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## Is your city planned for all citizens as they age? Selecting the indicators to measure neighbourhoods' age-friendliness in the urban planning field

Silvia Urra-Urriarte <sup>a,b</sup>, Patricia Molina-Costa <sup>a</sup>, Unai Martin <sup>b,c</sup>, Uyen Nhu Tram <sup>d</sup>  
and Juanita Devis Clavijo <sup>e</sup>

<sup>a</sup>TECNALIA, Basque Research and Technology Alliance (BRTA), Derio, Spain; <sup>b</sup>Department of Sociology and Social Work, University of the Basque Country (UPV/EHU), Leioa, Spain; <sup>c</sup>Social Determinants of Health and Demographic Change, Opik Research Group, University of the Basque Country (UPV/EHU), Leioa, Spain; <sup>d</sup>AGE PLATFORM EUROPE, Brussels, Belgium; <sup>e</sup>SMIT (Studies in Media, Innovation and Technology), joint research group between IMEC and VUB, Brussels, Belgium

### ABSTRACT

In many countries, urban population ageing trends are a recognized policy issue that requires a multidisciplinary approach. Although some fields, such as urban planning, encounter challenges in incorporating age-friendliness, they are crucial in enhancing the quality of life and well-being of all urban inhabitants. Additionally, they should provide solutions on how cities can cater to the needs of a population that is living longer than ever before. To accomplish this, older people's needs can be translated into multidomain indicators to be adopted when planning the cities. Using the World Health Organization's age-friendly cities indicators framework as a basis, the objective of this research is to establish a new indicators framework for urban planners and policymakers. With this aim, within the H2020 URBANAGE project, various cities have followed a process to adapt the WHO's general framework to their specific needs and interests, through research, iteration with the cities and co-creation methodologies with older people and civil servants. This process has resulted in the definition of an indicators framework, which aims to evaluate the age-friendliness of various neighbourhoods within a city. It also intends to inform the development of decision-support technologies to achieve age-friendly cities in the different cities involved.

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Urban planning; age-friendly; cities; indicators; measure; older people



### Introduction


The city is the space that best satisfies human needs by allowing the development of human capacities. The city provides access to a multitude of stimuli, proximity to others and the possibility of receiving social solidarity (Hernandez Aja *et al.* 1997). The environment we dwell in has a great influence on our health and well-being (Morris and Saunders 2017). It defines how our personal, social and productive life is shaped and how we interact with others. Therefore, the way a city is designed and planned has a big impact on how we experience it and, eventually, on how we age.

Historically, urban planners and architects have designed cities 'for heterosexual, able-bodied, cis-gender men' (Terraza *et al.* 2020). This resulted in urban environments and public spaces that are more used by some population groups. Women, gender minorities, and people of different ages and abilities have been often neglected in the design and planning processes. This resulted in great inequalities in the use of the urban environment. In the last decades, urban planners have been trying to find the answer to this question:

how can urban planning support cities in adapting to fulfil the specific needs of all the population groups, i.e. how to achieve inclusive and accessible cities (Phillipson and Grenier 2021)? In other words, cities can become a place where everyone, regardless of economic means, gender, race, disability, age, sexual identity, migrant status or religion, is legitimized and empowered to fully benefit from the social, economic, cultural, and political opportunities (UCLG Congress 2019).

Considering older people's needs becomes an urgent challenge to address if local and regional decision-makers want their citizens to age well. With the increased life expectancy and low natality (in 2050, 16% of the world population will be over 65 years old), joined by the fact that by 2050, 68% of the world population will be living in cities (UN-Habitat 2022), understanding the connection between population ageing and urban transformation has emerged as a significant concern for public policy (Buffel *et al.* 2019). To unlock the potential older adults bring to sustained human progress, cities must guarantee their integration and unrestricted access to urban

**CONTACT** Silvia Urra-Urriarte  [Silvia.urr@tecnalia.com](mailto:Silvia.urr@tecnalia.com)  TECNALIA, Basque Research and Technology Alliance (BRTA), Parque Científico y Tecnológico de Bizkaia, Astondo Bidea, Edificio 700, E-48160 Derio (Bizkaia), Spain

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environments, infrastructure, and services (Plouffe and Kalache 2010).

This article focuses on how cities can be redesigned to support the needs of older citizens, an often-forgotten part of the population, following the World Health Organization (WHO) model of age-friendly cities that prioritizes health, embraces diversity, fosters inclusion, and promotes unity, including across all ages and capacities. Indeed, the city's public spaces can be considered as the continuation of the private home, especially for those older adults who are alone (Noon and Ayalon 2018). Most of the time older people's needs are not incorporated into the urban planning process (Sophie Handler 2014). Not involving older citizens could therefore condemn them to the remit of their housing, leading to social isolation and its collateral negative health effects. The reasons can range from perceived safety issues,



**Picture 1.** Urra S. (2021), "Slopes in the city of Santander".



**Picture 2.** Urra S. (2021), "Mechanical ramps installed in the city of Santander to solve accessibility issues".



**Picture 3.** Glodeanu A. (2019), "Green and accesible public urban space in the city of Santander".

inaccessible buildings, lack of public toilets, and lack of seating areas or bad pavements (Van Hoof *et al.* 2021).

The objective of this research is to develop a set of indicators to support urban planners in meeting the unique needs of older individuals within their community while evaluating the age-friendliness of various neighbourhoods. This data will provide policymakers and urban planners with the essential information needed to make informed decisions and investments at the municipal level, allowing for comparisons of friendliness across different neighbourhoods within the city. It is a resource that is aligned with the competencies of the municipal body and its governance in terms of decision-making and investment prioritization.

A straightforward and systematic approach has been developed to collaborate closely with cities to create friendly urban spaces for all citizens, particularly the older ones. This approach has been tested in the URBANAGE project ('Enhanced URBAN planning for AGE-friendly cities through disruptive technologies'), a European Commission-funded initiative focused on improving urban planning by leveraging cutting-edge technologies. The URBANAGE project's objective is to assess the potential benefits, risks and impact of implementing a long-term sustainable framework for data-driven decision-making in the field of urban planning for ageing well in cities, using an engagement strategy with relevant stakeholders and users, supported by disruptive technologies. This project has three testing pilots: the city of Santander, in Spain, the region of Flanders, in Belgium, and the city of Helsinki, in Finland.

Each of these pilots faced different challenges to respond to the needs of their older citizens. In Santander, the city's topography significantly shapes the limitations older individuals encounter while navigating public spaces and infrastructure due to geographical constraints (Pictures 1, 2 and 3). The situation in Helsinki

involves tackling the complications arising from the widespread distribution of urban areas, as older residents in various neighbourhoods strive to access city services while also perceiving issues related to accessibility. Meanwhile, in the Flanders region, the driving force stems from the community's demand for urban areas that provide a sense of green comfort, aiming to alleviate the impact of climate change on the health of the most vulnerable groups such as the older citizens (Bayar and Aygün Oğur 2023).

In the following sections, after setting the background of this research, we outline the method used for the definition of the URBANAGE age-friendly city indicators. First, we describe the research background and present the results of our analysis of different frameworks concerning age-friendly cities. Subsequently, we elaborate on the iterative process undertaken in collaboration with the city of Santander, Helsinki, and the region of Flanders. This process involved several cycles of consultation with civil servants to identify the most relevant indicators from the WHO's age-friendly cities framework as they relate to urban planning competencies. We also briefly discuss the outcomes of the co-creation activities with older people and civil servants in the three pilots and how their feedback was incorporated into the URBANAGE indicators framework. Finally, we demonstrate how these activities supported the identification of specific urban planning areas where age-friendliness can be improved. We describe the necessary steps required to achieve this objective, and we outline the process followed for the selection of the final indicators. These indicators result in a framework that enables the comparison of different neighbourhoods in the same city.

## Background

The difficulties encountered by older individuals in today's society largely stem from the gradual adjustment of the environment to their requirements, perpetuating existing or emerging social challenges. It is imperative to acknowledge that older adults are not a uniform group, but rather possess diverse needs, lifestyles, preferences, and life experiences. Therefore, local governments should encourage citizen engagement and facilitate daily life for older adults by including them in any process that could have an impact on their lives. Designing urban spaces that acknowledge and incorporate the requirements of older adults into their design is not only crucial but creates living environment that enables them, but also other vulnerable groups, to maintain their independence (Brüchert *et al.* 2022) as well as enhanced health. Finally, by involving older adults in these processes, new approaches can be developed that are relevant and appropriate for their specific

contexts, ultimately helping them to be implemented and adopted successfully.

As highlighted by the WHO (World Health Organization 2015), the primary emphasis for age-friendly city initiatives and, consequently, their measurement in the short and medium term, lies in altering the features of the social and physical environment, which are significant determinants of health. Over time, the aim is to positively affect health and well-being through indirect means. While there are direct interventions like health promotion, disease prevention, early detection, treatment, rehabilitation, and palliative care for specific health outcomes, age-friendly cities prioritize a community-wide approach, focusing on the broader well-being of older individuals.

In 2007, the World Health Organization (WHO) released the *Global Age-Friendly Cities: A Guide*, which paved the way for the establishment of the Global Network for Age-Friendly Cities and Communities three years later. The network serves as a platform for connecting cities, communities, and organizations worldwide that share the goal of creating an inclusive environment for older people to live in and it focuses on actions at local-level initiatives that encourage active participation of older citizens in community life and promote healthy and active ageing. Currently, the WHO Global Network for Age-Friendly Cities and Communities includes 1,445 cities and communities in 51 countries, covering over 300 million people worldwide (WHO 2015).

In 2015, the WHO published the document *Measuring the Age-friendliness of Cities: A Guide to Using Core Indicators* (World Health Organization 2015). This document provides a framework and a set of indicators to guide the cities in evaluating their progress in improving the age-friendliness of urban environments. In 2018, the WHO regional office in Europe, and the European Commission published the document *Age-friendly environments in Europe: Indicators, monitoring, and assessments*. The 2018 document is based on the 2015 guide and introduces an enriched version of the previous indicators resulting from the analysis of other Age-friendly guides, such as the Active Ageing Index (Zaidi 2013) the *Age-friendly communities evaluation guide: using indicators to measure progress* (McKnight *et al.* 2015), the Standard indicator definitions from the new UNECE (Task Force on Ageing-related Statistics 2016) and the document *Healthy ageing profiles. Guidance for producing local health profiles for older people* published by the WHO (2008).

The latest WHO document categorizes a set of 81 indicators in the eight different domains previously identified in the 2007 guide (see Table 1)

All these documents have been analysed and further developed by other researchers. Kano *et al.*

**Table 1.** Domains of indicators (WHO 2007).

Domains	Indicators
Outdoor Environments	14
Transport and Mobility	11
Housing	10
Social Participation	12
Social Inclusion and Non-Discrimination	5
Civic Engagement and Employment	11
Communication and Information	8
Community and Health Services	10

**Table 2.** Domains of indicators of the URBANAGE AGE-FRIENDLY CITIES indicator framework.

Domains	Indicators
Outdoor Environments	14
Transport and Mobility	6
Housing	10
Social Participation	4
Communication and Information	3

(2018), analysed the process to measure these indicators in different contexts worldwide, appointing, among other conclusions, that the inclusive process that is followed to select, measure and reflect the indicators is the way to guarantee the validity of the data and to promote the collaboration while raising awareness. Davern *et al.* (2020) propose a different approach by developing a quantifiable spatial indicators framework that evaluated local living environments across all domains of Age-Friendly Cities (AFC) to address the challenges identified by the Age-friendly community movement in the WHO's Age-Friendly Cities and Communities Guide. Their research aimed to overcome the barriers of the movement, which included the need for a clearly defined scope of actions to measure and quantify results, and

the necessity to improve connections to policy and funding mechanisms. The age-friendly cities movement's assertions were well-founded due to the lack of direct implementation of the age-friendly approach in urban planning, despite the recognition of the need for planning and older people's input on the matter. They determined that there was a clear disconnection between the existing city planning processes and the integration of the age-friendly approach into policy and urban planning processes.

More recently, Van Hoof *et al.* (2021) analysed existing tools and instruments for measuring the impact of Age-Friendly Cities and Communities on the built environment. They found a need for a more integrated research methodology in urban planning related to AFCs and identified the importance of multi-disciplinary teams that employ co-design and co-production approaches. Collaborating with older citizens was also deemed essential for successful age-friendly plans and programmes.

Lately, other researchers have added other elements such as vulnerability. Agost-Felip *et al.* (2021) have concluded that to be replicated, the Age-Friendly Cities model should be adapted to the conditions of the study area and that it is highly dependent on the availability of reliable and disaggregated information, the scale of the application and for this specific vulnerability focused approach, the information from Social Services.

At this point, the question is whether the primary challenge in implementing the WHO approach is attributable to a deficiency in integrated research methodology and the associated difficulties in obtaining dependable data, or

**Table 3.** Sources of the first set of URBANAGE AGE FRIENDLY CITIES INDICATOR.

Name	Description	Total Indicators	Selected Indicators Urban Planning field
Age-friendly environments in Europe: Indicators, monitoring, and assessments ( <i>Age-Friendly Environments in Europe: Indicators, Monitoring and Assessments n.d.</i> )	<ul style="list-style-type: none"> <li>The WHO global list of indicators in Measuring the age-friendliness of cities: a guide to using core indicators (WHO 2015): core [WHO MAFC Core] and supplementary indicators [WHO MAFC Supp];</li> <li>The Active Ageing Index (UNECE 2016b) [AAI];</li> <li>Healthy aging profiles produced using WHO guidelines (WHO Regional Office for Europe 2008);</li> <li>The Public Health Agency of Canada's (2015) Age-friendly communities evaluation guide: using indicators to measure progress [AFC-CAN];</li> <li>Standard indicator definitions from the new UNECE (2016a) Recommendations on aging-related statistics, mainly for demographic and socioeconomic context variables (UNECE 2016a).</li> </ul>	81	37
A Spatial Indicators Framework for the Assessment of Age-Friendly Communities. (Davern <i>et al.</i> 2020)	A quantifiable spatial indicators framework to assess local lived environments according to each Age-Friendly Cities and Communities (AFC) domain. The selection of these AFC spatial indicators can be applied within local neighborhoods, census tracts, suburbs, municipalities, or cities with minimal resource requirements other than applied spatial analysis.	33	11
Australian Urban Observatory Liveability Index ( <a href="https://auo.org.au/measure/">https://auo.org.au/measure/</a> )	The liveability Index combines indicators of liveability found to be associated with health and wellbeing outcomes.	46	2
First set of URBANAGE AGE FRIENDLY CITIES INDICATOR			50

whether it is primarily a matter of applying the general framework to the unique context of each city and community. Furthermore, the adoption of an age-friendly approach, particularly in certain domains, such as urban planning, appears to be an even greater obstacle.

Although some cities have made progress in this regard, these cases remain isolated. For instance, in 2019, the city of Donostia-San Sebastian in Spain identified in their Municipal Housing Plan the existence of a large number of dwellings with just one inhabitant and proposed some measures to permit the subdivision of dwellings (Plan Municipal de Vivienda de Donostia-San Sebastián 2019). One of the purposes of this measure was to give older people living in big homes the option to divide them into smaller units. This measure would reduce the energy and maintenance bills of their homes and at the same time would allow them to have an economic profit by selling the units resulting from the subdivision.

The World Health Organization recommends that the adoption of the core indicators in a specific location should include the adaptation and the integration of new indicators to fit the specific local needs and emphasizes the need to customize the age-friendly approach to suit the specific needs and characteristics of individual cities and communities, rather than taking a one-size-fits-all approach (World Health Organization 2015).

To create a suitable framework of age-friendly indicators for each city that effectively integrates multiple components, it is crucial to first identify the indicators that are most relevant to the local context. This framework will facilitate the assessment of age-friendliness across various neighbourhoods within the city. It is also important to determine whether the necessary data to measure these indicators already exist at different scales, such as the city, neighbourhood, and building levels, or if it needs to be obtained. Collaboration with cities and engaging end-users, particularly older individuals, are essential components of this process.

Moreover, these indicators form an integral part of city governance and urban management systems, necessitating the collection, storage, analysis, and assessment of data to support informed decision-making. Ensuring the effective management of these indicator systems is paramount. Cities bear a significant responsibility for safeguarding the data's quality that underlies these indicators, as it directly impacts the quality of decisions made using them (Huovila *et al.* 2019). Neglecting to use transparent and reliable data, indicators, or indexes poses a risk to effective city management.

## Methods

A step-by-step methodology was followed to create the URBANAGE AGE FRIENDLY CITIES INDICATOR

framework. In this methodology, the results of each of the steps have created the ground for the next one. It employs a mixed-methods approach that involves two main components: a literature review of various age-friendly city (AFC) frameworks and a case study conducted in the cities of Santander, Helsinki, and the Flanders region. The case study comprises two primary components: a consultative iterative process involving civil servants of the pilot cities, and a co-creation process that includes interactive participation from both senior citizens and city officials.

## *Aims, objectives and participants*

The selection of the different methods used tackles the need to address distinct phases within the methodological approach. First, it is key to gain an understanding of prior work in this domain, and with that intention, other existing frameworks and studies have been analysed. Second, if we aim to develop a collection of indicators to support urban planners in meeting the needs of older people concerning the use of public spaces and infrastructure, it is mandatory to involve the end-users from the first stage of the process. In this case, end-users encompass both older adults and civil servants.

To facilitate this aspect, the second phase of this methodology included conducting case studies in the testing pilots of the URBANAGE project in Helsinki, Santander, and the region of Flanders. Throughout this process, civil servants from various municipal departments and groups of older adults have been actively involved in surveys and workshops. These collaborative activities have brought together a total of 40 older citizens and 40 civil servants.

## *Urban planning and age-friendly cities' indicators*

The process of selecting indicators for the framework was guided by two main criteria. The first involves reviewing the existing indicators within the WHO AFC domains and associated indexes to identify those that could enhance the framework. The second criteria consists of selecting indicators that are directly linked to urban planning or that may impact the planning of cities. Although urban planning may appear to be a relatively narrow field, the World Health Organization has acknowledged that interventions in the urban planning field can significantly affect non-urban planning outcomes (World Health Organization 2015). This is one of the reasons why certain indicators from other fields were also included in the initial set of indicators. Consider, for instance, Public Safety – a matter that urban planners typically don't manage directly. Still, the way an urban area is designed and lit up to

eliminate shady spots can make a big difference in how safe people feel in that place.

As mentioned in the introduction, we began by analysing the WHO framework of 81 indicators grouped in eight different domains, which are detailed in [Table 1](#). The goal was to identify domains and indicators that were affected by urban planning decisions or were within the scope of urban planning competencies. Three domains directly related to urban planning were selected: Outdoor Environments, Transport and Mobility, and Housing. We discarded some domains that were more related to services that depend on social services or regional competencies (e.g. health, employment), or other fields that are considered outside the scope of this research: Social Inclusion and Non-Discrimination, Civic Engagement and Employment, Community and Health Services.

However, not all the indicators of the selected domains were included. For example, some of the indicators dealing with public transport characteristics were excluded from Transport and Mobility since we understood that do not fall under urban planners' direct competencies. The two remaining domains (Social participation and Communication and Information) were included in the set of domains, although only some of the indicators were selected. We considered the indicators that enabled physical access to different city services and the existence of a digital infrastructure that promotes access to communication and information. This led to a reduction of the preliminary set of 81 indicators to 37 (see [Table 2](#)).

Additional frameworks associated with healthy and age-friendly cities were then analysed to identify other relevant indicators that could be incorporated into the framework. The following table ([Table 3](#)) lists some of the other frameworks examined and the number of indicators associated with each one. It also indicates the number of indicators from each framework that were eventually included in the initial set of indicators.

The various analysed indicator frameworks and indexes share a similar approach, and many of the indicators are commonly found across them. Despite not being included in the above table, we also examined the AGE FRIENDLY URBAN INDEX (Gibney *et al.* 2020), but found that the indicators it included were already covered by the other indexes and frameworks, like the Liveability indicators included in the Australian Urban Observatory (Davern *et al.* 2023) or the Spatial indicators framework (Davern *et al.* 2020).

The result of this first part of the methodology is the first URBANAGE AGE FRIENDLY CITIES INDICATOR framework, which is included in [Supplementary ANNEX 1](#), and identifies the new indicators added to the ones from the WHO indicators' framework, accounting for a total of 50 indicators.

### **Contrast of the framework with the pilots**

The second part of the methodology involves collaborating with the case study pilots. To identify the civil servants who should be involved in the participatory process, a cross-analysis is conducted between the selected domains and indicators, and the various city departments. This analysis identifies the administrative departments in each pilot city/region with competencies in the acknowledged domains that can contribute to making cities more age-friendly from an urban planning perspective.

The subsequent participatory cycles are aimed at identifying the areas where different pilot cities are failing to cover their older population's needs in the urban space. With that purpose, a survey is prepared transforming the set of indicators into questions to make the civil servants further explain the preselection of the indicators. As an example, the indicator *Number of accessible washrooms* was transformed into the question: *Does your city have accessible public toilets? are safe and well maintained?* The complete survey is included in [Supplementary ANNEX 2](#). With the results of that survey, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is conducted during an online session with civil servants of the case studies.

As a result of this process, a set of indicators tailored to the local context is developed by incorporating inputs from the case study pilots. This set of indicators, available in [Supplementary ANNEX 3](#), includes the new indicators identified in the iterative process with the case studies.

The outcomes of this part of the methodology are the foundation for the co-creation process with older individuals and civil servants. Their input will complement the indicators framework by ensuring that the needs and requirements of both groups are adequately covered by the URBANAGE Age-Friendly Cities Indicator Framework.

### **Co-creation with older people and civil servants of the cities of Santander, Helsinki and the region of Flanders**

Involving older people in decision-making processes related to urban planning is crucial as their unique experiences, skills, and abilities can complement the knowledge and expertise of researchers and policy-makers and provide different perspectives on relevant topics. One effective way to ensure their participation is to co-create with the end-users, including both older people and civil servants. Co-production and co-research are viable methods for accessing the expertise and knowledge of older people (Buffel 2018). They enable the inclusion of the views of those who are currently unheard and provide a platform for meaningful

social engagement and mutual learning between older people, service providers, professional groups, and civil servants. This is crucial for challenging discriminatory practices and developing age-friendly environments and cities that address the needs of older citizens.

As said previously, the co-creation process in the URBANAGE project targeted two main groups: older people and civil servants. For older people, the focus was to ensure that the selected list of indicators ([Supplementary ANNEX 3](#)) was comprehensive and that all the challenges they faced while navigating urban spaces were adequately represented. The co-creation process was designed to identify any potential gaps in the indicators and to work collaboratively with older adults to fill these gaps. Regarding civil servants, the process aimed at developing a sustainable framework for data-driven decision-making in urban planning for ageing well. The co-creation approach allowed a better understanding of their current city planning processes, existing age-friendly initiatives, available data, and specific challenges.

The process follows the *Participation for Policy for Older Adults (PAR4POA)* method (Van Leeuwen *et al.* 2022). This method involves three participatory actions, that have been purposefully designed to serve specific objectives as part of a comprehensive co-creation process. The first action is centred around gathering insights from older adults about their experiences and needs when navigating the urban environment. The second action engages policymakers and civil servants in the design process. Finally, the third action brings together both target groups to collaboratively design user journeys, validate existing requirements, prioritize new ones, and identify any missing user needs.

The initial phase of co-creation involves engaging with older citizens, with the primary aim of gaining insights into their vision of an age-friendly city. This encompasses both long-term and short-term considerations, addressing the challenges and immediate needs associated with age-friendly urban environments, and in our case also with specific pilot use cases. Drawing from these insights, the ultimate objective is to articulate user requirements that encapsulate 'what older citizens want to be able to do in their cities'. These requirements are formulated using the structure: 'As an older citizen, I want to be able to (take a certain action) to (achieve a specific goal)'.

The second phase of co-creation is directed towards civil servants. The primary goals are to validate the requirements gathered during the co-creation sessions with older adults, assess their feasibility, and gather information about existing initiatives and departments linked to age-friendly cities. This phase also delves into an examination of the technology and methods currently in use by civil servants and the

barriers they encounter when using and integrating different data sources.

The third segment of the co-creation process aims to synthesize the insights acquired in previous sessions with both older adults and public servants. A co-creation session bringing together these two groups serves the purpose of validating the user requirements initially formulated by older adults in light of the perspectives of public servants and the findings obtained from their session. Furthermore, this collaborative session allows for the prioritization of user requirements, considering participants' assessments of importance and feasibility. Additionally, the participation of public servants in this co-creation workshop facilitates the identification of potential technical constraints and challenges associated with implementation.

This process resulted in the completion of the existing framework and the development of the URBANAGE AGE FRIENDLY CITIES indicators framework v03 ([Supplementary ANNEX 4](#)).

## Results

The methodology described above was tested in the three URBANAGE pilots (Santander, Helsinki and the region of Flanders). This section presents and discusses the results of that process.

First, an analysis was conducted for the cities of Santander, Helsinki, and the region of Flanders, to identify the relevant departments to be involved in the process ([Table 4](#)). The results highlighted the need for an integrated and intersectoral approach, with common governance and data sharing between departments, to ensure comprehensive coverage of all relevant domains.

Then, the civil servants from the three URBANAGE pilots reviewed the initial set of indicators derived from the desktop research (URBANAGE AGE FRIENDLY CITIES INDICATOR framework v01, [Supplementary ANNEX 1](#)) and selected the indicators related to urban planning that applied to their respective contexts. They also suggested new indicators to be included.

The proposed indicators were accepted without any identified omissions by Helsinki and the Flanders region. However, Santander identified a new topic and two additional indicators ([Table 5](#)) (one related to the new topic Urban Accessibility Solutions, and the other one related to an existing topic, Neighbourhood walkability).

As a result of this process, a set of indicators tailored to the local context was developed for the URBANAGE project, incorporating inputs from the case study pilots. This set of indicators, available in [Supplementary ANNEX 3](#), encompasses the 14 topics and 50 indicators identified in the

**Table 4.** List of city departments identified.

Domains of the Urbanage Framework for Age Friendly Cities (AFC)		City administration departments
OUTDOOR ENVIRONMENTS	<ul style="list-style-type: none"> <li>• Urban Planning;</li> <li>• Infrastructures (works and construction);</li> <li>• Security and emergency: should encompass all public servants involved in ensuring safety, ranging from preventing criminal activities against older people to addressing falls or accidents in urban spaces and promoting a sense of safety.</li> <li>• Environment: the responsible at the city level for controlling the pollution (air quality, noise, light) but also for avoiding the urban heat islands.</li> <li>• Public spaces and Nature and green areas;</li> <li>• Innovation;</li> <li>• Public buildings (full access to hospitals, city council, administrative office, health center, public library, sports centers, cultural centers, etc.).</li> </ul>	
TRANSPORT AND MOBILITY	<ul style="list-style-type: none"> <li>• Public transport;</li> <li>• Parking: the proportion of parking lots reserved for people with special needs;</li> <li>• Streets and traffic planning;</li> <li>• Cycling and walking (infrastructure).</li> </ul>	
HOUSING	<ul style="list-style-type: none"> <li>• Housing;</li> <li>• Social Services, Equality, and Personal Autonomy: usually the departments in charge of funding housing interventions to improve accessibility are those of social and potentially homecare services;</li> <li>• Innovation;</li> <li>• Security and emergency: the same as in OUTDOOR ENVIRONMENTS but applied to housing;</li> </ul>	
SOCIAL PARTICIPATION	<ul style="list-style-type: none"> <li>• Urban Planning.</li> <li>• Citizen participation;</li> <li>• Culture (museums, theatres, leisure (pubs, coffee, restaurants. . .), sport and tourism);</li> <li>• Innovation;</li> <li>• Services (Banks, Post office, Commerce and markets, pharmacies, bakery, dentist, hairdresser, worship centre).</li> </ul>	
COMMUNICATION AND INFORMATION	<ul style="list-style-type: none"> <li>• Innovation.</li> </ul>	

**Table 5.** New target topic and two new indicators identified.

Domain	Target Topic	indicator
DOMAIN 1: Outdoor environments	Neighbourhood walkability	Shadow and sunlight zones.
DOMAIN 2: Transport and mobility	Urban accessibility solutions	Percentage of time of urban pedestrian facilities (escalators, etc.) service availability.

**Picture 4.** Urra S. (2021), "Cocreation session with older adults and civil servants in Santander".

analysis of various frameworks related to age-friendly cities, along with an additional topic and two indicators identified by the pilot cities, all of which fall under the five domains.

Subsequent iterations with the pilot cities aimed to pinpoint areas where they were lacking in meeting the needs of their older populations. The objective was to collaborate with these cities in identifying gaps within their urban planning strategies to ensure age-friendliness. These iterative processes led to the development of specific use cases for each pilot city within

the URBANAGE project. These use cases served as a blueprint for leveraging advanced technologies to bridge these gaps for older residents and their respective municipalities.

The co-creation process in the case studies within the testing pilots of the URBANAGE project yielded valuable insights into the common needs and challenges faced by older adults and civil servants across all pilot sites (Picture 4). Older adults consistently reported issues such as poorly maintained urban infrastructure, obstacles on sidewalks, and a lack of rest

areas. Civil servants, in turn, encountered technical, urban, and communication challenges when attempting to address the needs of older citizens in urban environments. Among the technical challenges were difficulties in obtaining and filtering extensive data sources, as well as linking different data sources from various departments and urban scales. These challenges often resulted in a lack of urban or policy action, as civil servants lacked awareness of which spaces were inaccessible for older adults or where interventions should be prioritized. Moreover, poor communication channels with older adults made it challenging to inform them of available initiatives and resources.

Through the co-creation sessions, we were able to identify the specific needs and requirements of older adults in the city that were not covered by the existing URBANAGE AGE FRIENDLY CITY indicators framework v02 and to share them with the civil servants in a common exercise to prioritize and check their feasibility. The analysis of the requirements formulated using the structure: ‘As an older citizen, I want to be able to (take a certain action) to (achieve a specific goal)’ paved the floor so that each pilot site translated the identified needs into indicators, which were cross-checked with the existing indicators.

The result of this co-creation process led to the new version of the URBANAGE AGE FRIENDLY CITIES indicators framework. In this new version, 34 new indicators were added. The additional indicators were primarily focusing on three domains: Outdoor Environments, Transport and Mobility, and Communication and Information. These indicators included specific requirements that were not necessarily related to urban planning competencies in some cases or were already covered by broader indicators identified previously. It is worth noting that seven new topics were also identified, such as environmental comfort of urban public places, green urban spaces, urban accessibility solutions, traffic levels, availability of information about events happening in the city, and digital skills of the older population as an enabler for communication with public administration.

Importantly, these results highlight the necessity of tailoring the indicator framework to suit specific local contexts. The needs and corresponding indicators identified in each pilot site reflect the influence of cultural and climatic factors on older adults’ requirements. For instance, the importance of maintaining urban accessibility infrastructure (such as ramps and escalators) was highlighted in Santander, while the Flanders region emphasized the significance of creating pleasant outdoor environments that were quiet, green, and enjoyable. In Helsinki, the focus was on the maintenance of urban spaces during winter to avoid slippery conditions and snow piles.

In addition, it is noteworthy that there are several common requirements shared among older adults in all three pilot sites, regardless of the city they reside in. For instance, the availability and placement of public restrooms, the presence and safety of sidewalks, trails, and walkways, and the need for clear communication and access to information channels with city administrations were identified as common needs, among others.

### **The URBANAGE AGE FRIENDLY CITIES indicators framework to measure the age-friendliness of neighbourhoods**

The process explained above resulted in the creation of the first version of the URBANAGE AGE FRIENDLY CITIES indicators framework, consisting of 50 indicators across five domains (Supplementary ANNEX 1). This version added three new indicators after the contrast with the URBANAGE pilots (Supplementary ANNEX 3) and was later updated to the third version (Supplementary ANNEX 4) with 86 indicators across five domains, including those from the co-creation process with older adults and civil servants.

We then analysed the new indicators to identify redundancies and groupings and assessed their feasibility for measurement using existing municipal data instead of surveys or queries. This is crucial as the resulting set of indicators is aimed at supporting data-driven decision-making in urban planning for ageing well.

Lastly, as explained before, the goal was to develop a collection of indicators that can assist urban planners in meeting the unique needs of older individuals within their community and evaluating the age-friendliness of various neighbourhoods. That was the reason for discarding indicators that affect the entire city, such as city-level regulations or infrastructure characteristics, as they do not provide information that can help compare the age-friendliness of different neighbourhoods. For example, one of the discarded indicators is *Housing programmes and resources* because, if these programmes exist, they are available for all the neighbourhoods of the city, and it would not give any information to compare among different neighbourhoods.

After the process, it was also decided to merge two domains, *Social participation* and *Communication and information* in one Domain *Social participation and communication*. This grouping results from the selection of indicators and the inputs received during the co-creation with older adults and civil servants.

After being tested in the pilot cases, the final URBANAGE AGE FRIENDLY CITIES indicators framework proposes four Domains: Outdoor environments, Transport & mobility, Housing and Social Participation & communication, with a total set of 36 indicators (see Table 6).

**Table 6.** URBANAGE AGE-FRIENDLY CITIES indicators framework. v04.

Domain	Target Topic	Indicator	
DOMAIN 1: Outdoor environments	Neighbourhood walkability	Number of rest places and distance between rest places.	
		Level of appropriateness (comfort) of benches/public furniture for older adult population	
	Accessibility of public spaces and buildings	Number of accessible washrooms, Availability (public) toilets	
		Safe crosswalks	
		Safe walkways	
		Existence of sheltered zones	
		Proportion of new and existing public spaces that are fully accessible by wheelchair	
		Proportion of public buildings (of a certain type/function) that that are fully accessible	
		Access to public open space (A public space is a space to which people normally have unrestricted access and right of way.)	
		Reported rate of crimes (per year) committed against older people	
Public safety	Numbers of physical incidents of older people (occurring in public places)		
	Location of public green		
Greenery & Water	Presence of water in public domain		
	Temperature, climate, noise & AQ		
DOMAIN 2: Transport and mobility	Accessibility of public transportation stops	Temperature/relative humidity	
		Presence of 'quiet' zones or zones	
	Accessibility of priority vehicle parking	Presence of clean air	
		Housing and public transportation	
	Urban accessibility solutions	Comfortable bus shelters	
		Priority parking at public buildings	
	Traffic levels	Special parking permit for older and disabled people	
		Maintainance of parking lots in winter	
	DOMAIN 3: Housing	Availability and affordability of housing	Urban accessibility solutions' schedule
		Accessible housing	Short time parking lots
DOMAIN 4: Social participation & Communication	Accessibility of participation opportunities	Traffic volume	
	Internet access	Safe biking infrastructure	
		Protected flats for older people	
		Public housing options	
		Accessible housing	
		Accessibility to community-based activities	
		Access to neighbourhood houses/community centres	
		Accessibility to cultural and educational facilities	
		Accessibility to sites of worship	
		Accessibility to leisure services	
		Accessibility to convenience stores	
		Accessibility to health centers	
		Internet access	

## Summary and conclusions

The subject of age-friendly city indicators has been extensively examined by experts across various disciplines. Our research focuses on identifying those indicators that apply to the urban planning field and determining whether they are suitable or need some tailoring for specific cities and their unique physical, social, and cultural contexts. Moreover, the objective was to identify indicators that can assess and compare the age-friendliness of neighbourhoods within a city, rather than redefining existing indicators, and to engage older residents and civil servants in the identification of relevant indicators.

During the co-creation process, new indicators emerged in response to the needs and requirements identified by civil servants and older people themselves. These indicators address issues such as urban accessibility, the need for sheltered zones or the importance of comfortable green spaces. It also emphasized the importance of some of the existing indicators, such as safe walkways, specifically the need for safe sidewalks in winter. The selection of

these indicators is contextualized by physical, climate, and cultural factors.

The identification of needs during the co-creation was influenced by various contextual factors, for example, the COVID-19 crisis. While many studies and articles have analyzed this situation, our study focuses on the specific urban planning field. As a concrete example, during the COVID-19 crisis, bars and restaurants were closed for several months, which made older people realize the lack of public toilets in good condition or the lack of information about their locations. Before this crisis, they could use the toilets in bars, but when they were closed, they were aware of the importance of having accessible public toilets.

The diversity among older people is another important consideration when identifying their needs and requirements for using city services and public spaces, which are influenced by their interests and their specific physical and digital capabilities. It also impacts the way we involve them in co-creation processes. As a result of this process, a policy brief was published containing recommendations for engaging older adults (Urbanage

2022). One of the key recommendations is to recognize that not all older adults are capable of using new technologies due to practical or psychological barriers. For example, they may lack access to an ICT device for economic reasons or resist learning new skills due to insufficient cognitive capacities, lack of education or lack of a supportive social network. By relying solely on new technology as a means of participation, a significant number of older adults may be excluded or discouraged from participating. It also applies to the modes of communication with older adults.

Creating age-friendly cities is a multifaceted issue that helps address the demographic, climate, and digital challenges that cities are currently facing. Addressing these challenges requires an integrated approach involving all city departments and competencies. However, in many cases, these departments operate in silos, which makes it difficult to achieve the necessary collaboration. This lack of collaboration can also make it challenging to access information needed to effectively measure and improve the age-friendliness of cities. Without this information, it is difficult to make informed decisions or conduct an accurate diagnosis of the situation. By cross-referencing information from the physical space, services, and social dimensions of cities, decision-making processes can be better informed, and all dimensions of the city can be considered.

The research has identified several information gaps, including the lack of available quality data. At the city level, it is often challenging to find the necessary databases to measure the defined indicators accurately, or the data available is no longer updated and doesn't reflect the current state of the city. Additionally, the relevance of the data is crucial, and cities must ensure they can store data sources over time and yearly aggregate this data.

Addressing these obstacles is essential in shaping the urban planning landscape of cities. By doing so, urban planners can gain valuable insights into the future requirements of the city's inhabitants, enabling them to make informed choices when creating more age-friendly environments. This information can also help municipal policymakers determine which investments to prioritize and optimize at the local level, to achieve the most significant enhancements in neighbourhood age-friendliness. This resource aligns with the competencies of the municipal authorities and their decision-making and investment prioritization capabilities in the field of urban planning.

In summary, it is vital to incorporate the age-friendly perspective into policy and urban planning processes, tailoring these approaches to the unique context of each city. Additionally, it's crucial to engage and secure the commitment of all city departments, highlighting the necessity of effective governance at the city level to gather essential information and data.

To successfully attain their goal of becoming age-friendly, cities must establish robust management systems encompassing a comprehensive set of policies, processes, and procedures to ensure they can fulfil the necessary tasks to achieve their objectives. Conversely, involving older citizens is paramount in the design and planning of cities that cater to their needs taking into account that older adults are a heterogeneous group, with different needs, lifestyles and interests.

Future research lines include the development of the URBANAGE Age-Friendliness Neighbourhood Index and its implementation within a particular urban setting. This first step of defining the framework for URBANAGE Age-Friendly Cities' Indicators will be followed by the identification of methods to measure these indicators and to acquire the necessary data. Once these steps are completed, the next challenge is to determine how to compare the age-friendliness of different neighbourhoods and prioritize certain domains. Incorporating new technologies can be beneficial in this process by integrating data from multiple sources to provide a holistic view of neighbourhood age-friendliness.

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### Notes on contributors

*Silvia Urra-Uriarte* is an Architect and senior researcher at TECNALIA, where she primarily focuses on Research and Innovation projects related to urban planning and construction, with a special emphasis on addressing the challenges posed by the growing trend of an ageing population. Her work revolves around analysing urban environments concerning the needs of their residents and implementing innovative construction and technological solutions to tailor these environments to the requirements of their population. She has been involved in several H2020 projects such as SmartEnCity and Homes4Life, and currently is working in H2020 URBANAGE project among others.

*Patricia Molina-Costa* is an Urban Planner PhD and Architect from Universidad Politécnica de Madrid (Spain) with a Master's degree from the Department of Urban Studies and Planning of the Massachusetts Institute of Technology (USA). Since 2022 she is the Director of City, Territory, and the Environment at Tecnalia, after 8 years as Lead Researcher of the Urban Transformation Lab. She manages a multidisciplinary team of 47 researchers, working with public and private organizations in helping cities and territories to deal with environmental, social, and

economic challenges, using data, technology, and innovation to enhance decision-making and public policy.

**Unai Martin** is an Associate Professor at the Department of Sociology and Social Work at the University of the Basque Country (UPV/EHU), PhD in Sociology (UPV/EHU) and PhD in Biomedical Research and Public Health (UAB). Member of the Research Group on Social Determinants of Health and Demographic Change OPIK. His main lines of research are social inequalities in health and social determinants of health, urban health, as well as the analysis and monitoring of population health.

**Uyen Nhu Tram** is an experienced Project Manager with a demonstrated history of working in the non-profit organization management industry. Strong community professional with a Master degree focused in Multilingual Communication - International relationships from Université libre de Bruxelles. She worked as a Research Project Officer at AGE Platform Europe, a European network of non-profit organisations of and for people aged 50+. Its aim is to voice and promote the interests of the 200 million citizens aged 50+ in the European Union (Eurostat, 2018) and to raise awareness on the issues that concern them most.

**Juanita Devis Clavijo** is an Urban Living Lab Developer at the AMS institute, she is responsible for AMS coordination the Marineterrein Living Lab, the EU ATELIER project and other Living Labs activities. She is passionate about cities, architecture and inclusion, and her interest is to investigate how technology and urban innovation can address energy, mobility, environmental and societal challenges. Her background combines her domain knowledge in urban planning with working experience in smart cities, mobility and technology. She was previously involved in the H2020 URBANAGE and the H2020 INDIMO and CityFlows projects as an Urban Design Researcher at IMEC.


## ORCID

Silvia Urrea-Urriarte  <http://orcid.org/0000-0001-5247-0192>

Patricia Molina-Costa  <http://orcid.org/0000-0002-6747-2753>

Unai Martin  <http://orcid.org/0000-0001-8937-2115>

Uyen Nhu Tram  <http://orcid.org/0009-0006-5609-4394>

Juanita Devis Clavijo  <http://orcid.org/0000-0003-3206-0457>

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