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Building an Age-friendly City for Elderly Citizens through Co-designing an Urban Walkable Scenario

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This paper is based on the research project – “LONGEVICITY” - carried out in the Metropolitan Area of Milan, which looks at the cities of the future as highly populated by long-living active people and innovative technological facilities. The project is conducted by a multidisciplinary research approach to study how to support social inclusion of elderly living in urban environments by enhancing their active walking. The whole process will engage participants (senior citizens) and stakeholders in a human-centred design approach. In this paper we will present the results from the preliminary research activities carried out: case studies and territorial observations. The first activity was oriented to investigate and select innovative solutions to enhance the mobility of elderly pedestrians and to improve their (social) lives. The second one helped us in better framing the design context of action and assessing at a microscopic level, the degree of walkability of specific territorial areas.

Keywords: Age-friendly city, Walkability, Social inclusion, Human-centred design

Introduction

Population ageing is one of the most significant global trends of the present times (UNWTO, 2017): older adults comprise the fastest growing segment of the population (i.e. ageing society). According to a recent forecast (WPA, 2015) by 2025 the number of people aged 65 and over will represent the 20% of the population in most of the OECD Member Countries. In particular, Italy and Japan hold the world record for longevity of the population, due to the decline of birth rate and the increase of life expectancy. This trend is even more relevant considering that by 2025 the 59% of the global population will live in cities and urban agglomerates. It's definitely necessary to take elderly into consideration of building future cities, where all citizens will be inclusively cared, supported and even empowered. This is especially crucial for managing and planning of urban environments.

“Walkability” is an idea that is increasingly popular for “smart growth” and sustainability in the city. (Glicksman, Ring, Kleban, & Hoffman, 2013). Research has tied measures of Walkability to health outcomes such as reduced obesity (Brown, et. al., 2009), lower rates of depressive symptoms (Berke, Gottlieb, Oudon, Vernez, & Larson, 2007), and even greater longevity (Tkano, Nakamura, & Watanabe, 2002). And “walkability” is also becoming an important concept in the field of ageing, especially among advocates for programs that encourage active aging and helping older adults remain in their homes and communities.

This research, funded by a national foundation for three years, is conducted by a multi-disciplinary research team: 1) information, system and communication research team, 2) design research team, 3) the regional volunteer association for the elderly and 4) advanced science and technology research team. In this research,



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the authors address the question of how to facilitate the urban neighbourhood to be more walkable for senior citizens in a specific European city. The research project aims at better understanding what elderly people perceive as criticalities or valuable elements while walking/crossing in the city and at improving the situation by means of practical interventions on the comfort, safety and attractiveness of urban environments. This study will focus on the co-creation of urban spaces, which will act as a “social centre” of the neighbourhoods that increase the possibility and the willingness of elderly citizens to participate in social activities and have social interactions. Existing checklists and guidelines for the design of age-friendly cities do not often take into account the needs of sociality among the elderly, which is instead the truly intrinsic motivation for them to navigate the city. The investigation of innovative design solutions for the outdoor urban areas will foster the walkability and accessibility of the environments, more significantly, will induce spontaneous aggregation and appropriation of public spaces by elderly citizens. This will be promoted by conducting a human-centred approach for creating new meaning of age-friendly cities. The results of the project will provide knowledge, data and experiences useful for city managers and policy makers involved in the design of innovative and technological solutions (ICT, IoT) for the management of mobility in future smart and sustainable cities, characterized by the presence of active long-living inhabitants interacting with multiple technology-based services.

Methodology

Based on the research questions identified in the previous part, the research strategy for the whole project is explained below.

Cross-disciplinary methodology: the proposed methodology is based on the integration between quantitative data collection techniques and qualitative co-design methods. On one side, there is a combination between collecting data of pedestrian locomotion behaviour (i.e. analysis) and the power of computer-based pedestrian simulations (i.e. synthesis). On the other side, a human-centred approach guides different actors to collectively participate in the whole research process. The results obtained from the representational observation and the experimental investigation of pedestrian behaviour give the basis for the following co-design phase, validation of computer-based simulation systems, testing the adherence of the simulation results on realistic behavioural dynamics. A GIS-based territorial analysis identified those areas in the city of Milan that are characterized by the highest presence of elderly inhabitants and by the poorest level of pedestrian safety. These areas will be exploited as “living labs”. Outdoor and indoor activities involving a large sample of senior citizens will be undertaken to foster their mobility and inclusive sociality. Senior participants will also be engaged in participatory design laboratories to express their needs and desires. A series of empirical studies will allow to: 1) assess the degree of walkability by means of questionnaires; 2) study age-driven walking and road crossing behaviours by means of observations and experiments; 3) testing and prototyping initial co-design solutions. The results of the project will provide first-hand feedbacks, ideas and proposals for the design policy and guidelines for the management of age-friendly pedestrian mobility in future cities.

Under the general defined methodology, the design research team specified the research strategy and activities based on its interests and its role in this project. In order to build a basis to start this research project, literature review was conducted to create framework and criteria for data collection activities. Case study, onsite observation and interview were organised to collect both first-hand and second-hand research data for shaping promising and situated design opportunities. After defining the design challenges, focus groups and participatory laboratories will be carried out to generate and test new solutions (new product, spatial and service ideas). The whole design research process has been illustrated below (figure 1).

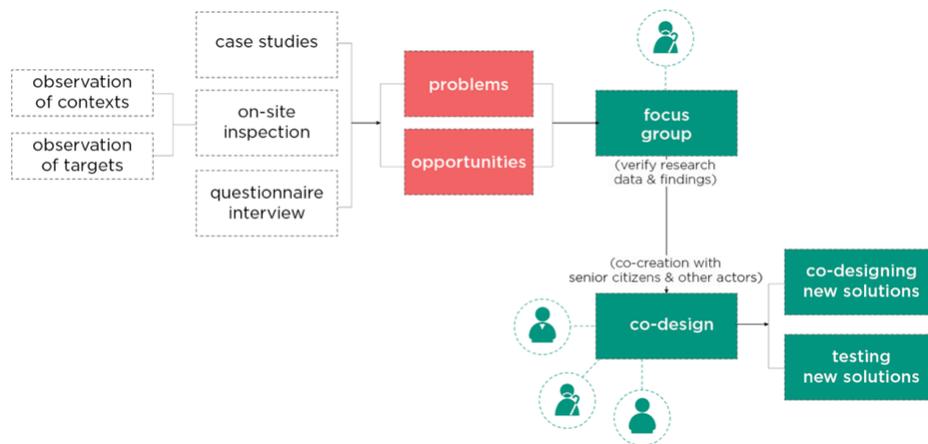


Figure 1: Research process of design research team in this project. Illustrated by authors.

Literature review

The literature review activity has been addressed to three main topics: age-friendly city, definition of walkability for elderly and collaborative design approach.

Developing age-friendly city

WHO (2002) stressed that the notion of ‘active’ refers to the idea that older people should be able to continue to participate in social, cultural, spiritual, economic and civic fields and issues. Then in 2007, the concept of “Age-friendly City” (WHO, 2007) was introduced: a framework for urban development encouraging Active Ageing, the promotion of physical activity of ageing people recognized as a priority for public health actions. Many countries responded through the development of policies and interventions supporting physical activity as a key challenge for future actions and calls to support vulnerable population groups, encouraging the active inclusion/participation of people in urban areas. An age-friendly city is a city that "encourages active ageing by optimizing opportunities for health, participation and security in order to enhance quality of life as people age. In practical terms, an age-friendly city adapts its structures and services to be accessible to and inclusive of older people with varying needs and capacities" (WHO, 2007). An age-friendly city: 1) recognizes the great diversity among older persons, 2) promotes their inclusion and contribution in all areas of community life, 3) respects their decisions and lifestyle choices, and 4) anticipates and flexibly responds to aging-related needs and preferences. Making age-friendly cities is one of the most effective instruments to respond to demographic ageing, enabling people to actively live the urban environment while the cities themselves will benefit from people involvement and well-being.

There are mainly two aspects to consider when developing an age-friendly city. Firstly, the physical environments, the city’s infrastructures, have significant impacts upon the elderly citizens. Older people might be especially sensitive to the change of built and physical environments. For example, some urban development models have focused more on physical infrastructure and design (Atlanta Regional Commission, 2009) for the elderly, and the safety of older pedestrians is identified as a major issue in many cities (Buffel et al, 2012). WHO released a checklist of essential features of age-friendly cities (2007) to guide policy makers, public institutions, groups and even individuals to make their cities more age-friendly. The checklist mainly includes the following aspects: for example, the outdoor space and buildings are set as one of the principle elements to consider and control for designing cities to be more age-friendly. There are different ways in which urban environments might be accessible and satisfying for older citizens: models are emphasizing on the physical/social environment and also on from top-down to bottom-up governance. Other models focus on physical infrastructure and design (Atlanta Regional Commission, 2009), while some else (e.g. the UK model of Lifetime Neighbourhoods) pay more attention towards social aspects of the environment. Physical accessibility, proximity, security, affordability, and inclusiveness appeared as important characteristics in all locations for developing age-friendly cities (Plouffe & Kalache, 2010). Buffel et al. (2012) has also stated other main issues as challenging for developing age-friendly cities: the safety of older pedestrians, rates of crime and environmental changes. Besides, he suggested to treat the resources associated with urban communities and networks generated in the neighbourhood as opportunities.

Secondly, the software of the city, e.g. offered services, relationships and networks relevant to specific contexts, is equally important to transform a city to be age-friendly. Hirsch et al. (2000) identified two major factors affecting the quality of life of an elder individual: independence (the capacity to care for oneself making one's own decisions) and engagement (the possibility to communicate and share experience and friendship). Research on age-friendly city also investigated the quality of social relations that promote social participation (Lui, Everingham, Warburton, Cuthill, & Bartlett, 2009; Scharlach, 2012). Some have studied the formal and informal relationships, participation and inclusion (Department for Communities and Local Government, 2008). The relationships between elderly citizens and cities could be positively leveraged through forming a lively and dynamic age-friendly community. Social participation is strongly associated with physical and psychological well-being, in older life as during the entire lifetime; it refers to people's interaction and engagement with other people within a society, whether it is a defined association of people or the neighbourhood in a city. Activities such as working, volunteering, engaging in recreational activities and living with the community, is the heart of social participation. Sense of belonging and trust on people and places enforce social networks and spring new ties.

During the 1990s and early 2000s, WHO introduced the concept of "Active Ageing": the word "active" refers to "continuing participating in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labour force", having as a final and highest goal to "extend healthy life expectancy and quality of life for all people as they age" (WHO, 2002). Mobility and accessibility are also key factors in the discourse of Active Ageing as they presume the capacity to move independently and safely from one place to another. From another perspective, Active Aging also promotes the recognition that older adults are not just the beneficiaries of age-friendly communities: they also have a key role to play in defining and shaping their distinctive features (Menec, Means, Keating, Parkhurst, & Eales, 2011; Buffel, 2015). The development of age-friendly city should involve elderly citizens in actively reforming, together with other actors, the city for all citizens.

Walkability assessment for senior citizens

The attention around the issue of walking in the city grew considerably at the end of the '80s. Designers and urban planners focused on strategies for the development of pedestrian areas and, in general, on promoting walking in urban territories. The European Charter of Pedestrian Rights (1988) highlighted the need to ensure the comfort and safety of pedestrians in urban areas, including the elderly and people with impaired mobility:

- Art. I - "The pedestrian has the right to live in a healthy environment and freely to enjoy the amenities offered by public areas under conditions that adequately safeguard his physical and psychological well-being"
- Art. III - "Children, the elderly and the disabled have the right to expect towns to be places of easy social contact and not places that aggravate their inherent weakness"

Jeff Speck (2013) has recently defined a general theory of Walkability, which explains how, in order to be favoured, a walk has to satisfy four main condition: it must be *useful*, *safe*, *comfortable* and *interesting*. As stated in "Proposed Walkability Strategy" by Stantec Consulting Ltd. (2009), "walkability is the measure of the overall walking and living conditions in an area and is defined as the extent to which the built environment is friendly to the presence of people walking, living, shopping, visiting, enjoying, or spending time in an area". Reid Ewing (2009) defined three characteristics for a pedestrian-friendly environment:

- Essential features: Urban density, mixed use of the territory, relatively small neighbourhoods, safe and recurring pedestrian crossing (every 150 meters), continuous sidewalks wide enough for dyads, separate walkaways from vehicles-dedicated lanes.
- Highly desirable features: Proximity to commercial activities and green areas, harmony of big and small buildings in the same area, right proportion of space dedicated to the vehicle traffic and pedestrian flow.
- Nice additional features: Street and public space furniture such as benches, effective signals and urban elements aiming at enriching urban decor and cultural features.

Improving mobility implies barrier-free buildings, streets maintenance, perceived safety and, in general, making secure for children to play, for women to venture outside and for elderly to find place in outdoor activities. The whole community would benefit from an age-friendly environment and, in particular, from the

participation of its older members. An age-friendly city is also a city able to develop a "walkable community" (Jacobs, 2011), that is, to design a human scale environment where safety is promoted, and people can enjoy walking and gathering in comfort.

Starting from the general theory of walkability proposed by Speck (2013), this research redefined a set of walkability assessment criteria specifically focussed on the needs of senior citizens who walk in urban neighbourhoods. As explained in the previous part, senior citizens have more sensitive feelings about urban environments and infrastructures. According to this preliminary consideration, below a set of walkability indicators for the evaluation of the level friendliness of urban areas for senior citizens is proposed and explained:

- **Usefulness:** the urban environment should be designed and planned with an adequate level of land-use mix, street connectivity and commercial density, to guarantee the presence of numerous and diverse public services and facilities within a walkable distance (e.g. public transport services, residential facilities, commercial activities).
- **Comfort:** urban infrastructures should be designed according to a series of standard criteria of quality and accessibility which accommodate the needs of all pedestrians, especially the senior citizens (e.g. pavement type and continuity on sidewalks, installation of ramps for people with reduced mobility, adequate width of sidewalks to avoid crowds in rush hours), but also according to a set of highly recommended elements which support the comfort while walking (e.g. installation of dedicated urban furniture for resting for the elderly, such as green areas with trees, benches, tables and fountain; installation of waste baskets for separate collection of rubbish to maintain the cleanliness of the city; typologies of public spaces, e.g. playground to meet others) (Gorrini & Bertini, 2018).
- **Safety:** urban environment should be planned to assure the safety of senior citizens while walking and crossing the roads (e.g. absence of barriers, obstacles and pothole on side-walks to avoid the occurrence of injuries; proper design of road intersection layouts to avoid pedestrian-car accidents; installation of speed bumpers to reduce the speed of vehicles; installation of traffic light and illumination systems at intersections to guarantee visibility of pedestrians while crossing; specific crossing aids to support senior citizens). This is most crucial element when evaluating the walkability for the elderly.
- **Attractiveness:** the city should be designed to have with several and distinctive areas of attraction to promoting walking activities; this is based on the presence of points of interest and events, the quality of the architectural appearances (e.g. enclosure, amenities, public spaces, green areas) and the vitality of the social context. Also, the emotional aspects (e.g. hearing and smell) should be considered as a part of attractiveness.
- **Legibility:** streets should be designed to support way-finding activities. Most senior citizens are familiar with the neighbourhood where they are walking, however, the urban environment should be designed to be legible, interpretable, memorable, or navigable by itself considering its architectural and infrastructure features (Gorrini & Bertini, 2018).

The proposed criteria represent a general guideline towards the design of age-friendly urban environments. To be successfully used as supports to city managers' activities, every specific item should be listed in a better organised protocol for further steps. According to Pearce (1985) and Blečić et al (2016): socio-demographic characteristics in terms of age and grouping (e.g. the decline of motor abilities linked to ageing make elderly people walking slower than adults); the purposes and frequency of walking (e.g. the walking behaviour of senior citizens for leisure is different from those with specific task to complete).

Design shapes a new meaning of "elderly"

Design, as a discipline, is increasingly crucial to play an irreplaceable role in understanding complex social issues and solving social problems. When Papanek (1972) firstly mentioned the importance for designers, architects and city planners, to consider the social and environmental impacts of products and raised the concept of humanitarian design movements, which emerged over during the following decades. Looking at the social impacts of most products, which do not take ageing and its peculiarities into consideration or simply avoid the consciousness of getting old. The products are well designed with a beautiful appearance, but they don't consider the seniors' needs and behaviour habits. Often in the world of products, as well as marketing, it does not seem to notice the availability and predisposition for consumption of the seniors. When there is attention to the problems (physical, cognitive, psychological, emotional) of the elderly, the creation of

artefacts is often excessively stigmatizing. The products that respond to a specific function, almost a mechanical translation without any attention to the aesthetic and emotional aspects, the user-friendly interaction and the right meanings. The problem is that a certain type of design (but also a certain approach of marketing) forgets that an artefact must, above all, be able to transfer meanings and emotions, not only the function.

The concept of involving design discipline and methods in this research is naturally linked to some significant design issues: design for all (EIDD, 2004), universal design (Mace, 1996) and inclusive design (Myerson & Lee, 2010; Clarkson et al, 2013; Shipley, 2014). Especially, when design solutions should be applied for a wider range of users (e.g. in urban public spaces), the design principles and guidelines need to guarantee the equality of different types of users and targets. This is the basis of designing for an age-friendly city. From another perspective, there's the so-called "hospitalization approach" which is constituted by very stigmatising products and services, usually characterized by little attention paid to attractiveness. Design, in this situation, could and should not forget a design solution (product, service or spatial design) has to transfer a new meaning to users and consumers (Verganti, 2009). Therefore, an attention to the senior users with meaningful product, spatial and service solutions should be paid when designing for them. Attractiveness and usefulness are two equally significant aspects to consider. In a Human-Centred Design process (Norman and Draper, 1986; Norman 1988), a design activity have to start from gathering a better understanding of senior users' needs. This approach has its origin in ethnography and participant observation methods: the user should be put at the centre of the observation and designers could get important insights derived from the identification of customer needs in order to generate innovative products (Zurlo, Sedini & Vignati, 2015). However, human-centred design approach alone doesn't work effectively to read and tell behaviours, actions, interactions and relations. Designers should be able to reveal the hidden needs, interpret and transform them into new solutions, which provide more than what users think and feel they want.

Jacobs (1961) has stated that cities have the capability of providing something for everybody, only because, and only when, they are created by everybody. This idea claimed the importance of involving citizens in a co-think and co-doing process of creating a city for all. In this research, in order to shape an age-friendly space for elderly to walk, it's necessary to engage senior citizens in the whole design process. Designers are facilitators to bring the voices of the elderly and to create a condition in which they could participate in discussing and decision-making processes. The design process is a creative conversation, in which different actors are going to negotiate on ideas, strategies and implementation as well. Another element to highlight is that the design process doesn't end up with ideas on the paper with well-illustrated graphics. The advantages of involving senior citizens in a co-creation process lies also in prototyping the initial solutions and getting feedbacks in order to make adjustment quickly and effectively. However, the balance between listening to final users and making interpretations should be controlled by designers. Radical innovation comes through meaning change and, as we already stressed, design for seniors must, first of all, change its approach to its meaning and contents (Verganti, 2009).

Case study

The literature review has helped to create the research boundary and focus. Afterwards, the case study phase collected international inspiring cases useful also for the following ideation phase.

Case collection

The case collection activity started from the three key topics identified in the literature review phase, and mainly four categories/main areas have been selected to guide this step:

- New concept of urban living for elderly (with a focus on "mobility")
- Smart aids for elderly (with a focus on technologies' impact)
- Active social life (community-based solutions)
- Explorative/visioning solutions (conceptual and experimental projects)

The first category is focused on finding solutions (products and services) providing new concepts of urban living for senior citizens. In this direction, mobility is a highly relevant issue to consider. The second category looks at solutions that are enabled by applying specific technology to answer to specific needs of senior citizens. The technology, especially digital technology, has been playing more active role in the lives of the elderly. The third group of cases includes solutions that involve senior citizens to actively participate in social life within their

area). The selection process considered a series of indicators (e.g., quality of sidewalks, safety of crosswalks, presence of public services), and this selection was decided together with all the partners.

Designing observation protocol

Based on the walkability framework for elderly identified from literature review, the research team developed a protocol for conducting onsite observations in selected neighbourhoods. The observation protocol includes six main indicators: usefulness, comfort, safety, attractiveness, legibility and population. The first five elements have been explained in detail in the previous part. The last indicator: population, has been added in the protocol with the consideration of getting comprehensive picture about the observed area. During the observation process, researchers paid attention not only on the hardware: urban infrastructure, but also on the software: typology of people, who are living and carrying out their daily activities in that neighbourhood, etc. For each element, specific questions were designed to get sufficient data for producing a walkability assessment. Each question has generally four levels: low, medium, high and excellent.

The areas to observe were selected starting from the service centre for elderly located in that area as the main central point of interest. There is higher density of senior citizens who are walking in those areas. Moreover, the protocol is highly standardized in order to register neutral-enough results without personal preferences.

Conducting walkability assessment

Two researchers conducted the on-site observations. They went to the first selected area about 7 times and conducted the observations both during the day (in the morning or in the early afternoon) and during the late afternoon (around 16:30 to 18:00). In winter during these hours the sun goes down, therefore, it's the right period to observe the effectiveness of the lighting system. Data were collected thanks to the implementation of a shared online protocol. The choice of using a digital online tool was due to the possibility to standardize the observation process and give the researchers a common tool. In addition to that, this tool allowed to easily analyse and compare data. We carried out 15 observations. The data were analysed using excel and assigning scores for each elements according to their presence or absence. In this research, the walkability assessment formula has been designed as: $\text{Walkability} = \text{Usefulness (20\%)} + \text{Comfort (20\%)} + \text{Safety (30\%)} + \text{Attractiveness (20\%)} + \text{Legibility (10\%)}$. At the end, we calculated a score for each observation and based on the formula, we generated the final walkability score for each street and then for the whole area of interest.

Results from preliminary research data

Thank to observations, carried out initially in the central area of the city of Sesto San Giovanni, and then in the area of Gorla-via Padova of Milan, we investigated different aspects which concur in the evaluation of walkability. We both analysed the levels of walkability for each street taken into consideration and for the whole area of interest.

We present here only the results from the observations carried out in Sesto San Giovanni (because the observations in Gorla-via Padova were made afterwards). In particular, looking at the general scores of the area:

- Usefulness: registered a medium score (0.32). Indeed, this area offers several important services which are at a walking distance from our main point of interest, such as Post offices, banks, grocery shops, recreational places, etc.
- Comfort: registered a high score (0.52). This area presents pretty good conditions of accessibility especially for elderlies and it is constituted by elements which favour to experience the area by foot. This means, for example, that sidewalks are wide enough and not too steep to be easily walked and that there are not many obstacles which impede the passage of a person. In addition to that, public spaces and urban furniture are generally satisfying in terms of pleasantness and they basically answer people needs to rest and be informed.
- Safety: also this indicator registered a high score (0.57). This indicator is very important in order to favour both the perceived and the actual security in walking around the area both during day and night. It does not refer only to personal security but for example it includes the presence of safe pedestrian crossings.
- Attractiveness: a high score it was registered (0.58). In a different way from the usefulness indicators, attractiveness points out the vocation of an area. A mixed vocation is preferable than a unique one

and our area of interest is indeed mainly both residential and commercial, offering also educational and others' service activities. In addition to that, attractiveness measure also the presence of litter, noise and unpleasant odours, which in our case are all limited to those present in an average but well-maintained urban street.

- Legibility: even if this is the least important indicator, we registered a high score as well (0.64). This means that signs and street indications are readable enough also for people who might have some sight issues.

As the total walkability is concerned, the area registered a high score (0.52). This is an important result to evaluate also the possibility for us to easily conduct the following research activities, such as shadowing of senior citizens who walk in this area, organize outdoor group walking activities with the senior citizens who agree to participate in the project, etc.



Figure 3: The visualised result of walkability assessment through onsite observation. Illustrated by authors.

As explained in the methodology, from the case studies selection and observations, it was possible to identify different scenarios that are going to drive our future steps of research. In particular, we are going to focus on the square “outdoor-enabling” of our matrix. Moreover, the research team has also tried to use the five indicators identified from literature review to re-analyse 31 cases collected in the previous step. With the objective of absorbing useful inspirations, the re-analysis process has selected the most relevant cases to generate direct insights for next phases. Regarding to “usefulness”, one case has presented a new service typology of community-living for elderly. A case about responsive urban furniture provides ideas about how an open space could be transformed by technology to provide useful information for citizens, especially those have limited accesses. This is a way to increase the “comfort” level. Besides, a number of product design have offered solutions to elderly people to ensure the “safety” of daily activities and to encourage their active walking. For example, a pair of shoes have been designed to prevent elderly falling down while walking. Regarding to “attractiveness”, one case has shown the possibility to change a neighbourhood through artistic intervention to retell the historic stories relevant to elderly citizens.

In addition to that, next steps of field research, which has been already planned, will consider a new field of observation in a more critical area of the city of Milan in terms of walkability (Gorla-via Padova). As in the case of Sesto San Giovanni' observations, we are going to collaborate with another centre of support for elderlies. Starting from the centre, which constitutes our point of interest, a surrounding area of observation has been identified. This second phase will be used to assess and refine the observation protocol. Moreover, these primary results will be also evaluated according to:

1. A series of qualitative interviews with senior citizens;
2. The design-orienting scenarios identified.

The first activity (interviews) will be oriented to the assessment of walkability' indicators since the perception of our target might be different (better or worst) from what we actually observed. In addition to that, we are going to gather information about different levels of social inclusions thanks to questions about their daily life. The second activity will be oriented to identify and develop design solutions able to address and eventually solve walkability issues. Indeed, the exploratory research phase (case studies) will be interpreted in accordance with observations and interviews results in order to select even more specific areas of interest. The following phase will expect the conduction of co-design activities where the senior citizens will be involved in order to design a more walkable and therefore inclusive neighbourhoods.

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References

- Atlanta Regional Commission (2009) Lifelong Communities: A Framework for Planning [<http://www.atlantaregional.com/aging-resources/lifelongcommunities/lifelong-communities>], accessed 1 Feb. 2019.
- Berke EM, Gottlieb LM, Oudon M, Vernez A, Larson EB. Protective Association Between Neighborhood Walkability and Depression in Older Men. *Journal of the American Geriatrics Society*. 2007;55:526–533.
- Blečić , I., Canu, D., Cecchini, A., Congiu, T., Fancello, G., Mauro, S., Sacerdotti, S.L. and Trunfio, G.A. (2016), "Coupling surveys with GPS tracking to explore tourists' spatio-temporal behaviour", International Conference on Computational Science and Its Applications Springer International Publishing, pp. 150-60.
- Brown BB, Ikuho Y, Smith KR, Zick CD, Kowaleski-Jones L, Fan JX. Mixed Land Use and Walkability: Variations in Land Use Measures and Relationships with BMI, Overweight and Obesity. *Health and Place*. 2009;15:1130–1141. doi: 10.1016/j.healthplace.2009.06.008.
- BSI TBSI: Design management systems. Managing inclusive design. Guide. vol BS 7000-6:2005 (2005).
- Buffel, T. (2015). *Researching age-friendly communities. Stories from older people as co-investigators*. Manchester: The University of Manchester Library.
- Buffel, T., Phillipson, C., & Scharf, T. (2012). Ageing in urban environments: Developing 'age-friendly' cities. *Critical Social Policy*, 32(4), 597-617.
- Clarkson, P. J., Coleman, R., Keates, S., & Lebbon, C. (2013). *Inclusive design: Design for the whole population*. Springer Science & Business Media.
- Department for Communities and Local Government (2008) Lifetime Homes, Lifetime Neighbourhoods: A National Strategy for Housing in an Ageing Society. London: Department of Health, Department for Work and Pensions.
- EIDD: The EIDD Stockholm Declaration 2004. Adopted on 9 May 2004, at the Annual General Meeting of the European Institute for Design and Disability in Stockholm. Design for All Europe (2004).
- European Parliament (1988). *The European Charter of Pedestrian Rights*. https://www.diba.cat/c/document_library/get_file?uuid=246cdcd3-0c1b-4056-9573-115f2eb986b3&groupId=7294824 Accessed February 2, 2019.
- Ewing, R., & Handy, S. (2009). Measuring the unmeasurable: Urban design qualities related to walkability. *Journal of Urban design*, 14(1), 65-84.
- F. Zurlo, C. Sadini, A. Vignati, Longevity in Y. Lee, P. Moore, *Ageing and Ingenuity*, Desis Network, www.hkdi.desislab.vtc.edu.hk Hong Kong 2015.
- Glicksman, A., Ring, L., Kleban, M., & Hoffman, C. (2013). Is "walkability" a useful concept for gerontology?. *Journal of Housing for the Elderly*, 27(1-2), 241-254.

- Gorrini, A., & Bertini, V. (2018). Walkability assessment and tourism cities: the case of Venice. *International Journal of Tourism Cities*.
- Hirsch, T., Forlizzi, J., Hyder, E., Goetz, J., Kurtz, C., & Stroback, J. (2000). The ELDer project: social, emotional, and environmental factors in the design of eldercare technologies. In *Proceedings on the 2000 conference on Universal Usability* (pp. 72-79). ACM.
- Jacobs, J. (1961). *Death and Life of Great American Cities*. New York:Random House.
- Lui, C. W., Everingham, J. A., Warburton, J., Cuthill, M., & Bartlett, H. (2009). What makes a community age-friendly: A review of international literature. *Australian Journal on Ageing*, 28(3), 116–121.
- Mace, R.L., Hardie, G.J., Place, J.P.: Accessible environments: toward universal design. North Carolina State University: The Center for Universal Design. http://www.ncsu.edu/ncsu/design/cud/pubs_p/pud.htm (1996).
- Menec, V. H., Means, R., Keating, N., Parkhurst, G., & Eales, J. (2011). Conceptualizing age-friendly communities. *Canadian Journal on Aging*, 30, 479–493.
- Myerson, J., & Lee, Y. K. (2010). Inclusive Design Research Initiatives at the Royal College of Art, Book in *Universal Design Handbook*. McGraw-Hill Professional.
- Nevens, F., Frantzeskaki, N., Gorissen, L., & Loorbach, D. (2013). Urban Transition Labs: co-creating transformative action for sustainable cities. *Journal of Cleaner Production*, 50, 111-122.
- Norman, D. A. (1988). *The psychology of everyday things*. New York, NY: Basic Books.
- Norman, D. A., & Draper, S. W. (Eds.). (1986). *User centred system design*. Hillsdale, NJ: Erlbaum.
- Papanek, V. (1972). *Design for the real world* (p. 22). London: Thames and Hudson.
- Pearce, P.L. (1985), "A systematic comparison of travel-related roles", *Human Relations*, Vol. 38 No. 11, pp. 1001-11.
- Plouffe, L., & Kalache, A. (2010). Towards global age-friendly cities: determining urban features that promote active aging. *Journal of urban health*, 87(5), 733-739.
- Rundle A, NEckerman KM, Freeman L, Lovasi GS, Purciel M, Quinn J, Richards C, Sircar N, Weiss C. Neighborhood Food Environment and Walkability Predict Obesity in New York City. *Environmental Health Perspectives*. 2009;117(3):442–447.
- Scharlach, A. (2012). Creating aging-friendly communities in the United States. *Ageing international*, 37(1), 25-38.
- Speck, J. (2013). *Walkable city: How downtown can save America, one step at a time*. Macmillan.
- The European Charter of Pedestrian Rights (1988) <https://goo.gl/0vKTJ9>
- Tkano T, Nakamura K, Watanabe M. Urban Residential Environments and Senior Citizens' Longevity in Megacity Areas: The Importance of Walkable Green Spaces. *Journal Epidemiological Community Health*. 2002; 56:5.
- United Nation (2015). *World Population Ageing report*. http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf. Accessed February 2, 2019.
- Verganti, R. (2009). *Design driven innovation: changing the rules of competition by radically innovating what things mean*. Harvard Business Press.
- World Health Organization (2007) *Checklist of Essential Features of Age-Friendly Cities*. Geneva: WHO Press.
- World Health Organization (2007). Checklist of essential features of age-friendly cities. http://www.who.int/ageing/publications/Age_friendly_cities_checklist.pdf. Accessed January 25, 2019.
- World Health Organization (2007). *Global Age-Friendly Cities: a guide*. https://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf. Accessed January 25, 2019.

World Health Organization. Office of World Health Reporting (2002). The World health report: reducing risks, promoting healthy life: overview. Geneva. <http://www.who.int/iris/handle/10665/67454>. Accessed February 3, 2019.