggestions section, users consider it important to create more protected pedestrian crossings, build traffic moderators, cycle paths, and renovate existing spaces. Besides, they suggest constructing of new parking lots, establishing of one-way streets with traffic moderators, and forbidding the passage of heavy vehicles (Fig.8).

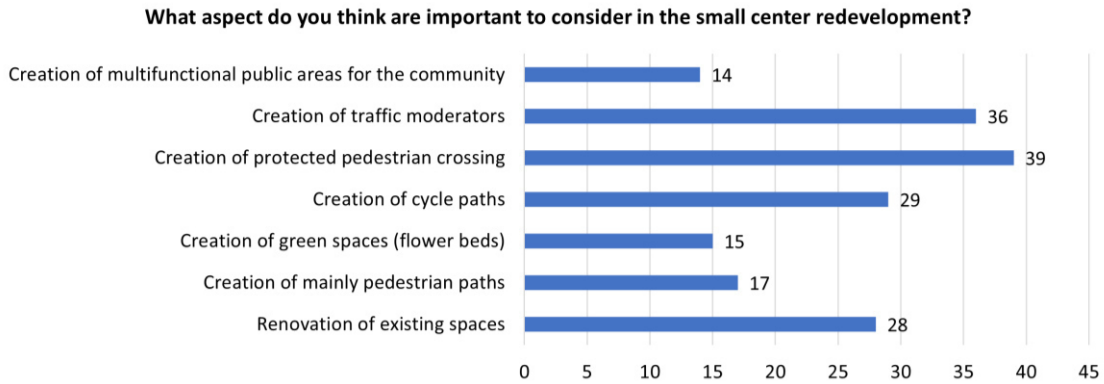

Fig.8 Citizen requests in the survey for San Bartolomeo district

The age of participants ranges from 24 to 65 years old in the Casazza neighborhood and are mostly women (65%). Participants primarily reside within 1.5 km of the neighborhood center, 94% frequent this space, while 6% are just passing through. Those just passing through are mostly headed to their homes, restaurants, bars, stores, or work. The area is visited daily by 53% of participants, once or twice a week by 23%, and a few times a month by 24%. Dwell time is about 30 minutes, mostly in the afternoon. The most frequented activities are the pharmacy, the supermarket, the municipal library, and the parish. The places are reached mainly on foot, by bicycle, and by car. According to residents, the section on critical issues shows that crosswalks are unsafe and there is not enough parking for bicycles. 35% of participants perceive

high vehicular traffic, while 47% perceive medium intensity. Numerous point out the high speed of vehicular traffic and parking in unauthorized areas. Thus, about traffic, the urban environment is perceived by users as unsafe. On the contrary, the territory is perceived as pleasant. Finally, in the suggestions section, users believe it is important to create more protected crosswalks, build traffic moderators, build bicycle lanes, renovate existing spaces, and create a square as a center of identity and aggregation for the neighborhood (Fig.9).

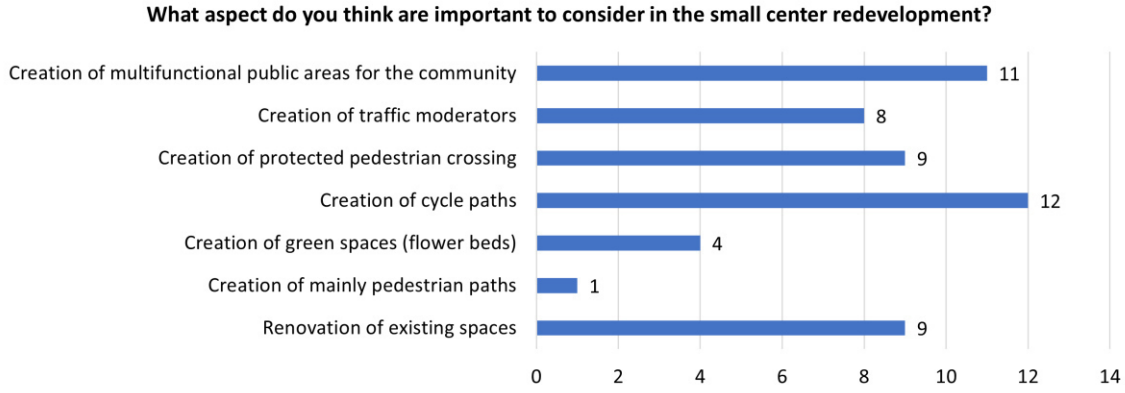

Fig.9 Citizen requests in the survey for Casazza district

3.3 Some regeneration proposals

The analysis of the survey responses shows that traffic problems, high speeds, and lack of parking have occurred repeatedly. Therefore, it is necessary to redevelop both small towns in the two districts. Here are some helpful tips that can be used in the later planning stages. For San Bartolomeo, the direction of travel of some roads could be changed to create parking lots. These interventions will help reduce the load on cars illegally parked along main roads. Subsequently, the parking area to the north can be reduced to allow the creation of a small square to identify the community and become a meeting place for the young and old.

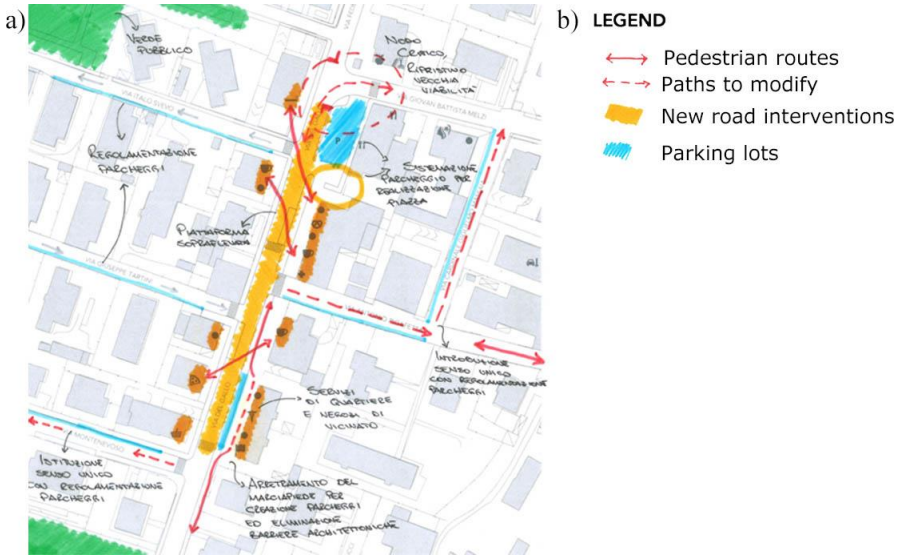

Fig.10 First hypotheses of intervention for the regeneration of the San Bartolomeo district

Furthermore, the south sidewalk can be moved to create a space dedicated to parking lots and bins, to not constitute an obstacle for pedestrians (Fig.10). In Casazza, it is suggested to eliminate the central car park to allow the construction of a characteristic square and create a further pedestrian crossing to the east (Fig.11). Finally, in both districts, it is conceivable to create an elevated platform with StreetPrint processing

to reach the carriageway at sidewalk level and pay more attention to the safety of pedestrians crossing the street.

Fig.11 First hypotheses of intervention for the regeneration of the Casazza district

4. Discussion and Conclusion

Following the industrial revolution, the popularity of private cars has led to a gradual decline in the quality of public spaces and the quality of the surface available to pedestrians and cyclists. This problem is solved first with a solution that separates vehicular traffic from pedestrian traffic, and then with an integration solution, also thanks to the introduction of traffic moderation technology. These technologies work through direct intervention on the road and induce drivers to slow down in an environment shared with pedestrians, cyclists, and public transport. However, reducing the speed and volume of traffic are just some possible solutions to increase the livability of the space. In fact, by freeing up parking lots and vehicular areas, reducing accidents and pollution, the urban space can become more livable, making the city suitable for every citizen. While the introduction of traffic calming technology appears to be just a technical application, it includes a broader process involving the entire community. Residents can play an important role in identifying problems and helping to find possible solutions.

With these premises, this article aims to define a methodology to build a cognitive framework for public spaces and to carry out urban regeneration projects favoring sustainable mobility. The proposed method involves three different stages. It involves the definition of a first technical analysis (based on measurements, observations, data analysis, and thematic maps), followed by a perceptual analysis (obtained from the direct participation of citizens through surveys), and finally some proposals for the regeneration of public space. The technical analysis is divided into the analysis of land use, the analysis of the soft mobility system, the analysis of the physical criticalities of the spaces, the analysis of accidents in the study area, and finally, the analysis of the flow of pedestrians. This method was applied to the districts of San Bartolomeo and Casazza in the northern part of Brescia.

The analysis is carried out to define a complete cognitive framework that investigates the characteristics and criticalities found in the case study, taking into account the real and perceived risks of the user and the user's needs for the space itself. The results show that the high traffic volume on main roads encourages citizens to use their private cars even for short trips instead of using sustainable mobility systems. Therefore, public space regeneration interventions are necessary to encourage the use of sustainable transport systems without forgetting the characteristics of quality, accessibility, and safety of public spaces.

The mobility system analysis could be implemented considering new transport methods such as electric e-scooters and self-balancing devices. The introduction of these new systems involves various issues related to public space, such as the decrease in space available for pedestrians, and road safety, such as the increase

in accidents and conflicts between different users (Boglietti et al., 2021). Furthermore, the perceptual analysis phase of the work can be further integrated using other forms of participation, such as seminars and focus groups. The participation of a greater number of people in the design phase allows you to define a project based on the requests and real needs of the citizens living in the study area. Moreover, following the criticalities perceived by users, it could be useful to analyze of the speed of vehicles and the type of vehicles crossing the area. In this way, it could be possible to intervene by inserting traffic calming technologies or by prohibiting access to certain types of vehicles.

Moreover, the first hypotheses of regeneration of the spaces will then be submitted again to the District Councils and the citizens to discuss further the possible solutions adopted. This paper applies this approach to the neighborhood scale, but it can also be used in large urban areas. The cognitive framework obtained constitutes preliminary material for the Competition of Ideas Design of the public space of Casazza and San Bartolomeo districts in Brescia.

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Image Sources

Fig.1-11: Own productions.

Author's profile

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