Building Site City - Inclusive City
Monitoring of perception degrees and usability in settlements and in the urban landscape.

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The following contribution reports some results of research applied to the city of Udine. Identifying the existing critical issues to be solved allows possible urban transformation as an essential requirement to guarantee an inclusive living. The urban monitoring considers the pedestrian connective spaces - part of a selected urban fabric - while identifying the different needs and perceptions of a wide spectrum of users.
Therefore, this is an analysis of urban accessibility and porosity aimed at defining a design methodology that allows the subjective assessment of the different and possible users; the limitations related to accessibility, the possible advisable itineraries, and urban permeability are highlighted in the research. The research considers experimental data corresponding to different 'users' with reduced kinetic and visual skills differentiated by gender and age.

Introduction

The following contribution reports some results of research applied to the city of Udine (Fig.1). Identifying the existing critical issues to be solved allows possible urban transformation as an essential requirement to guarantee an inclusive living. The urban monitoring considers the pedestrian connective spaces - part of a selected urban fabric - while identifying the different needs and perceptions of a wide spectrum of users.

Therefore, this is an analysis of urban accessibility and porosity aimed at defining a design methodology that allows the subjective assessment of the different and possible users; the limitations related to accessibility, the possible advisable itineraries, and urban permeability are highlighted in the research. The study investigates the types of transformation necessary to improve urban livability, as far as possible, and identifies the critical elements to overcome as pre-project support to avoid architectural barriers.

The research considers experimental data corresponding to different 'users' with reduced kinetic and visual skills differentiated by gender and age.

The area in question includes buildings of ancient layout, and new urbanities corresponding to different housing models as well as the use of urban space.

The methodology used, the human-centered design (HCD), investigates the 'use/function' of urban blocks and the existing relationships of living, towards a connectivity policy, with a focus on public connection spaces that are of collective interest (Conti and Tatano, 2018).

The 'transformation' of the city to define the possible future and coherent urban structure must contain the theme of the community: this is crucial for the development of living conditions (Pizzoccaro and Figiani, 2009); improving attractiveness by focusing on well-being, training and promotion of new sensitivities is essential to respond to the needs of the population.

### Perception, urban space, and product-city

The city must be able to give satisfactory solutions to human needs which correspond to the usability principles and represent the definition of measurable quality of a product and its interface.

The attention shifts from the concept of 'user' to the one of 'person' and leads to the participation and direct involvement of users in the design of the 'city object' (w). Therefore, considering the city as the building site of a possible inclusive system for living involves a design based on experience (Tubaro and Milocco, 2019).

The lack of humanity in architecture and in the contemporary city can be understood as the consequence of negligence towards the body and the senses, as the result of an imbalance of our sensorial system (Pallasmaa, 2007, pp.17-18).

The city is alive and it is considered as a set of objects in relationship with its inhabitants, therefore the interaction with the 'city product' can generate different types of emotional and 'behavioral' responses, directly connected to the link that is established in

FVG

UDINE

AREA DI STUDIO
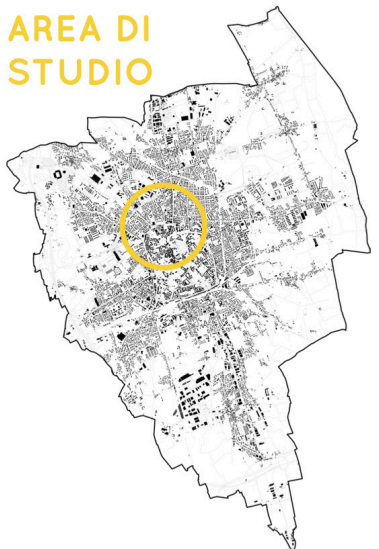
the use of a place or object (Donald Norman, 2004).

Multisensory and perceptual design is generally described as the set of stimuli of our senses in a given context. Sounds, scents, and surfaces "can help an elderly or blind person to orient themselves [in] disorienting and uniform urban spaces" (SuperAbile, 2006). Orientation thus becomes a fundamental part of inclusive planning; for Malagugini "*the design process [...] has to register the likely qualitative changes that the architectural intervention will lead to the space in which you will operate*" and the author, recalls that for G. Leibniz (1716) "space it is relational" (Malagugini, 2007, p. 13); it is clear that in the perspective of design for all, the relationship between space, objects, and user (*user*) cannot be ignored.

Urban space cannot always be considered as objective space, but as subjective space (Malagugini, 2007), so cognitive strategies that redefine places according to elements of reference, coordination, orientation, and recognisability, would improve the 'use of space'.

A place must be recognized in its particular uniqueness and in its urban function and consequently taking into account the different sensory aspects of people, in order to proceed with coherent interventions (Law, 2004; Howes, 2005).
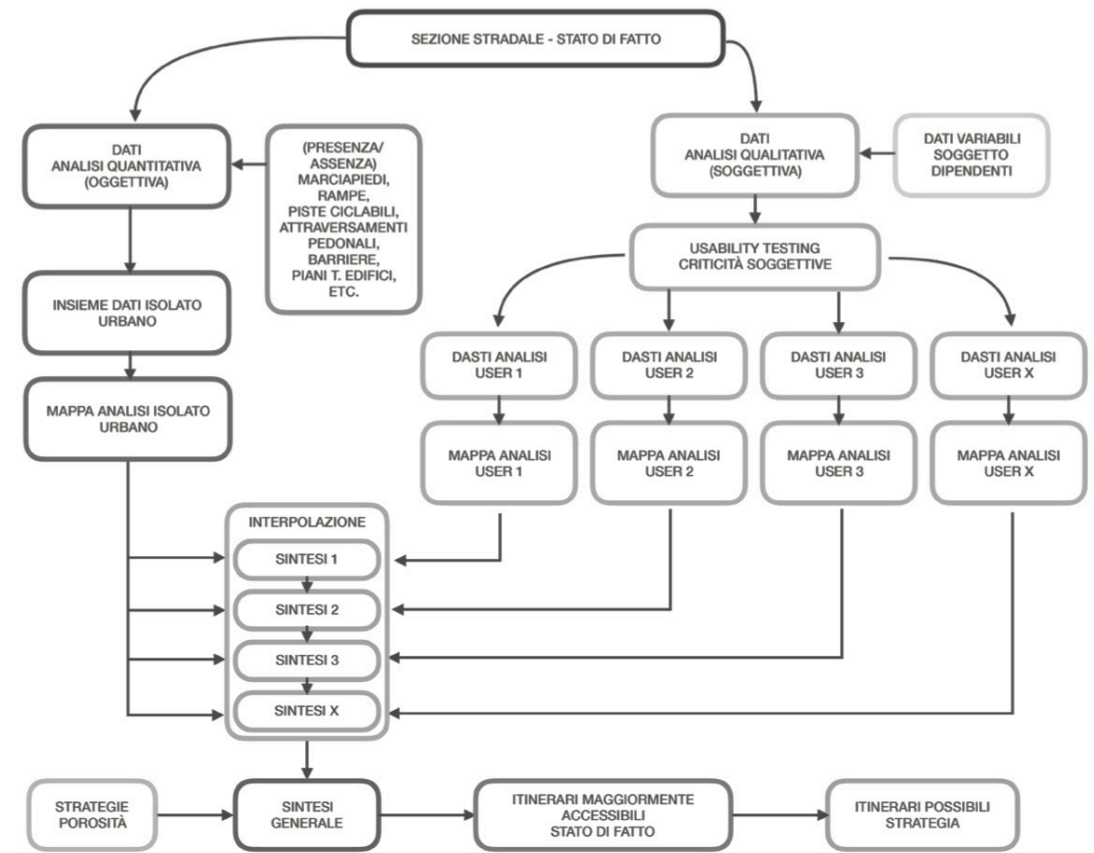
HCD flow
Fig. 2

If the architecture of the senses is relational, therefore social architecture, it becomes essential to design it around the user (*Human-Centered Design*) and this process (Pratt and Nunes, 2012) is identified through the words 'mediation' and 'reconciliation' with space and its perception (Howes, 2005). J. Pallasmaa (2007, p. 11), argues that "architecture [should] accommodate and integrate", so it should become inclusive, attentive and empathic, for all (parameterization - relationship - interaction) by continually redefining perceptual experience, simultaneously (Pallasmaa, 2007) involving all available senses.

Indicating, suggesting, orienting become integral parts of any distribution system that allows the user a complete urban experience (Malnar and Vodvarka, 2003; Howes, 2005). Some of the requirements, which emerge from the state of the art, are the concept of 'adaptability', applied to both the system and users, the concept of permeability, conversion, and connection between areas (urban and private), participation, and the concept of renegotiation of spaces.

Specifically, adaptability[1] occurs within urban, social and economic systems that continually evolve according to user needs; the degree of change applies not only to the volumetric transformation of the city (urban devices) but also and to the interactions that the
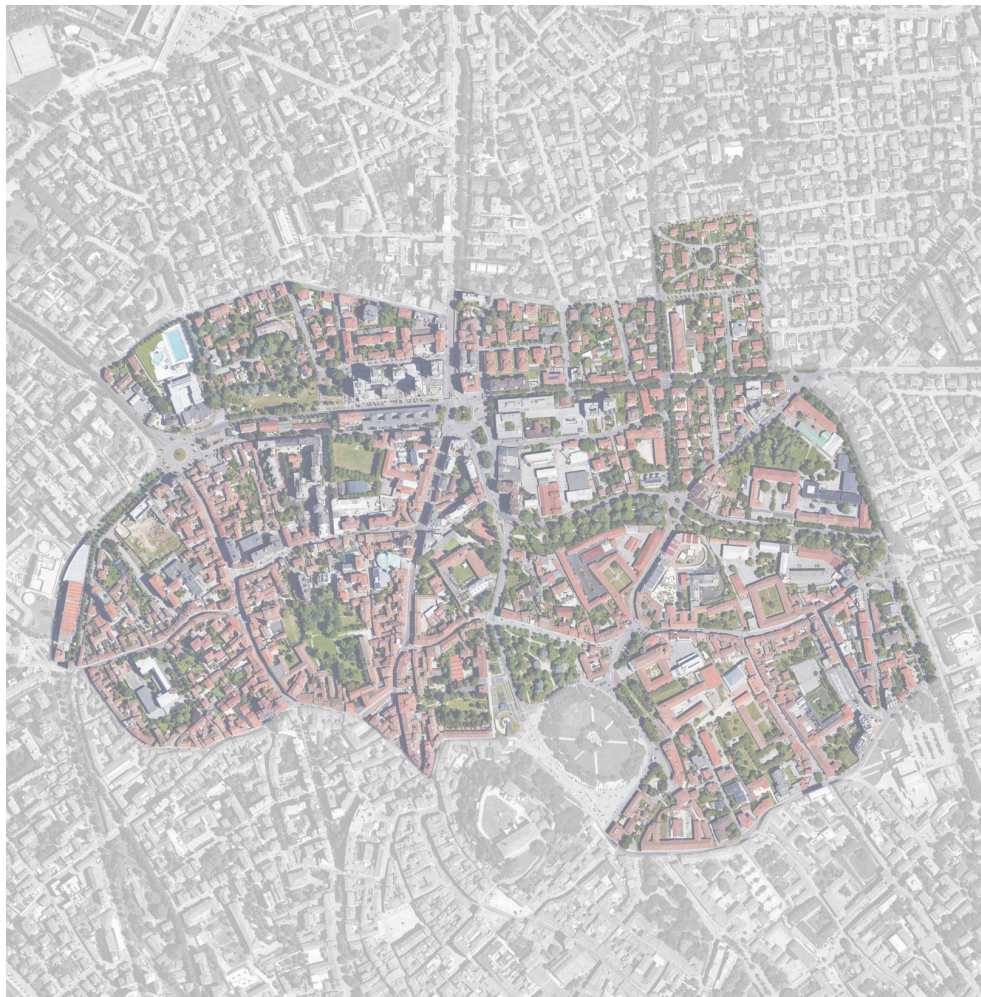
Selected macro area
Fig. 3

inhabitants have with it (Celucci, 2018).
It is necessary to operate with different general and punctual strategies, where the access to public and private spaces is included through an integrated and integral design of the entire city system to *[re]enable it* (ADB, 2017). Inclusive processes aim to satisfy the needs of all users (Conti and Tatano, 2018). The *User-Centered Design practices*, applied to architecture and building processes, are summarized in the study of the human figure and its dynamics in response to the context in which it is found; when designing for the human being, we must work to improve general comfort, for any 'user' and with any ability (Celucci, 2018).

Therefore, the problems related to usability are investigated reading the existing urban fabric specificities, referring both to technical-regulatory aspects and to subjective use of 'users' with particular needs of different ages. It is clear that in order to achieve the best results it is imperative to use intervention strategies that take into consideration all the 'actors' that give rise to urban transformations, putting the user first. So inclusive processes are mediated by 'conscious planning' (Conti and Tatano, 2018) which aims to satisfy the needs of all users; the more space will be made usable the more it will be possible to make it become a collective asset through architectural and technological interventions towards an ethical social development process (Conti and Tatano, 2018).

Interacting with the built environment is an integral part of every citizen's life, regardless of his or her abilities, so it is necessary to study the different ways of relating between the city and a determined and significant sample of 'users', analyzing the dynamics that exist between individual subjectivity and degrees of freedom, referable, for example, to routes and/or services of proximity, of primal interest. The research presented does not investigate a single type of relationship 'human being – city', but the set of possible, potential and with any level of impairment in usability actions: the greater the accessibility (for all inhabitants) to services and the spaces located in the contemporary, the greater the city will be able to be presented as interactive to the social, economic and service possibilities that the civic space can offer, without inequalities or limitations.

M. Inger and K. Solvang (2016), recall the words of M. Nussbaum (2006): public space is an artifact of ideas on inclusion; this set of ideas should be systematized and managed in a unified way, at least within the same urban fabric.

The inclusive city guarantees the use of the services present for any inhabitant with all or some skills, fairly and without creating diversity. It is clear that the objectives on a planning level are directed towards approaches that must take into consideration every type of inclusion: social, economic and environmental, towards a 'universal strategy',[2] with adequate timing of implementation in order to improve the city, which belongs to everyone.

In view of inclusive urban design, however, it is necessary to consider different targets with all or some skills and different ages. Therefore, it has been experimented, through a study that examines the different needs of different 'users', what are the critical issues and limitations present in the urban fabric, with specific attention to the fair distribution of services and infrastructures, always keeping in mind both the human and urban 'size'.
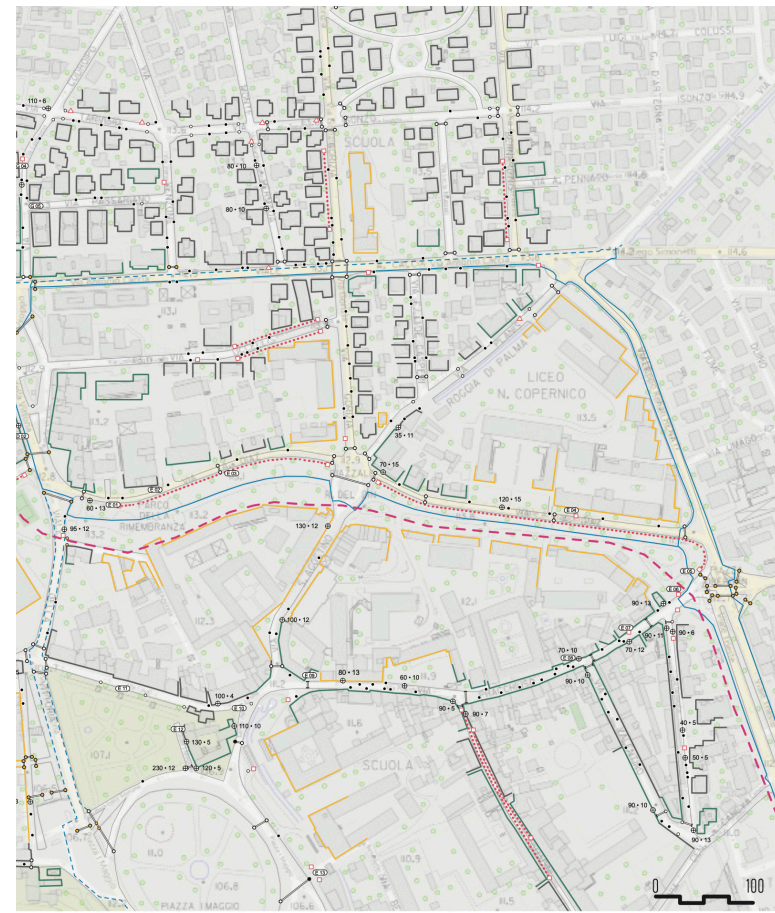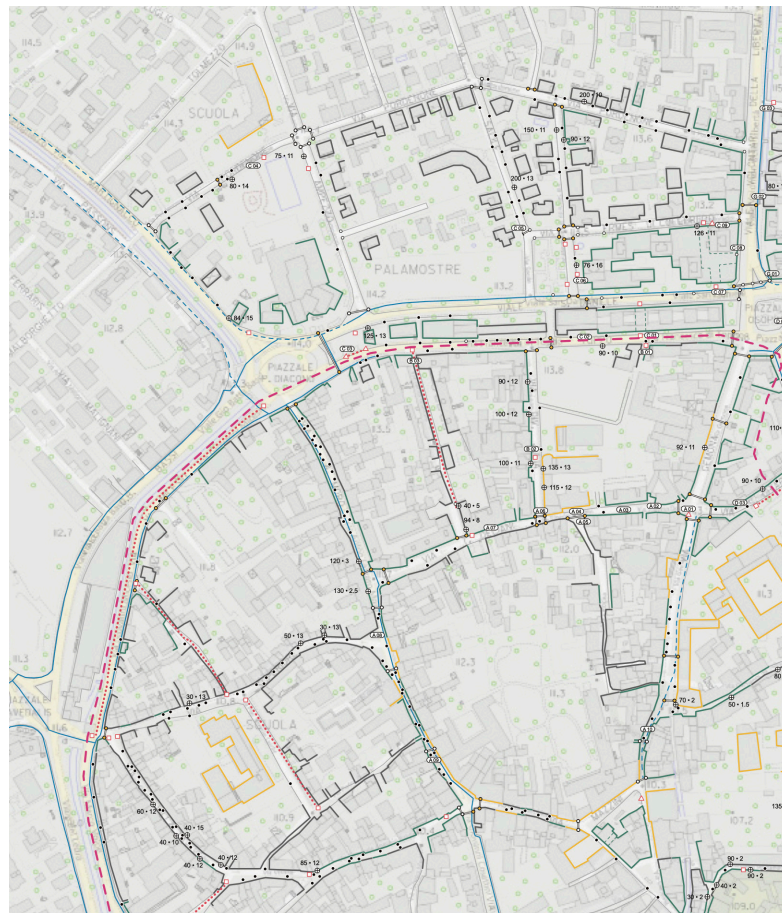
**Objective
mapping on
macro area**
Fig. 4

103

BUILDING SITE CITY · INCLUSIVE CITY.

Legend:
- CRITICITÀ TEMPORANEA
- CRITICITÀ PERMANENTE
- RAMPE PEDONALI, ZEBRATE
- RAMPE PEDONALI, TATTILI, ZEBRATE
- LARGHEZZA, ALTEZZA MARCIAPIEDE
- RAMPA CARRABILE
- PERIMETRO ISOLATO
- P.T. RESIDENZA
- P.T. PUBBLICO
- P.T. PRIVATO
- PISTA CICLABILE PROMISCUA
- PISTA CICLABILE NON PROMISCUA

Analysis Tools & International Case-Studies

The technological and IT evolution has led to the development of apps to support all the relevant architectural practices and field analyzes that are part of the evolution of the construction process.

The common denominator of the apps that concern urban mapping, with a specific concern for people with disabilities, is the desire to redefine the space according to the principles of accessibility presented above, to achieve a database of information to be returned to the community; thanks to the information collected (with an open access and participatory approach) it is possible to create and calculate routes suitable for one or more needs according to the requests of a specific user. AccessMap[3] and OpenSideWalks[4] (Taskar Center for Accessible Technology, Washington University) and events such as the Mapathons,[5] are some of the application examples that aim to make the urban landscape usable, to collect data and to publicly disseminate them by suggesting the best routes considering the physical limits of the cities, the ramps, the slopes, the dimensions of architectural devices and the sidewalks, and so on (Salman, 2018).

An emblematic example is the city of Venice that had been studied with an analogous, but distinct case (Tatano, 2018); La Serenissima is to be considered as one of the metropolises with the highest degree of difficulty in terms of accessibility because of its 'liquid soil'. The *caesura* of Venice, as the canals or the lack of bridges, can be compared to those of a 'solid' city, such as Udine; the carriageways can be compared with the interruptions caused by the waterways. The lack of level crossings or ramps can be compared to the possible lack of crossing devices between the waterways of the Serenissima.

The interpolations between the collected data and the specific interpretations of the chosen urban case go towards a strategic solution of reconnection and reactivation of the areas and paths of the quadrant being studied. A similar *modus operandi*, but with a different outcome, can be found in the city of Amsterdam that has adopted a system of analysis and graphic restitution to define

the greater or lesser urban accessibility, publicly, open access, and for the good of the entire community. The system used by the administration is called 'Accessibility Thermometer' and is available on the city website;[6] in the document the 'hot' and 'cold' paths are represented in different colors, the least and most accessible paths respectively. The interpolations between the collected data and the specific interpretations of the chosen case-studies go towards a summarized strategic solution of reconnection and reactivation of the areas and paths of the city studied.

Declination and application of the HCD method

The reinterpretation of 'human-centered design' (Fig. 2), where the object to be studied in the city and the interactions between it and its stakeholders investigate the dynamics between the individual subjectivity and the grips or lack of freedom of use, referable, for example, to routes and/or proximity services. The research methodology proposes the involvement of the 'user' in a way towards the identification of critical issues with participation and simulation testing. The approach is analytical/strategic based on

the objective study referred to the current regulations (Fig. 3, 4, 5) and subsequently on the experience of different categories of users of the urban environment, divided into groups according to their disability: *subjective mapping* (Fig. 7-8). The inclusive city cannot be realized without taking into account of its current state, and it is a matter of redesigning the whole urban space according to criteria of fairness and coherence with the timings of possible transformation.

The inclusive city should guarantee the use of the services disseminated in the urban area to any user, in a fair way (Afacan, 2011) and without creating diversity, so the research takes into consideration every type of inclusion (social, economic and environmental), proceeding towards a strategy that is as universal as possible. Naturally, the appropriate timescales implementation must be considered to improve the city as a common good, creating strategies that can enhance design interventions and update the norms.

The research considered various possible intervention strategies by referring to the summation of the critical issues found, and the proposals for inclusive itineraries

PARCHEGGI MEDIAMENTE ACCESSIBILI
PARCHEGGI DIFFICILMENTE ACCESSIBILI

Accessible parking lots
Fig. 5

respecting the city in it present state; this guarantees at least a continuous and usable path for the stakeholders for each urban road analyzed.

Through documentation, geo-referencing, photo-reportage, and geometric and photographic survey, with notes and critical considerations of the subjective experiences, a database was thus created to improve the possible calibration respecting the specific needs experimentally deduced. It became necessary to study the different ways of relating between the city and the different groups of users, analyzing the phenomena

detected in the study area.

In order to collect these data, the active participation of the users proved itself indispensable, and to achieve this result, an act of disclosure and sharing was made, clarifying that the intent was not to define the individual interventions but to have elements of critical knowledge.

The research investigated and parameterized the city (set of objects) and the human figure, with the aim of minimizing the social distance and the differences in the usability of the population; the study was based on the volumetric analysis of the urban

Pilot area
Fig. 6

agglomeration taking into consideration social and cultural dynamics.

From a social and economic point of view, the improvement of urban usability leads to the reactivation of areas with partial or total inaccessibility, and under-utilization or urban abandonment.

The conditions surrounding the chosen area were verified as well as the services available (transport, commercial service or refreshment), the architectural limitations and the presence (or not) of cycle paths, road safety and access to public buildings.

The analysis carried out, through a declination of the HCD method is instrumental in defining the evolutionary framework of the research itself and has provided the synthesis of data with the weighing of the critical indicators, the definition of the 'performance requirements' referring to the different categories of 'users' and, therefore, the definition of the technical feasibility of transformative interventions consistent with the HCD approach.

To collect this data, with the active participation of users, mapping tools were used; with this method, it was possible to compose guidelines (translated into elaborated graphics) that highlight the areas and needs of a given place that needs priority interventions and/or that its possible adaptation is at least sufficient to guarantee a greater degree of urban usability and safety (Fig. 7-8). A possible (pre) strategic plan, supported by other professionals and institutions, should reduce distances and increase porosity in light of the needs of each citizen (Fig. 9-10-11).

The urban transformations connoting inclusiveness have been analyzed and synergy has been created with associations and users which will lead to the research developments to proposals to the civic administration.

Methods: in-depth analysis, comparisons, definition of analytical tool, and degrees of perception and usability

The analysis or mapping of the area taken into consideration, and presented through graphic summaries in the figg. 3-4-5, has been developed with the local survey of the following specific features:

- overlapping and study of the cartography of Eng. Lavagnolo (1850) and contemporary cartography (GIS data) to highlight urban voids and the modification of porosity over time.

- recognition of street level activities (ground floor, altitude + - 0): services (includes commerce, gastronomy and private activities), public areas and/or buildings or buildings for public use, areas and / or buildings for private use;

- on-site measurement (laser meter) of the depths of the pavements and positioning on the cartography of the ramps for the disabled and for cars;

- average timekeeping between distances assigned around the urban block: walking user (age); walking user with non-electric wheelchair, walking user with supports (crutches), users eith impaired vision;

- photo reportage and recognition of areas on the street level through the following symbols caption: full accessibility (green color), medium accessibility (yellow), partial or difficult accessibility (orange); inaccessibility (magenta)
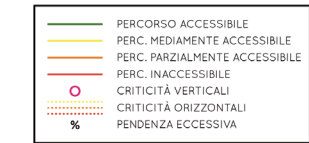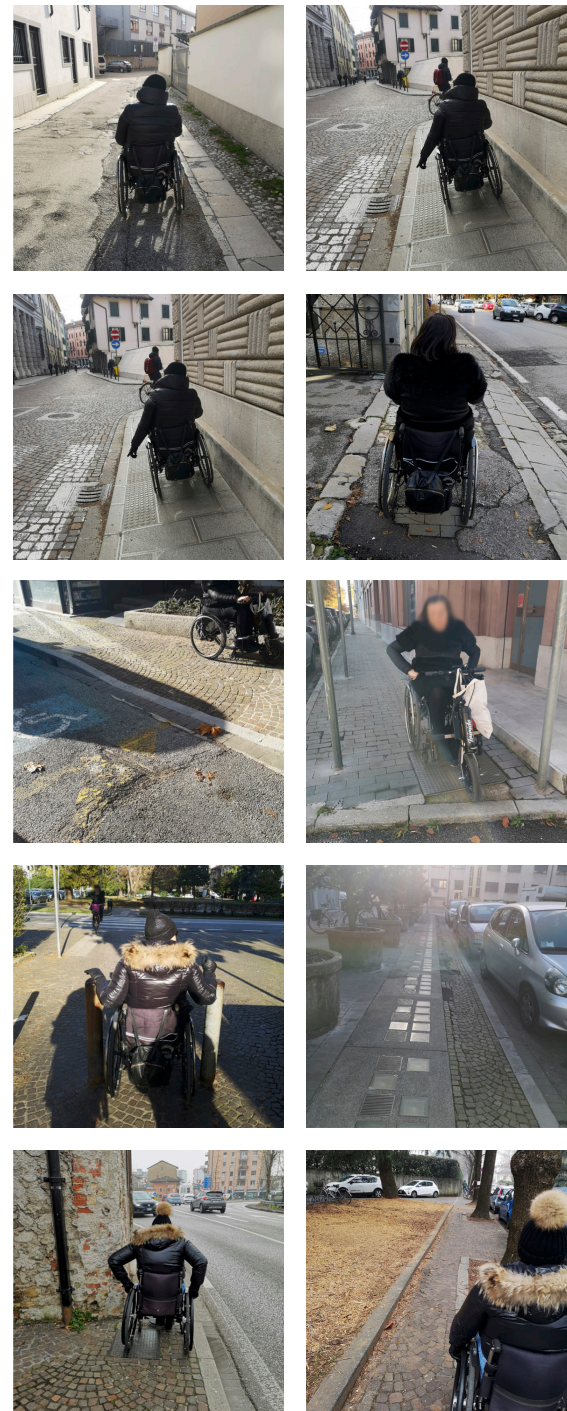
Subjective mapping, Example, User 02
Fig. 7

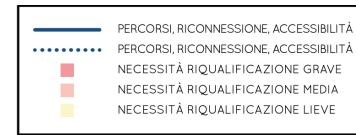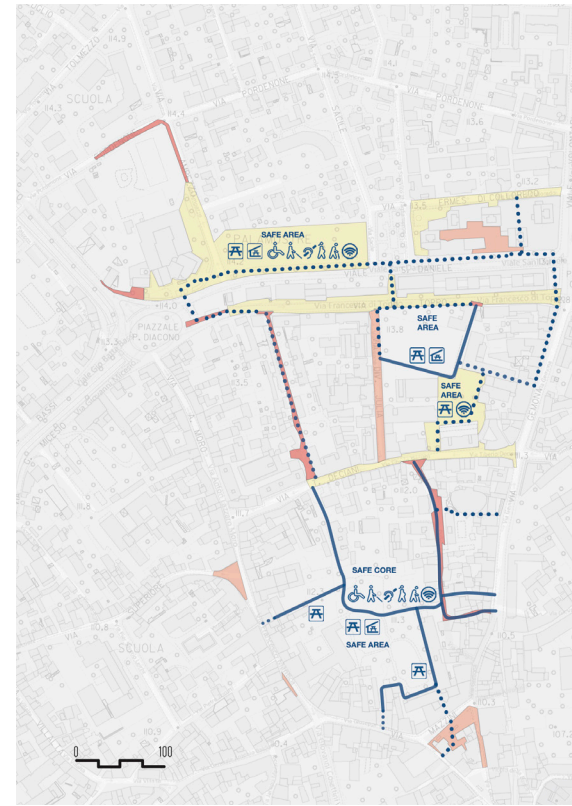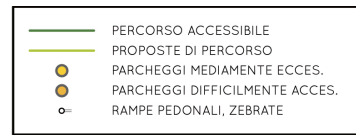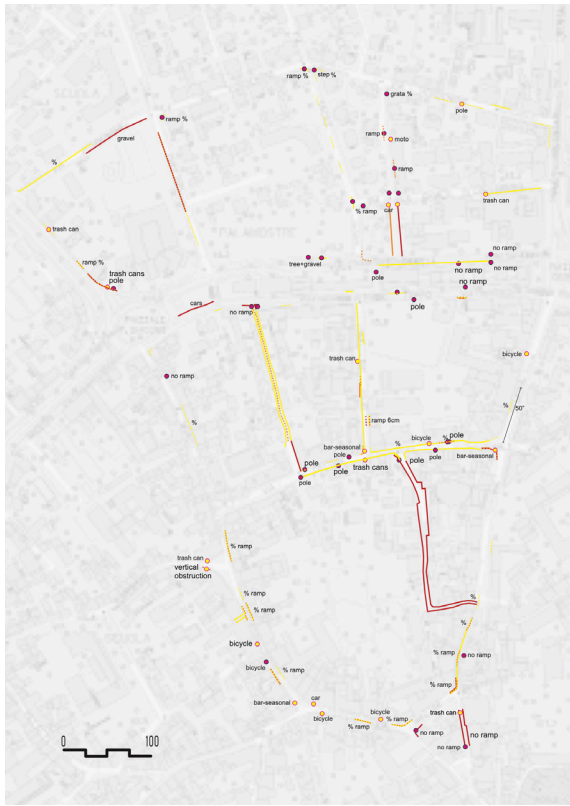
Photo reportage, Geo-referenced, User 02
Fig. 8
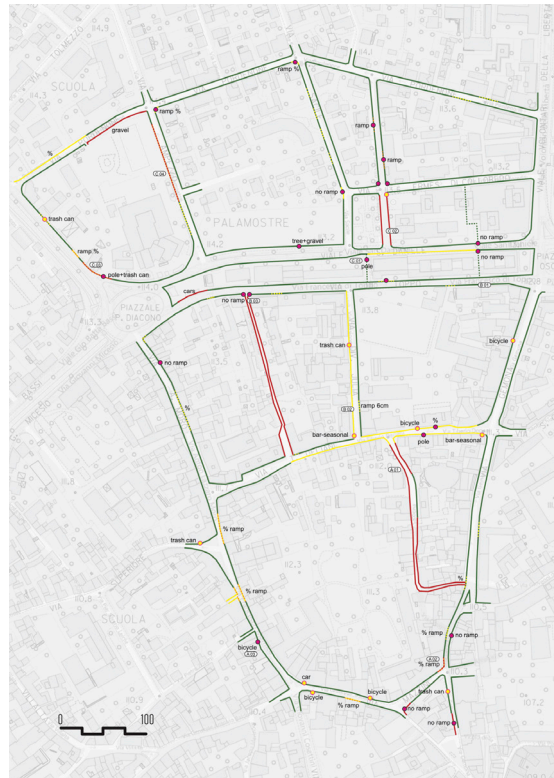
The study took into consideration 3 different Groups of users: reduced kinetic abilities, impaired vision, and blindness.
The selected macro-area presents spaces for public use that do not relate to each other; in order to give back those areas to the community the acquisition of potential awareness of those spaces it is required; the renegotiation of semi-private spaces allows the re-connection favoring a greater permeability, as long as a possible reactivation of services disseminated on 'new' routes reducing average times and travel distances (Fig. 4).
The conditions surrounding the chosen area (Fig. 6: the pilot area) such as the services available (transport, commercial service or refreshment), the architectural limitations, the presence (or less) of cycle paths, road safety, and access to public buildings or private activities open to the public.

The analysis and mapping of the area taken into consideration have been developed with the local survey and recognition of critical issues (Fig. 4): full accessibility (green color), average accessibility (yellow), partial or complex accessibility (orange); inaccessibility (magenta).
In doing so, the characteristics of the street fronts - on the ground floor - were documented, i.e. the parts in direct connection with the first outdoor space (sidewalks and paths) and the undeveloped areas of public or private property that become a reference for all the studies.
In the pilot area, several 'users with' different disabilities (reduced mobility, vision problems), and age (subjective mapping) were involved in order to collect data to be re-proposed and summarized according to specific 'discrimen' (Fig. 7-8).

The qualitative mapping of the area sees the user of the urban space walking the streets and identifying the blocks, signaling, and evaluating the critical issues he/she encounters. These critical issues, reported on the cartography, define a 'thermostatic' layout: the fully accessible areas are represented by the green color, those that are accessible on average by the yellow color, those partially or hardly accessible by the orange color and those completely inaccessible with a magenta color.
Monitoring and photo-reporting made it possible to highlight areas that can be considered inaccessible, partially accessible, or average accessible.
The 'critical areas' are in fact defined - generally - by limitations of a horizontal type, such as the depth of the sidewalks, measured on several points and reported briefly only on the limiting areas, the quality of the pavements or asphalt, the presence or absence of ramps connection and/or their possible size and positioning, the presence of artifacts that temporarily or permanently interrupt some paths.
Vertical devices are also a problem, such as the presence of signal poles in the middle of the sidewalks, the height of the curbs, the presence of racks that limit the pedestrian path and the presence of temporary or seasonal objects with the occupation of public land: bar's tables and chairs.

PERCORSO ACCESSIBILE
PERC. MEDIAMENTE ACCESSIBILE
PERC. PARZIALMENTE ACCESSIBILE
PERC. INACCESSIBILE
CRITICITÀ VERTICALI
CRITICITÀ ORIZZONTALI
% PENDENZA ECCESSIVA

PERCORSO ACCESSIBILE
PROPOSTE DI PERCORSO
PARCHEGGI MEDIAMENTE ECCES.
PARCHEGGI DIFFICILMENTE ACCES.
RAMPE PEDONALI, ZEBRATE

**Strategies, Pilot Area -
Retraining, new paths for all
users**
Fig. 11

PERCORSI, RICONNESSIONE, ACCESSIBILITÀ
PERCORSI, RICONNESSIONE, ACCESSIBILITÀ
NECESSITÀ RIQUALIFICAZIONE GRAVE
NECESSITÀ RIQUALIFICAZIONE MEDIA
NECESSITÀ RIQUALIFICAZIONE LIEVE

**Sum of critical issues
- all users group 1 -
kinetic disabilities**
Fig. 9 (left)

**Suggested accessible
path - all users group 1 -
kinetic disabilities**
Fig. 10 (right)

The interpolations between the collected
data and the specific interpretations of the
chosen urban case have produced a strategic
solution of reconnection and reactivation
of the paths in the quadrant being studied.
Innovative information technologies have
been integrated, such as apps to support all
the architectural practices of survey and field
analysis which are also part of the evolution
of the building process (qGis , Umaps , etc.).

The subjective mappings of the *users*
have allowed the recognition of the most
accessible route (summation of critical issues
and recommended itinerary on the state of
affairs for each group of users) in order to
relate it to the objective analysis routes of the
urban block (Fig. 9-10).
The interpolations of the data design new
routes born from the porosity of the block
which also goes towards the reduction of the

travel distances (Fig. 11).
The ultimate goal is therefore to start a
virtuous process of citizens' sensitization
and empowerment of the municipal
administration that allows the redevelopment
of the urban fabric aimed at the inclusion of
the city: coherent projects will be followed
by decisive and contextualized interventions
(Fig. 12).

Visions
Fig. 12

Conclusions

One of the steps necessary for monitoring the degrees of perception and inclusive urban usability consists in knowing how to contextualize life models through the rediscovery of culture, of the material history, of the local community; in addition, recognizing the collective identity elements necessary to create better-living conditions allows the regeneration of the urban fabric. Monitoring, disseminate, promote the involvement of the users and the local community becomes the 'enhancement element' of the city, of its activities and its built heritage. The process thus defined becomes integrated into the city-system and also becomes an element of the high symbolic value of a wider strategy aimed at attracting new development opportunities.

The applied research presented allows us to plan the evolutionary framework and the result of a succession of design interventions at different scales from the urban one – with the definition of accessible itineraries – to the detailed one – with the removal of architectural barriers.

The experiment carried out allows subjective considerations to be extended to the entire study area, leaving further possibilities of transferability of this calibration system, oriented towards the city improvement. The research conducted permits to have the first framework of subjective knowledge necessary for the correct contextualization of the sensitivities of the different types of users; consequently, the method is also transferable, as a preliminary support element per the redefinition of a wider urban quadrant to be surveyed: usability testing (Tosi, 2005).

The experiment, therefore, allows us to propose shared collective activities in the different contexts where there is the need to create safe and inclusive areas while lowering down the social stigma and increasing the universal awareness of urban and human multitudes.

Note

Acknowledgments

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