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Urban Mobility Next 9
±15-Minute City: Human-centred planning in action
Mobility for more liveable urban spaces

A study by:

TUM

±15-MINUTE CITY

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Key outcomes & recommendations

The Thought Leadership Study "±15-Minute City: Human-centred planning in action" focuses on how the concept of the 15-Minute City brought back human-centred planning to the attention. Fuelled during the COVID-19 pandemic, this concept raised interest all over the world with Paris as a frontrunner.

Contextualizing the Study

- The COVID-19 global outbreak led to changes in people's mobility and lifestyle during the pandemic. In many European cities, bike, bus, and overall traffic volume share was reduced during the first half of 2020.

- The pandemic has enforced unprecedented investment in cycling, especially in European countries. More than €1bn in cycling-related infrastructure and 2.300 kilometres of new bike lanes have been spent since the pandemic began.

- Some changes on travel behaviour were identified in most European countries. The demand for parks and public space has increased, while movement for work, retail and recreation has decreased.

- This study has been developed in three phases:

  - Literature and policies review
  - Practical assessment including workshops with practitioners and the applications of measurement tools on five European cities (Milan, Munich, Madrid, Ghent and Amsterdam)
  - A roadmap was defined to help practitioners and stakeholders to implement the ±15-Minute City in different contexts

The human-oriented planning paradigm of the ±15-Minute City

- The 15-Minute City is based on previous planning models from the Garden City, through the Neighbourhood Unit and Transit Oriented Development to Chronourbanism. Simultaneously reclaiming people's space in the city caused by other planning models that have prioritised the private car.

- Within this study, 16 cities have been identified that are trying to implement the 15-Minute City model under different labels (e.g., 10 –Minute town, 20-Minute Neighbourhood, etc) around the world.

- Based on the review of existing ±15-Minute City and discussion of its limitation (e.g., lack of inclusivity and transferability to different spatial contexts) 8 planning principles were determined:

  - Proximity to essential services

  - Proximity to public transport

  - Density

  - Mixed land use

  - Walkable and cyclable streets

  - Liveable public spaces and placemaking

  - Inclusiveness

  - Ubiquity

Challenges for the implementation of a ±15-Minute City

- A ±15-Minute City model cannot be homogeneous in its implementation strategies, due to the different spatial contexts and complexities that our territories present; strategies on how to implement the model in suburban areas need to be developed including land-use, territorial jurisdictions, and morphology.

- In its current formulation the concept takes into consideration mainly spatial and environmental observation, leaving behind socio-economic and demographic aspects (e.g., age, gender, income, people with disabilities, etc).

- Walking and cycling policies and assessments should be in relation to users´ ability (e.g., older people walking speed could be around 3,5 km/h while the average speed is considered 5 km/h.), travel purpose and environmental conditions.

- Higher quality and accessible, universal design walking and cycling networks in most under-served and low-income neighbourhoods that ensure connection to all areas of the city, combined with frequent and affordable public transport.

Recommendations for the implementation of a ±15-Minute City

- In order to implement the ±15-Minute City we recommend following the steps of the roadmap:

    - Envision a ±15-Minute City

    - Measure it

    - Identify areas of need

    - Create an action plan

    - Implement by phases

- Workshops with planning practitioners from five cities (Amsterdam, Ghent, Madrid, Milan, Munich) have shown that they have relatively similar ideas of the ideal 15-minute city. However, subtle differences also emerged, underlining the need to involve local actors in creating a shared vision of a +15-Minute City.

- An analysis of accessibility in five cities has shown that large European cities are already 10- if not 5-minute cities in large parts. The goal of bringing facilities closer to residents is therefore primarily a problem in suburban areas, while in urban areas the focus should be on factors such as the quality of walking and cycling routes and the attractiveness of public space.

- Before implementing permanent changes in your city, plan by phases: in short-, medium- and long-term. In this way, you can test different strategies and choose what is the best to achieve a ±15-Minute City.

1. Introduction

During the COVID-19 pandemic, lockdowns and travel restrictions forced people in cities all around the world to stay in the vicinity of their homes. As people spent more time outside, many people realized that the built environment in which they live is not designed according to their daily needs. Instead, it is characterised by a separation of functions and the provision of space for cars. The places in front of our homes are not designed as places to stay but as places through which we speed through, moving from one destination to another. Amidst the disruptive experience brought on by the pandemic, new ways to create more liveable, human-centred neighbourhoods, received increased attention. One of those new ways is presented through the 15-Minute City concept.

The 15-Minute City, as conceived by Carlos Moreno, has risen to prominence during Anne Hidalgo's campaign for re-election as mayor of Paris in the spring and early summer of 2020. It is seen as a way "to build back better" (C40 Cities Climate Leadership Group, 2020) in wake of the pandemic and has become a source of inspiration for European cities since then. The 15-Minute City concept was thought of as a human-scale proposition for how cities should be planned to improve quality of life. The goal is to provide people with all necessary destinations within 15 minutes from their homes walking or cycling. In turn, with more people interacting within their local environments, the creation of vibrant neighbourhoods is made possible.

The 15-Minute City, thus, ties in with past planning ideals such as Clarence Perry's Neighbourhood Units which aims at compact residential units where the proximity between services and homes contributed to establishing the identity and sense of belonging of a community; Ebenezer Howard's Garden City which proposed the creation of compact suburban towns near both nature and basic services: the German concept *Stadt der kurzen Wege (city of short distances)*; Harris and Ullman's Polycentric city which is based on the arguments that cities have multiple growth points around which city life should be developed; Hägerstrand's Time Geography which then evolved into chronourbanism or Calthorpe's Transit Oriented Development (TOD). The latter is an important concept around which our cities are being developed nowadays, aiming at creating dense, walkable, and mixed-use space near transport hubs. An overview of the historical development of the concepts and their relation to the 15-Minute City is presented in Figure 1.

PAVING THE WAY TO THE ±15-MINUTE CITY

Hierarchical system of urban amenities based on the neighborhood unit, many neighborhoods form the city (Perry, 1929).
Similarity with ±15-Minute City: neighborhood scale

NEIGHBOURHOOD UNIT
1926

Is a theory that specifies the constraints on human activity imposed by fundamental limits on human mobility and interaction in space and time (Hägerstrand, 1970).
Similarity with ±15-Minute City: daily life, travel time

TIME GEOGRAPHY
1970

Reorganize an area functionally around public transit options (Calthorpe, 1993).
Similarity with ±15-Minute City: pedestrian friendliness, high density, mixed land use

TRANSIT ORIENTED DEVELOPMENT (TOD)
1993

1898
GARDEN CITY
Balance between urban concentration, rural areas and nature (Howard, 1902; Marchigiani & Bonfantini, 2022).
Similarity with ±15-Minute City: close proximity to services

1945
POLYCENTRIC CITY
Cities has multiple growth nuclei around which growth take place (Harris and Ullman, 1945).
Similarity with ±15-Minute City: polycentric cities, even distribution of services

1979
NEW URBANISM
Distribution of workplaces, stores, schools, parks and all facilities essential to the daily lives of residents, all located within easy walking distance in a compact and diverse manner (Davis, 1979).
Similarity with ±15-Minute City: neighborhood level, services access at walking distance

1997
CHRONOURBANISM
Time based urban planning (Asher, 1997).
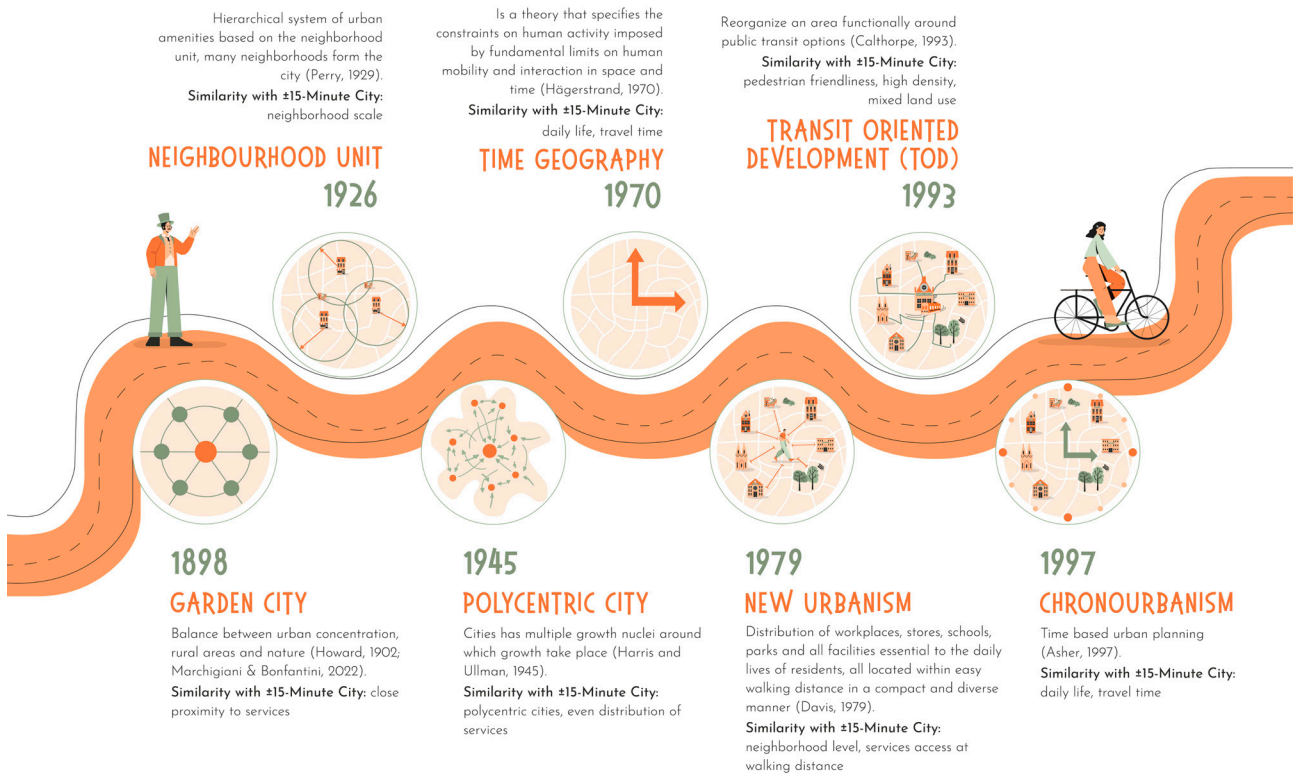**Similarity with ±15-Minute City:** daily life, travel time

Figure 1: Timeline of related planning concepts that preceded the 15-Minute City

The need to change our cities' fabric has long been acknowledged by practitioners and decision-makers alike. In the European context, the *Leipzig Charter on Sustainable European Cities*, which was adopted in 2007 by the responsible ministers of the EU member states, marked a shift for sustainable and just conceptions of modern cities (European Union, 2007). Further, it called for greater attention to the neighbourhood scale, especially regarding deprivation. The goals were reaffirmed in the updated *The New Leipzig Charter*, adopted in 2020 (European Commission, 2020a). On an international level, the call for more sustainable and just cities has been echoed, like the 11th Sustainability Development Goal (SDG) of the United Nations calls for inclusive, safe, resilient, and sustainable cities and settlements (United Nations, 2015).

The COVID-19 pandemic has been a reminder of the need to continue along these lines and has highlighted the inequity in urban planning around the world while presenting an opportunity to redesign and rethink urban planning. Following Paris' introduction of the concept, many cities have followed suit. There is now a growing number of 10-, 15-, and 20-minute cities, neighbourhoods and towns across the globe. We will therefore hereafter adopt the term ±15-Minute City; adding "the "±" to draw attention to the many models of chronourbanism that share common ground with the 15-Minute City. The spread of ±15-Minute Cities is a positive sign for changing priorities of many municipalities but also creates the need for guidance based on existing knowledge and experiences.

Within this report, we want to provide an overview of existing concepts (Chapters 2.1 and 2.2), potential benefits (Chapter 2.3) and discuss possible limitations and opportunities (Chapter 3 and 4). We also present our own vision of what the ±15-Minute Cities should be (Chapter 5) and a roadmap for its implementation (Chapter 6). Within the roadmap, the study provides practical tools and recommendations for planning practitioners and policy makers on how to implement and evaluate their ±15-Minute Cities in a way that takes into consideration their local context and different demographic and socio-economic groups. Ultimately, the goal should be to create a ±15-Minute City for ALL.

2. The human-oriented planning paradigm of the ±15-Minute City

The ±15-Minute City is one of the most discussed topics in urban planning, both in practice and in academia, today. This chapter will first give a brief overview of Carlos Morenos 15-Minute City concept and its application in Paris (Chapter 2.1). This short introduction serves as a basis for comparing different chronourbanist concepts in practice and finding out where similarities and differences lie between them (Chapter 2.2). Finally, expected benefits that can accompany the implementation of the concept are presented (Chapter 2.3).

2.1. The Concept of the 15-Minute City

The 15-minute city is a comprehensive model to redevelop our built environments coined in 2016, by Carlos Moreno. The concept gained momentum during the ongoing COVID-19 pandemic and debates around the development of sustainable cities. It can be defined as "an urban set-up where locals are able to access all of their basic essentials at distances that would not take them more than 15 min by foot or by bicycle" (Moreno et al., 2021, p. 100). The goal is to bring activities and destinations closer to the users of the city – its citizens. Thus, the need to drive a car should be reduced. It recognizes that spatial development and our mobility behaviour are intimately linked and a change to a more sustainable transport system can only be achieved by creating the right built environment. The goal is to create healthier, more liveable, equitable, sustainable, and resilient cities. There are four major planning principles to achieve the concept: proximity, diversity (of land use and people), density, and ubiquity (Allam et al., 2022).

Proximity is the key to the 15-Minute City. Destinations should be close to one's home, ideally within 15 minutes by foot or bicycle. This proximity requires a population **density** that can support

the existence of local businesses and services that depend on a certain number of customers or visitors. Because *all* relevant destinations should be easily accessible, there must be a **diversity of land uses.** But there should also be a **diversity of the people** in a city. Although Moreno focuses on cultural diversity, diversity of people could also be interpreted as creating more inclusive cities in which people with all abilities are included (see Chapter 4). Lastly, 15-Minute City should be **ubiquitous**, i.e., available and affordable for all citizens. This is especially directed towards the segmentation between different socio-economic groups that can be found in many cities (Allam et al., 2022).

Besides these main principles, it should be noted that Moreno also focuses on the improvement of walking and cycling facilities. Attractive and safe facilities are needed to encourage people to walk and cycle and hence, **walkability and cyclability** are important components of each 15-Minute City. Further, Moreno stresses the need to create cities and neighbourhoods that have an *identity*. We need to create **liveable public spaces** in the vicinity of people's homes that are recognizable and invite the by-passers to stay. Ideally, this is done in close cooperation with the residents through means of **placemaking**. Thus, walkability and cyclability as well as liveable public spaces and placemaking should be seen as two additional principles that are essential to the 15-Minute City concept (Moreno et al., 2021). How these seven principles can be integrated into a city's urban and transport policy is demonstrated in study case 01 about Paris' adaption of Moreno's concept.

Study case 01: Paris, France

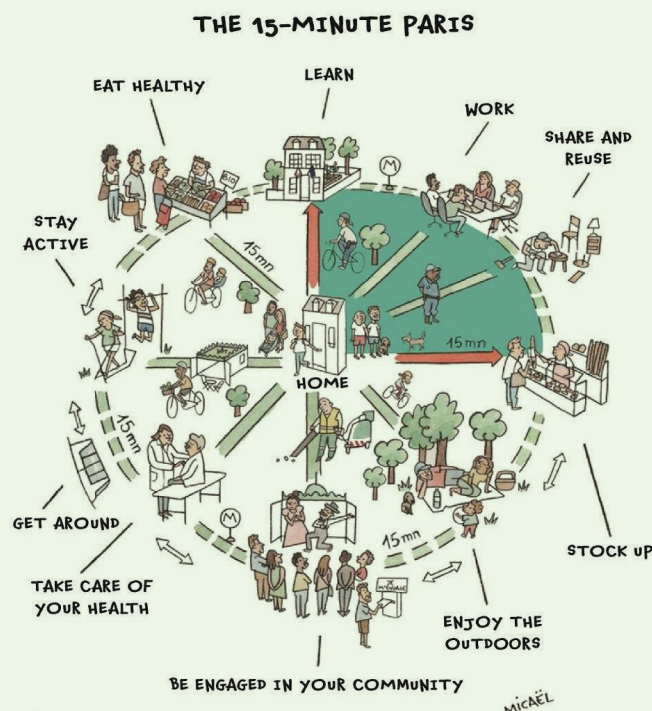The first city implementing Carlo's Moreno concept.

Figure 2: Anne Hidalgo's vision of a 15-Minute City according to her campaign Paris en commun
Source: Paris en commun, Micael

Carlos Moreno's concept has been the basis for Paris' goal of the "ville du quart d'heure" (Paris Municipalité, 2022) which was proposed by mayor Anne Hidalgo in her campaign for re-election in 2020 (see Figure 2). At the centre of Paris' concept, the schools are meant to be "capitals" of the neighbourhoods. As part of the project "Les course Oasis", they will be opened in the afternoons when classes are over and on weekends to allow different uses. Paris also plans to remove half of its 140.000 on-street parking spots to make space for greenery, playgrounds, and bicycle parking. With the introduction of a new bicycle plan ("plan vélo 2021-2026"), Paris aims to make all streets cycle-friendly by 2026 and create sufficient parking locations for the new demand. Paris will first focus on pilot neighbourhoods and evaluate the need for improvement in every district in cooperation with the district mayors. Because involvement of the local stakeholders and citizens is critical in these transformations, the city introduced a pact ("Pact parisien de la proximité") in 2021 which grants more rights and budgets to the district governments, for measures that affect public spaces.

It has already been said many times that **destinations** should be accessible through proximity, which raises the question of what relevant destinations are. Moreno himself defines **six social functions** that he deems as essential for urban life: living, working, healthcare/caring, education, commerce, and entertainment (Moreno et al., 2021). However, Moreno does not further define which specific destinations are assigned to the individual categories. This allows the essential functions to be flexibly transferred to different contexts without already imposing too many restrictions. In chapter 2.2, we will therefore briefly address which goals are defined as essential in concepts in practice. However, there also remains the questions, how the ¨essential¨ functions and their importance might be different for different users and contexts (cultural, geographic, etc).

Even though, Moreno's concept focuses on a 15-minute radius he acknowledges that the time should be dictated by the local context and must be adapted for different cities (Moreno et al., 2021, p. 106). In some cities, a 10-minute goal (or even less) might be appropriate while for others even 20 minutes could be acceptable as a starting point. In fact, there are already many different applications of the chronourbanism idea around the world. In the next section, we want to introduce these examples and discuss common principles and differences of these applications of the ±15-Minute City.

2.2. ±15-Minute Cities across the globe: Common ground and key aspects

Paris' 15-Minute City concept might be the most prominent realisation of chronourbanism but it is by far not the only one. The idea to centre urban planning around the time required to reach destinations has been introduced before in cities in the US, notably Portland, Eugene, and Tempe as well as in Singapore and Melbourne. In the wake of the COVID-19-pandemic and with Paris as a leading example, Europe has become the hotbed for new ±15-Minute Cities with cities like Rome, Dublin, and Utrecht. In total, we have collected 16 municipalities that have adopted or are in the process of adopting a ±15-Minute City strategy (see Figure 3 and Annex I). In this chapter, we want to give a brief overview of these realisations of the concept and try to find common principles and key aspects that they share.
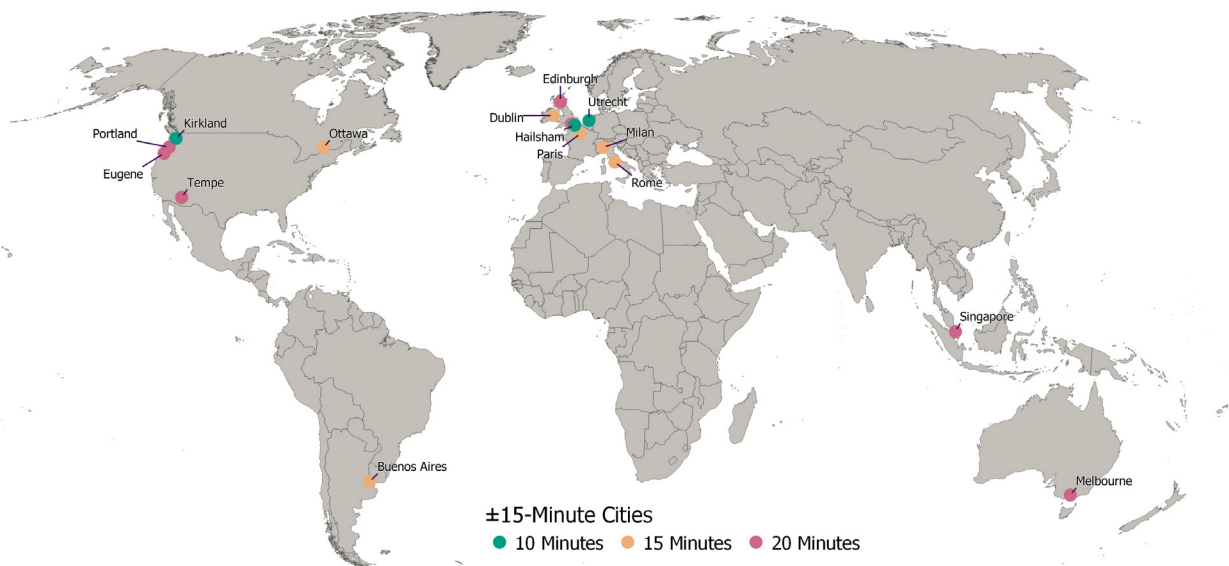

±15-Minute Cities
● 10 Minutes   ● 15 Minutes   ● 20 Minutes

Figure 3: Map of ±15-minute cities in practice and progress around the world

Of the 16 cities that we have collected, twelve cities already made the ±15-Minute City part of one or more of their official spatial or transport **planning strategies**. The rest are in the process of submitting their plans (Dublin), made them part of their planning without a formal strategy (Rome, Milan), or have not taken concrete actions yet (Buenos Aires). The ±15-Minute City's focus on integrated urban and transport planning is reflected by its introduction in land use plans (e.g., Ottawa, Utrecht), transport plans (e.g., Surrey, Singapore), or environmental plans (e.g., Eugene). Ideally, the ±15-Minute City will eventually become part of all planning documents that are related to land use and transport planning within a municipality since its implementation requires the involvement of interdisciplinary departments. The City of Edinburgh has, for example, a transport plan which includes the goal of creating 20-Minute Neighbourhoods (The City of Edinburgh Council,

2021b) and is in the process of finalizing an urban development strategy that will also include the 20-Minute Neighbourhoods as one of its key goals (The City of Edinburgh Council, 2021a).

With all these different strategies, the questions arises whether they share the **key planning principles** and other characteristics that were defined by Carlos Moreno in his conception of the 15-Minute City (see Chapter 2.1). For each of the 16 cities with planning strategy, we examined whether they incorporate Moreno's eight planning principles that were identified in chapter 2.1 (proximity to services, diversity of land use and people, density, ubiquity, placemaking, and walk- and cyclability). Because it was a common theme in all the documents, we added *proximity to public transport* as an eighth category. As can be seen in table 1, the eight principles are part of almost every ±15-Minute City concept even though ideas of ubiquity are less commonplace than the others. This shows that behind the many realisations in concepts and strategies there are common principles that can be assumed as quasi-general for the idea of the +15-minute city. However, a focus on equity aspects is still missing here, which is why these aspects are discussed in more detail in chapter 4 of this study.

Table 1: Key planning principles in ±15-Minute City plans and strategies

	Proximity to services	Proximity to public transport	Mixed land use	Density	Place-making	Ubiquity/ Affordability	Walk- and Cyclability	Inclusiveness
Dublin (Ireland)*	X	X	X	X	X	X	X	X
Edinburgh (UK)	X	X	X	X	X		X	X
Eugene (USA)	X	X	X	X			X	
Hailsham (UK)	X	X	X		X	X	X	X
Kirkland (USA)	X	X	X	X			X	
Melbourne (Australia)	X	X	X	X	X		X	X
Ottawa (Canda)	X	X	X	X	X	X	X	X
Paris (France)	X	X	X	X	X	X	X	X
Portland (USA)	X	X	X	X		X	X	X
Singapore	X	X	X				X	X
Surrey County (UK)	X	X	X	X	X		X	X
Tempe (USA)	X	X	X	X	X		X	
Utrecht (Netherlands)	X	X	X	X	X		X	X

Sources: For each city, the plans and websites in Annex I were reviewed.

*Notes: *Plans are still in the consultation phase*

Interestingly, the analysis also highlights the importance of proximity to public transport. Public transport is seen as an important cornerstone of all strategies since it enables citizens to reach destinations outside of the ±15-minute radius, thereby creating a link between the different neighbourhoods within a city and beyond the city limits. Many cities, for example Utrecht, link their ±15-Minute City strategy with spatial development around public transport nodes (see Study case 02).

Study case 02: Utrecht, the Netherlands

Combining Transit Oriented Development model with a 10-Minute City strategy

The City of Utrecht has put public transport at the heart of its 10-Minute City ("tien-minutenstadt") concept which is a fundamental part of its spatial planning strategy for the year 2040 ("Ruimtelijke Strategie Utrecht 2040"). In Utrecht, new urban developments should be concentrated around public transport nodes to promote public transport use. To achieve this, the city has created a priority order for future urban development where the densification around inner-city public transport nodes has the highest priority (see Error! Reference source not found.). By this, the city also aims to transform Utrecht from its current monocentric form to a polycentric city.

1   Densify around inner-city transit nodes

2   Densify at transit stops on the outskirts of the city and densify inner-city areas, sparing green spaces (including small green spaces) and public spaces (specifically small squares) where possible; do not resort to this until (1) has been fully utilised.

3   Outside the city
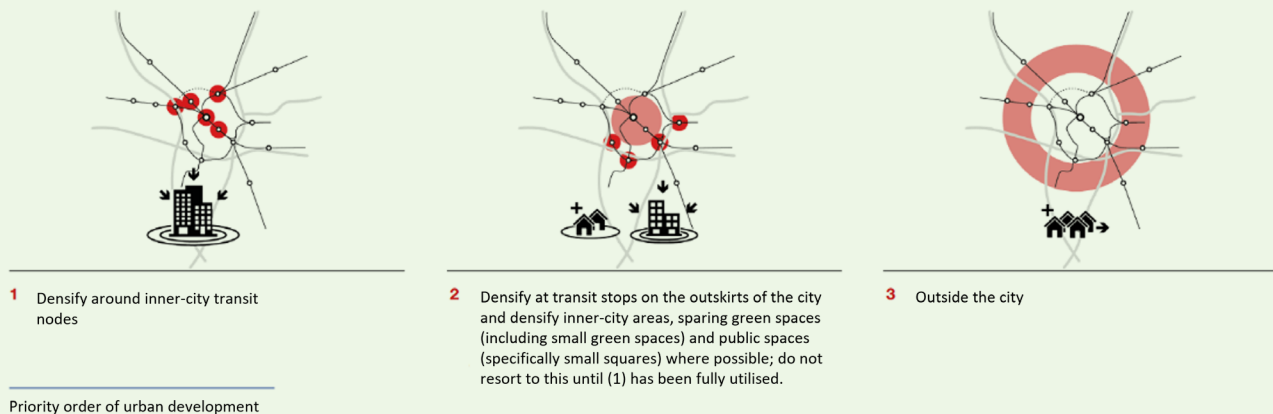
Priority order of urban development

Figure 4: Priority order of urban development according to Utrecht's tien-minutenstad

Source: Gemeente Utrecht 2021, p.28 (own translations)

Unsurprisingly, an analysis of the different planning documents and strategies shows that walking, and cycling are the **main modes of transport** considered (see Table 2). However, it stands out that in many countries outside mainland Europe, public transport is considered as well. All ±15-Minute Cities in the United Kingdom consider local public transport as an additional mode of transport, especially for people who have problems getting around on foot or by bicycle. On the same note, it is interesting that wheelchairs and other mobility aids are seldomly considered as separate modes of transport. This shows that there is a need for more inclusiveness towards people with mobility impairments in these plans (see Chapter 4.2 for a further discussion of these problems).

Table 2: Different modes of transport included in ±15-Minute City plans and strategies

	Walking	Cycling	Wheelchairs (and other aids)	(Local) Public Transport
Dublin (Ireland)*	X	X		
Edinburgh (UK)	X	X	X	X
Eugene (USA)	X	X		
Hailsham (UK)	X	X		X
Kirkland (USA)	X	X	X	
Melbourne (Australia)	X	X		X
Ottawa (Canda)	X	X		
Paris (France)	X	X		
Portland (USA)	X	X	X	
Singapore	X	X		X
Surrey County (UK)	X	X		X
Tempe (USA)	X	X		X
Utrecht (Netherlands)	X	X		

Sources: For each city, the plans and websites in Annex I were reviewed.

*Notes: *Plans are still in the consultation phase.*

Closely tied to the questions of transport modes, is the question of what **proximity** actually means in the different plans. Amongst the sixteen ±15-minute cities, three have a 10-minute label, six have a 15-minute label, and seven a 20-minute label. However, focusing on the label alone can be misleading. For example, Edinburgh and Melbourne both consider round trips when speaking of a 20-Minute Neighbourhood, i.e., 10 minutes from home to the destination and back. Although the numbers might seem arbitrary and interchangeable (why not 7 minutes or 12 minutes?) placing the maximum walkable travel time somewhere between 10 and 15 minutes (about 800 and 1.200 metres, respectively), is in line with commonly used thresholds for walkable distances found in the scientific literature on walking accessibility (e.g., Marquet et al. (2017) and Silva & Altieri (2022)). In fact, Melbourne's 10-minute radius was justified based on this argument (The State of Victoria Department of Environment, Land, Water and Planning, 2017).

The access to **essential urban functions and destinations** and a mix of land uses are two of the key components of Morenos' 15-Minute City concept (see Chapter 2.1). Although Moreno

defines six essential functions of cities in his concept, it remains unclear exactly which specific destinations can be associated with them. Since this is such a large number, we will refrain from an analysis by means of a table at this point. The main destinations that are considered by almost all concepts are (primary) schools, supermarkets and other food markets, parks and playgrounds, health and care facilities, as well as leisure/recreational facilities such as sports centres. There are also concepts that consider local working opportunities and shopping centres as additional destinations. In the practical application 01 in chapter 6.1, this topic will again be discussed based on workshops with local planning practitioners from five European cities.

After covering these different aspects of ±15-Minute Cities, the question remains how the ideals can be transformed into reality. What does a ±15-Minute City look like? Looking city's local strategies revealed, at least four typical **spatial implementation strategies:**

- Transit-Oriented-Development

- (Re-)Development of and around high streets/main streets

- Development around vertical centres/hubs

- Reuse existing (public) spaces

Transit-Oriented Development focuses on high-density, mixed-use developments in proximity to public transport stations. The goal is to have a walkable environment around the station while also being able to quickly travel to destinations in other parts of the city and regions with public transport. Many cities seek this strategy for new developments. In existing structures, especially in smaller towns or former villages, we often find high streets (or main streets) that serve as centres for shops and services. Another model of ±15-Minute Cities, are hubs or "*vertical centres*". Like shopping malls, different services (i.e., doctors, childcare, libraries, etc.) are housed within a larger building. Such structures are typical for cities with only limited available space. Another strategy could be the reorganization of activities established in existing built infrastructure, for instance, green open spaces are increased by making better use of open spaces of schools, offices, residential complexes, and universities, during weekends. Obviously, these approaches are not mutually exclusive but can instead be combined in different ways to support the benefits of each other.

Now that the basic commonalities of ±15-minute cities have been discussed, the question arises as to which arguments speak in favour of introducing them. What are the benefits of cities with high proximity to essential facilities and a pedestrian and bicycle friendly design? In the next chapter, we will present selected statistics that support the introduction of ±15-minute cities.

2.3. Positive impacts of street redesign in line with the ±15-minute city concept: social, health, environmental, and economic

Adopting a ±15-minute cities approach where every citizen could access to daily mean services at a short distance by walking or cycling would present a wide range of benefits including social, health, economy and environmental (Table 3), that could be considered as strengths and opportunities for its implementation. Below are some examples of the proven benefits that have been found with the implementation of these models.

Social impacts: The social aspect is one of the most important as the ± 15-minute city is an ¨human centred model¨. Urban regeneration improving accessibility in neighbourhoods by walkability and cyclability increases social cohesion and sense of place (placemaking), where neighbours get to know each other, feeling part of the community and engaged with it. Crime is reduced and perception of security improves by natural surveillance (Allam et al., 2022), mixed users and activities that alive public spaces. One of the main goals of the ± 15-minute city concept is to recover time expended on traffic congestion and commuting to work for good quality time for family, friends, leisure and other personal activities that improve wellbeing (Moreno et al., 2021).

Health impacts: Active mobility modes such as walking, and cycling promote mental and physical health. Physical activity has been proved to have important impact on people's health and prevention of chronic diseases such as diabetes, obesity, cardiovascular, respiratory, etc. Sedentary lifestyles have been found as the fourth leading risk factor for global mortality that causes around 3,2 million deaths globally according to the WHO (World Health Organization, 2015). Studies have found that a minimum of 15 minutes of exercise a day reduce the risk of dying early by 22% in people over 60 years old (Hupin et al., 2015). Accessible urban spaces, well connected and free of barriers enhance mobility independence for older people, children and people with disabilities and their caregivers, improving their wellbeing and inclusion. Furthermore, friendly walking and cycling environments improve road safety, reduce injuries, falls and traffic accidents. Additionally, health is affected by some environmental factors like air and noise pollution, and extreme weather events. Air pollution (most caused by fuel oils and vehicle emissions) is the largest environmental health risk in Europe that causes around 400.000 premature deaths per year, while noise pollution from road traffic cause around 8.900 premature deaths a year in Europe (European Environmental Agency, 2018).

Sustainability and environmental impacts: a city where most of their inhabitants could choose to walk or cycle to reach their daily needs reducing the private car use, contributes to several urgent and important global goals reducing carbon emissions, noise pollution and improving air quality. Nearly a quarter of greenhouse gas emissions come from the transportation sector, which is also credited with being the primary contributor to smog in urban areas. Road traffic, which relies

on oil products like gasoline and diesel, is the primary source of PMs emissions. The study done by Skirienė & Stasiškienė (2021) assessed the impact of COVID-19 lockdowns on air pollution in five countries in Europe: Spain, Italy, UK, France, and Sweden, because of the reduced industrial, commercial, transport flows and human activities compared to previous years. Results revealed that during the lockdown, traffic volume was significantly lower, and resulted in a reduction of pollutants NO2, PM2.5, and PM10 by about 20–40% in 2020. Additionally, as example of this air pollution reduction, according to the EU's current cycling rates, more than 3 billion litres and more than 16 million tons of CO2 are saved per year (ECF, 2018).

Economic impacts: there is evidence of benefits at both micro and macro scales. Household economies benefit by not needing to own or maintain a private vehicle for instance. While cities and countries benefit with lower road maintenance costs, and public health costs (Litman, 2022). Cycling generates 150 billion euros in benefits annually for Europe economy (ECF, 2018). Positive externalities for the environment, public health, and transportation system total more than 90 billion euros. In contrast, a recent analysis by the European Commission pegged the costs of motorized road travel for the environment, health, and mobility at 800 billion euros annually (ECF, 2018). Additionally, walkable environments have shown a positive correlation with the enhanced value of local services, the creation of new job opportunities, and the support of local businesses and street markets. For instance, in Portland, residents drive 20% less which has been transform in $1,2 billion that stays in the local neighbourhood's economy (ARUP, 2016). Consumers who travel by walking tend to expend more than car driver (Litman, 2022). Another economic benefit is the promotion of tourism by creating attractive walkable and cyclable streets, connected with public spaces to enjoy local services, shops, and landmarks.

Table 3: Impacts of street redesign in line with the ±15-minute city concept

Impact area	Benefit
Economy	Reinforce and support local business
	Urban regeneration
	City attractiveness
	Cost saving in public and private motorized transport
	Promotes tourism
	Creation of new job opportunities
	Enhance creative thinking and productivity
	Reduces motor vehicle maintenance in household expenses
	Reduce public health cost from chronic and environmental related diseases
	Reduces road infrastructure maintenance costs
Social	Improve social cohesion and equality
	Healing spatial segregation
	Placemaking and identity: sense of place and communities
	Improve safety
	Improve wellbeing
	Promote citizen engagement

Health	Promote more active lifestyle
	Healthier environment
	Reduce falls and road accidents
	Improve air quality
	Accessible healthy food
	Less risk of chronic diseases
	Reduce of environmental health risk by noise and air pollution.
Environmental	Reduce carbon emissions and energy consumption
	Reduce noise pollution
	Improve air quality
	Improve urban microclimate
	Increase greenery
	Reduce carbon footprint by consuming local products

Like almost every planning model, the implementation of a ±15-Minute City can present a variety of threats and weaknesses depending on the context, especially in established cities and suburban areas that need more attention, the following chapter will focus on the need to think about their flexibility according to different contexts and their main challenges.

3. An ideal only for the urban centre? Feasibility in different spatial contexts

There are already many existing positive examples of implementing a ±15-Minute Cities. A major challenge of strategies that focus on the ±15-Minute City goal is the transfer to different spatial contexts which, for example, leads to 5-, 10-, 15- or 20-minute implementation strategies. A ±15-Minute City should be tailored to individual cities based on both, their morphology and specific needs and characteristics (Moreno et al., 2021). Even in the world's most advanced cities, some concessions must be made on the level of facilities available within every ±15-Minute City. A university, museum, and Opera House within ±15-minute radius of every individual household, sounds more utopian than practically achievable. In a more ordinary sense, each of these stated requirements seems more attainable on a reduced scale, making it operationally viable for urban centres or even small towns which are more inclined to be able to offer greater variety in a tighter space as part of their mixed-use zoning strategies in downtown areas. This focus on mixing different land uses as possible challenges most of the planning orthodoxy of the past century, where separating residential from retail, entertainment, and workspaces have been the norm. The implementation of the ±15-Minute City model, so far, has been focused on its viability in neighbourhoods in big cities. However, with the concept being so new, its implementation and feasibility in suburban areas (Chapter 3.1) but also many challenges to the urban context (Chapter 3.2) have not been explored yet.

3.1. Challenges in suburban contexts

Below, we try to open a few questions on the challenges that the ±15-Minute City model could face during its implementation in suburban areas, considering land-use, territorial jurisdictions, and morphological implications.

Land-use implications: There are many questions related to the implementation of the ±15-Minute City when it comes to suburban contexts. As some studies have shown (Guagliardo, 2004; Vitale Brovarone, 2022) peripheral areas of the cities have been destined as suburbs or residential areas where access to services is more limited to a range of ±15 minutes by walking or cycling. These areas are the hardest to address, in part, due to the strict zoning limitations around residential uses only. Achieving the ideals of the ±15-Minute City in suburban areas requires a change in the narrative that has been guiding modern city planning around the world. Not only does it require a re-mix of everyday uses but also reducing car dependency, which for many decades has been the norm in suburban communities. It is also important to take into consideration here, that smaller and poorer communities may have limited funding for modifications in their neighbourhoods; a challenge that needs to be addressed by policymakers when it comes to municipal and regional funding allocations.

Territorial jurisdiction implications: Different needs, interests, and objectives in specific territories form the aims of local administrations (Halaskova & Halaskova, 2009). Therefore, each territorial unit has restrictions in terms of extending their own jurisdictions beyond their territorial boundaries, the will and necessities of people living in the given territory, and the legal codes that they are bound to. In implementing the 15-Minute City strategy in the immediate suburbs of a municipality, one key challenge could be extending the model beyond the municipal boundaries and aligning interests and objectives among different territorial units. Where one municipal jurisdiction ends to make space for other municipal jurisdictions, one might ask whether it is desirable or not that all territorial units, regardless of their location, become hyper-local and take on a more urban character. On the other hand, from an economic-development perspective, streams of investments directed toward implementing the ±15-Minute City in the main central city could lead to increased inequalities between the main city centre and the immediate suburbs. If not well coordinated with regional actors, core investments fuelling the ±15-Minute City, risk a decline in public transport infrastructure investments. If public transport is not sufficient and far-reaching throughout the city and its suburban borders there is the risk that commuters will resort to car usage in order to cover longer distances.

Morphological implications: Inherently, suburban centres impose a morphological challenge due to their non-urban character. In her analysis of implementing the ±15-Minute City in Munich, specifically in the outskirts of the city Allach[1], Zakariasson (2022), pointed out that such suburban areas composed of single-family housing are not ideal for the 15-Minute City model implementation, since the residents are spread out on a larger surface. Based on their territorial

morphology, this raises questions, on how adaptable suburban towns are to implementing the 15-Minute City which aims at having 'optimal density' (Moreno et al., 2021). The population density question becomes highly relevant to justify the provision of services, starting from daily amenities to the infrastructure and public transport density. For the latter to serve the population comfortably and sustainably, the frequency and availability should be so high that using a car becomes redundant when fulfilling daily needs.

3.2. Challenges in the urban context

Gentrification. The urban transformations happening to allow for the implementation of the 15-Minute City planning model should enable access to opportunities, urban amenities, variety, and other people within a 15-minute walking/cycling radius. However, if the planning model does not put a strong emphasis on its ubiquitous character, it will end up favouring certain neighbourhoods more than others, consequently bringing along gentrification issues. Extreme inequalities are manifested in terms of resource distribution and access to high-quality amenities and services, in our modern cities (Pozoukidou & Angelidou, 2022). This is partly because strict land-use planning codes have favoured the separation and segregation of functions in our cities. Therefore, new urban planning interventions, such as the 15-Minute City model must be understood and implemented alongside socially inclusive development processes (TUMI, 2021). If investments for the 15-Minute City follow a purely capitalistic approach, where governments and corporations tend to focus on decentralised variants of urban consumerism, eventually, bringing more services to already well-served and wealthy areas, the concept risks spurring new waves of gentrification in our cities.

High vacancies of retail stores in historic town centres. In the European context, many small to mid-sized cities, especially with historic town centres, offer conditions that are favourable for the implementation of ±15-minute cities. Historic centres offer greater densities, short ways, and a mix of different land uses (Bibri et al., 2020). However, fuelled by the development of larger greenfield commercial areas, they have been neglected and many town centres suffer from through-traffic and the slow but steady decline of businesses. Many residents of these places are therefore increasingly dependent on the private car, whereas they used to be able to find the most relevant services at their doorstep. Nevertheless, this development is not irreversible. Cities should draw up concepts that strengthen local supply in their historic centres and regulate growth on their edges. As the example of Hailsham shows (see Study case 03), such a concept can even be adopted with the consent of a large majority of citizens.

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[1] Allach is a suburban area in the northwest of Munich, mostly made up of single-family housing, row houses and villas

Study case 03: Hailsham, United Kingdom

Revitalising historic town centres based on ±15-Minute City principles

Hailsham is a town with approximately 20,000 residents in the south-east of England. To curb traffic and revitalize its historic centre, it created a so-called neighbourhood plan from 2015 until 2021. A key strategic goal of this plan is the creation of a ten-minute town (see Figure 5). Central to the concept are the improvement of walking and cycling infrastructures as well as public transport services. Walking and cycling should further be encouraged by mixed land use and attractive and vibrant public spaces. The plan focuses largely on the revitalization of the town centre with its historic high street. A major obstacle to achieve this goal is the dominance of parked cars in the public realm. In the future, the municipality plans to provide more space-efficient parking opportunities that help reduce traffic in the town centre and increase the available space for other uses. The neighbourhood plan was eventually approved in May 2021 by the citizens in a referendum with almost three-quarters voting in favour of the plan.

Figure 5: Hailsham's 10-Minute Neighbourhood Town

Source: Hailsham Town Council, 2020

4. The 15-Minute City for whom?

Diversity in the context of the ±15-Minute City frame is related to mixed land use (commercial, residential, and entertainment) but also to diversity in culture and people (Moreno e al., 2021). To achieve this goal, in addition to the traditional accessibility by proximity framework, the assessment of need indicators such as safety, people's ability, freedom, and affordability are also important (De Bok & Hendriks, 2021; Milias & Psyllidis, 2022). The ±15-Minute City must ensure access to essential services for ALL groups of society regardless of their abilities and socio-economic or cultural factors.

Disadvantaged groups including socio-economic-demographic like age, gender, race, migration background, language, income, education level, employment, people with disabilities and their specific accessibility and mobility needs are rarely considered in city planning. In this same situation are caregivers, and people with baby prams, shopping carts, wheelchairs, and another mobility aids. The ±15-Minute City, as a new proximity and equity model, could be an opportunity to bridge this gap, where the city is not just accessible in terms of proximity, but it is accessible in terms of inclusiveness and design for all. Therefore, citizen participation and the interdisciplinary planning process are key to build concrete human centre city policies and ensure their application.

The allocation or spatial distribution of essential services has always been a planning problem regarding social justice (Leventhal, 1980) and remains unresolved in most cities, affecting people's wellbeing. The discussion of accessibility to these services has been ongoing in mobility research related to social exclusion. For instance, it is unfair that transport barriers prevent some people with disabilities from taking jobs or attending interviews. It is also unfair that older people who have limited walking ability cannot access basic services because they find it difficult to navigate their neighbourhoods due to exclusive urban design. Therefore, the question of 'whom' when considering new policy and redesign recommendations for the ±15-Minute City framework, becomes of paramount importance and the answer should be **¨for ALL¨.**

4.1. Social justice in the ±15-Minute City

The concept of justice involves moral rules, some are universal (i.e., human rights) and others may depend on the cultural context (Leventhal, 1980). Those rules are divided into informational, procedural, interpersonal, and distributive (Cropanzano et al., 2015). Regarding the distribution (Cropanzano et al., 2015) this includes concepts like equity, equality, and efficiency which leads to spatial fairness (Durán-Rodas, 2021; Leventhal, 1980) . There are two types of social equity: horizontal and vertical. Horizontal equity refers to the uniform distribution of resources for all or egalitarianism, while vertical equity is based on the distribution or accessibility to opportunities according to the different social-economic -demographic groups' needs and abilities, it can

also be referred to as **social justice** (Anderson et al., 2017; Leventhal, 1980). On the other hand, the efficiency rule or affordability refers to the allocation of resources according to people's contributions or ability to pay (Leventhal, 1980).

In terms of accessibility justice could be applied in a wide sense, from the distribution of services and resources (availability, affordability, infrastructure) to the barriers that urban built environment presents for certain users to access those main services and opportunities which produce **inequality.** If some measures are applied just for certain groups, according to their specific needs it would be called **equity,** for example the implementation of ramps just in certain zones of the city. If those measures were implemented throughout the city this would be **equality,** assuming that everyone benefits from the same support, for example a ramp does not help too much to a blind person and other kind of disabilities. While the **just** city will be that one where ALL citizens independent of their abilities and needs could reach all their destinations free of barriers and at an appropriate distance. Figure 6 tries to illustrate these concepts applied to an example of barriers in urban context.
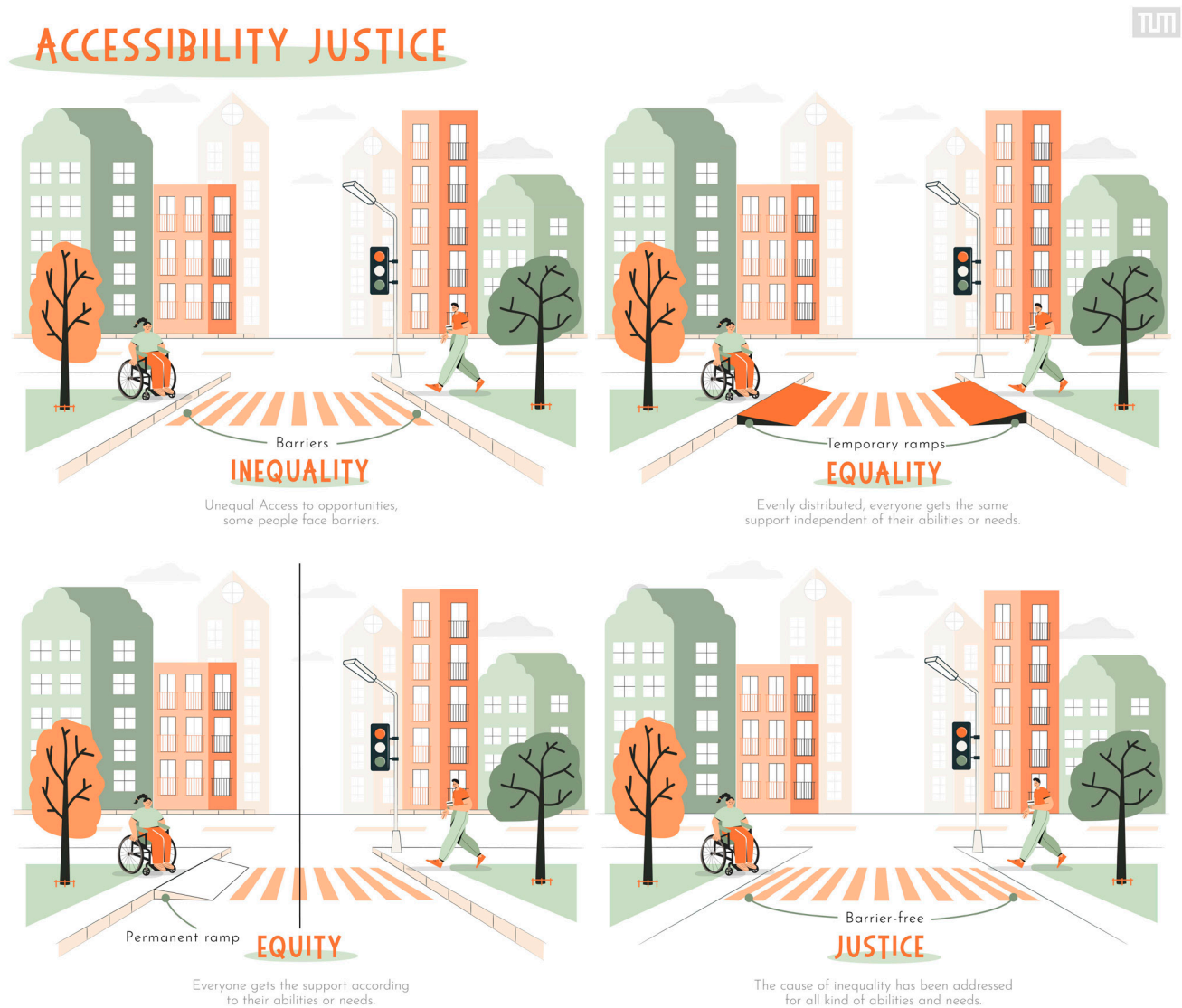

Figure 6: Example of accessibility justice concepts in urban planning

Social injustices are the result not only of social inequality, but also a combination of distance, inadequate transport, and limited ways of communicating. Mobility injustice has been closely linked to social exclusion which exists when certain groups are denied the same access to services as the rest of society. Table 4 represent the most common kinds of inequality, inequity, equity, and justice regarding transport modes.

Table 4: Some examples of most common kinds of inequality, inequity, equity, and justice regarding transport modes in cities

Mode of transport	Inequality Unequal access to opportunities	Equality Equal design of infrastructure / distribution of resources and opportunities regardless needs and abilities	Equity Distribution of resources based on different needs and abilities	Justice The context does not generate disadvantages, thus everyone has real access to the same opportunities and resources
Private motor vehicles (car, motorbike…)	▪ Not being able to afford it ▪ Not having a driving licence ▪ Not being able to drive		▪ Free driving courses ▪ Car facilities for people with disabilities	▪ Not to need a private car because you have access to a good public transport system and walkable and cyclable infrastructure
Public transport (train, underground, bus)	▪ Lower provision and frequency in the suburbs or low-density residential areas.	▪ Price is the same for everyone. ▪ Cities tend to provide access to most of the urban space through public transport. ▪ Public transport vehicles may not always be usable for people of different ages and abilities.	▪ Financial aid may be provided to make public transport more affordable for low-income population. ▪ Special, barrier-free runs may be programmed to fit those of different ages and abilities.	▪ Good service, distribution and frequencies all around the city and suburbs. ▪ Free public transport ▪ Total barriers free public transport
Cycling and other non-motorized devices	▪ Cycling infrastructures may not be present in low-income neighbourhoods or in suburbs.	▪ Can be achieve by creating connected and safe cycling infrastructures. ▪ Cycling devices may not suit every condition (seniors, kids, disabilities…), and adaptations may be expensive.	▪ Financial aid may be provided to get adapted devices.	▪ Good quality infrastructure in all the city and suburbs
Walking or on wheelchair	▪ Quality of sidewalks and pedestrian areas may be reduced outside the city centre.	▪ Motor-vehicle infrastructure may create discontinuities in the walkable infrastructure.	▪ Walkable incentives (apps, rewards, attractors, etc.) may be present to foster walkability instead of other means for short trips. ▪ Ramps, tactile surfaces, wayfinding	▪ Good quality infrastructure in all the city and suburbs ▪ Total barrier-free and safe pedestrian areas

Note: These topics are wide and complex, some concepts are missing in this table including pricing, design, information, access, accessibility, infrastructure, vehicles, affordability, abilities, needs, opportunities, safety, inclusiveness, segregation, etc. This this is just an example of those.

4.2. Walking and cycling: who, where and for how long?

In Europe, cycling or walking are chosen for 20-40% of all journeys, even though is the most commonly used for just short trips (under 5km). Some socio-demographic groups prefer to walk or cycle more than others. For instance, in the Netherlands, children under 12 and adults over 75 years old do more walking trips. Meanwhile, for age groups under 25 years old, bike trips are more common (20-52%), and less popular among older people they use it for only 17% of their trips (European Commission, 2020b). While according to the 28-country Global Advisor survey by IPSOS (2022), males use bicycles as a primary transport mode more than females.

Walking is the most affordable, inclusive, and accessible travel mode for any age and income level, compared to other active mobility options (Milias & Psyllidis, 2022). The average walking trip length varies from 1km (Great Britain) to 2.5 km (Finland). Walking trips up to 2km are higher in Great Britain (65%), followed by Spain (55%) and Turkey (49%) (IPSOS,2022). About 15-30% of the walking trips correspond to shopping purposes and 30-55% to leisure (European Commission, 2020b).

In terms of cycling, India, China, and the Netherlands rank highest in bike use at least once a week (67%, 66%, 65% respectively). For trips up to 2km, the Netherlands reaches the highest percentage (45%), followed by China (33%) and Japan (27%). Among European countries, cycling trips are higher in the Netherlands (in Amsterdam alone it's 38%), followed by Denmark and Sweden, with the lowest in Finland (European Commission, 2020b). Among European cities, one of the lowest is Madrid with 0,81%, a city with low cyclist infrastructure (ECF, 2014). The number of bicycles by 1000 inhabitants is between 52 (Czech Republic) to 1000 in the Netherlands. Between 30-40% of trip purposes correspond to home-work, while leisure represents 20-45% (European Commission, 2020). The average cycling trip length is around 3km in most European countries (European Commission, 2020).
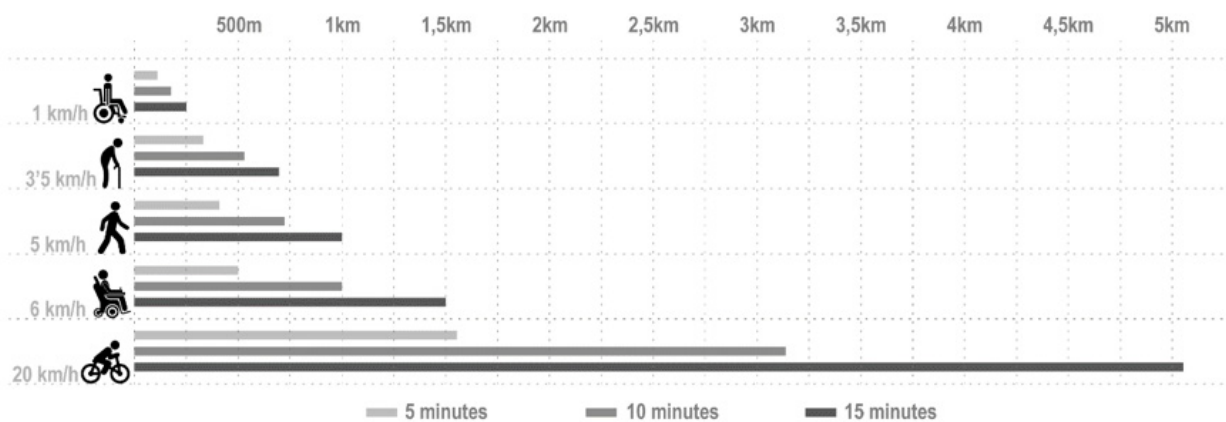

Figure 7: Average speed and reached distances of different user groups and transport modes

Walking and cycling policies and assessments should be in relation to subject to ability, travel purpose, and environmental conditions. In cities with adequate cycling infrastructure, it is one of the most popular modes of travel. Some disabilities may not be compatible with cycling, although models of bicycles or similar devices have been developed to allow people with different abilities. Adequate infrastructure such as separate cycle lanes could contribute to their autonomous and safe mobility in the city. This is the case with single-person electric wheelchairs or trolleys, which are increasingly used by older people. Some studies have considered a speed varying from 1 km/h for users of non-electrical wheelchairs to 6 km/h for electric aid modes (Shi et al., 2009) (see Figure 7). Therefore, it is important that pedestrian, cycling, and traffic ways have a separated infrastructure to ensure safety for all users (Handler, 2014).

Regarding time and distance, there is no consensus on which travel time or travel distance would capture most pedestrian and cycling trips, since the distance covered by different age and abilities groups may vary (Milias & Psyllidis, 2022). Considering times of 5, 10 and 15 minutes may lead to different distances reached according to different population groups. For instance, older people walking speed could be around 3,5 km/h while the average speed is considered 5 km/h in most studies (Schimpl et al., 2011). This means that a 15-minute walk could represent 900-1.000 metres at an average speed, while at a reduced speed it could be 700 metres. It's likely in this radius that their primary needs must be out of this influence radius.

4.3. A needs-based approach to redesign the ±15-Minute City for ALL

Travel purpose may be related to the essential services which also differ among context, not only depending on the socio-economic-demographic status, but also on a local, regional, and global scale. To find out those main services, citizen participation should be considered. Weng et al. (2019) assessed the importance of different amenities to different age groups in Shanghai through a survey questionnaire based on the "Shanghai Planning Guidance for 15-min walkable neighbourhoods" considering 6 main categories: education, medical care, municipal administration, finance and telecommunication, commercial services, and elderly care. People were asked about the number of times per week (or month) in specific activities and the amenities that they would like to reach within 5, 10 and 15-minute walking distance. Results showed that the most weighted activity for older people was "fresh food market" while for children it was "schools". On the other hand, people with disabilities and older people with some chronic diseases may need specialized health or social services that are not located in every neighbourhood; thus, it is important for them to have proper access to public transport to reach them, highlighting that a ±15-Minute City or any accessibility by proximity model should consider public transport connections in their policies.

In addition, a ±15-Minute City should consider and ensure to apply the universal accessibility or "design for all" concepts in their policies, which could benefit not only people with disabilities but also all groups such as pregnant women, older people, children, people with temporal disabilities, people with shopping trolleys and parents with prams. This includes getting rid of not only physical barriers, such as steps or steep slopes but also cognitive, visual, and auditive ones. About 15% of the global population currently experiences permanent disability, and this percentage is increasing, amongst other reasons, because the population is aging, and non-communicable diseases are becoming more common these days. There is an interaction between individuals with a health condition, infrastructure and environmental factors including inaccessible transportation and limited social support (World Health Organization, 2021), which affects how people interact with the urban scenario and the services it provides, this can improve or enhance their quality of life.

Following the same line of thought, the environmental condition is an important issue to be assessed. Environmental quality or exposure could reinforce the walkability or cyclability of a city and encourage people to choose these transport modes. Including variables like comfort (e.g., thermal, visual, acoustic, etc.), security (e.g., cleanliness, lighting, visibility, social control, crime, etc), directness and simplicity (e.g., legibility, wayfinding, signals, information, free of barriers), and traffic safety (e.g., spatial separation between footpaths, cycleways, and traffic roads, safe crossings, timing in traffic lights, etc.) (Jehle et al., 2022). This quality criterion could influence some people's choices of walking, cycling or not (Weng et al., 2019). For instance, older people are vulnerable to being socially isolated due to being afraid to leave their homes because of their building and neighbourhood quality or presents some barriers, which affects their autonomous mobility and quality of life (Gill et al., 2001). If those are not accessible for them in terms of safety, security, and simplicity, they are denied the possibility of moving around on their own in the immediate neighbourhood.

The pandemic has made visible the situations of inequality and vulnerability of some sectors of the population, overcrowding in neighbourhoods, poverty, the reduction of public space, circumstances that hinder the maintenance of physical distance and urban mobility as a key element, especially in the global south. While in all Organisation for Economic Co-operation and Development countries (OECD), migrants are concentrated in certain areas. People from different races, cultures and migration backgrounds are prone to present disparities in access to different services, infrastructures, and protection. In most cities, they tend to live in less privileged or underserved neighbourhoods (OECD, 2021), thus opportunities exist to give these neighbourhoods a higher priority for change.

All these policies should consider the negative side effects, which unfortunately, are followed by improvement in a city's urban environment. Gentrification and further social segregation are likely to occur as more investments in these areas cement spatial inequalities. Since high walkability and accessibility are usually accompanied by increased housing values in downtown neighbourhoods (Weng et al., 2019), vulnerable groups are at higher risk of experiencing displacement. Rent control

and affordable housing policies may provide equal opportunities for economically disadvantaged people to access and could remain living in their improved neighbourhoods. So that living in a ±15-Minute Neighbourhood would not be a privilege of the few but a right for ALL.

Higher quality and accessible, universal design walking and cycling networks in most under-served and low-income neighbourhoods that ensure connection to all areas of the city, combined with frequent and affordable public transport are some concrete ways to ensure accessibility to all users in a ±15-minute development model (Bruntlett, 2022). Based on this, a list of possible design and policy recommendations has been provided in chapter 6.4.

5. Summary: Common planning principles for a ±15-Minute City

The chapters above gave an overview of the origins of the 15-Minute City concept and linked it to other previous similar urban planning concepts (Chapters 2.1 and 2.2), potential benefits (Chapter 2.3) and discuss possible limitations and opportunities (Chapter 3 and 4). The ±15-Minute Cities around the world and, especially, the many different labels (e.g., 10-Minute Town, 15-Minute City, 20-Minute Neighbourhood) show that there is not one approach that could simply be transferred to everywhere. This puts an emphasis on the fact that the conceptualisation of the ±15-Minute City should keep a **context-dependent perspective.**

Nevertheless, we found a large consensus on the key planning principles, but also some limitation regarding the themes of inclusivity and ubiquity. Based on the seven key planning principles that we identified in Moreno's work (see Chapter 2.1) and the principle of *proximity to public transport* that is important for all implementation of ±15-Minute City (see Chapter 2.2), we have defined the following eight princas common planning principles for ±15-Minute Cities (see also Figure 8):

- **Proximity to essential services:** Residents can access essential services within a reasonable time by foot, bicycle, or other non-motorised devices.

- **Proximity to public transport:** Residents have public transport nearby and free of barriers, to reach areas outside of their home's vicinity without having to rely on a car.

- **Density:** The population and employment density of an area supports the existence of local businesses and services.

- **Mixed land use:** Residents find a variety of land uses that fulfil all their daily needs and urban functions close to their homes.

- **Walkable and cyclable streets:** Walking and cycling paths are well connected, free of barriers and comfortable for pedestrians, cyclists, and all other non-motorised road users.

- **Public space and placemaking:** Co-creation of places together with the community to strengthen the connection and identity to new destinations according to their needs.

- **Inclusiveness:** All residents are able to move safely and free of barriers in public spaces and make use of services, irrespective of their individual capabilities, age, gender or origin.

- **Ubiquity:** All these characteristics, should be so widespread that they are available to each resident all around the cities, irrespective of their socio-economic and demographic status.

±15-MINUTE CITY PLANNING PRINCIPLES

1. PROXIMITY TO ESSENTIAL SERVICES

Residents can access essential services within a reasonable time by foot, bicycle or other non-motorised devices.

2. PROXIMITY TO PUBLIC TRANSPORT

Residents have public transport nearby and free of barriers, to reach areas outside of their home's vicinity without having to rely on a car.

3. DENSITY

The population and employment density of an area supports the existence of local businesses and services.

4. MIXED LAND USE

housing
office
grocery store

Residents find a variety of land uses that fulfil all their daily needs and urban functions close to their homes.

5. WALKABLE AND CYCLABLE STREETS

Walking and cycling paths are well connected, free of barriers and comfortable for pedestrians, cyclists, and all other non-motorised road users.

6. LIVEABLE PUBLIC SPACES AND PLACEMAKING

Co-creation of places together with the community to strengthen the connection and identity to new destinations according to their needs.

7. INCLUSIVENESS

All residents are able to move safely and free of barriers in public spaces and make use of services, irrespective of their individual capabilities, age, gender or origin.

8. UBIQUITY

Parking spot
Street
Neighbourhood
City

All these characteristics, should be so widespread that they are available to each resident all around the cities, irrespective of their socio-economic and demographic status.

Figure 8: Common planning principles for a ±15-Minute City

However, the question now is how these planning principles can be translated into reality as part of the ±15-minute city. Chapter 6 therefore presents a roadmap that includes the most significant steps on the way to the ±15-minute city.

6. Roadmap: Implementation of a ±15-Minute City

After discussing the features, obstacles, and different implementations of ±15-Minute Cities, we want to use this chapter to provide planning practitioners, policy makers, government and organizations with a roadmap to put the ±15-Minute City into practice (see Figure 9). This roadmap is one of the many ways in which ±15-Minute Cities can be achieved. It features crucial steps that could be considered when planning your own ±15-Minute City. This chapter will feature exemplary tools that we have applied in five European cities, namely: Amsterdam (Netherlands), Ghent (Belgium), Madrid (Spain), Milan (Italy) and Munich (Germany). Additionally, we will also present 'good cases' from European and international ±15-minute cities.
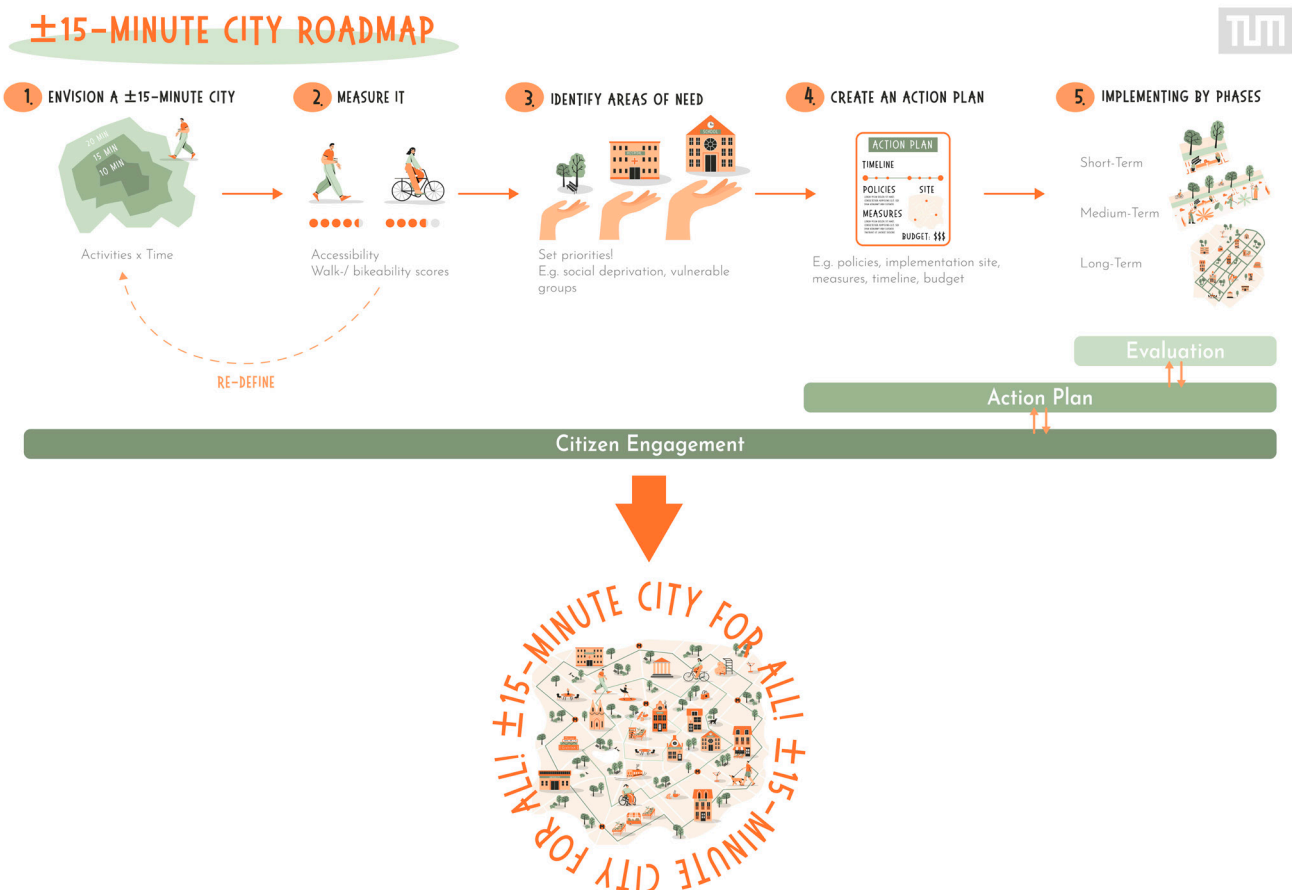
Figure 9: A roadmap to achieve a ±15-Minute City

Our roadmap consists of five steps that should eventually lead to a "±15-Minute City for ALL" (see Chapter 5 for our vision). First, a city should define its own vision of a ±15-Minute City since many aspects of it are very context dependent (see Chapter 6.1). Next, we propose measures

to assess the current status and, later, the progress of the implementation of the strategy (see Chapter 6.2). It may be necessary to readjust strategies if measures reveal that the strategy isn't feasible or has already been achieved (see the feedback loop in Figure 9). In addition, the measures can identify areas of need where interventions should be prioritized (see Chapter 6.3).

Based on the results of the previous steps, the input of citizens, and the knowledge of the local decision-makers and planning practitioners, a tailor-made Action Plan can be designed. This plan should include a budget, timeline, an assessment of areas of need, a review of existing policies, and the planning of new policies and measures (see Chapter 6.4). In the end, the Action Plan should be put into practice. We recommend planning and implementing in phases (in the short-, medium-, and long-term) to achieve the objectives set out, allowing first to experiment with low-cost interventions, leaving room for failure and to evaluate (see Chapter 6.5). The results of the evaluation may indicate that certain adjustments need to be made to the Action Plan and then either adjust the measure on the same site, replicate or increase the quality of the interventions.

All the steps should be done with the involvement of the local community where the measures are implemented. This way, human-centred insights are collected to create places and public spaces that people will use. Citizen's involvement is, thus, a critical component throughout the whole process.

6.1. Step 1: Envision a ±15-Minute City

Before thinking about concrete actions and the implementation of a strategy, cities should create their own vision of a ±15-Minute City. This vision will form the basis for the action plan and includes the strategic objectives of the ±15-Minute City strategy. As discussed in chapter 2.2, the ±15-Minute City concept is being implemented in various forms around the world and in Europe. They differ by the time thresholds, relevant destinations, and other characteristics. There is no one-size-fits-all solution that can be transferred simply from one place to another. A ±15-Minute City must be fitted to the specific context. This makes it necessary to include the knowledge of local stakeholders, such as citizens, businesses, NGOs but also urban and transport planners already when creating a vision. By doing this, problems and potential conflicts can be identified early on. Some starting points in this process include the identification of relevant destinations, potentially disadvantaged groups, lack of walking and cycling infrastructure, low environmental quality, and high- and low-density zones.

Because we need to redistribute space, change the use of public spaces, and intervene in the existing transport infrastructure, it is crucial to build a consensus and involve different groups of people (including all socio-economic-demographic). Citizen engagement is crucial to pave the way to acceptance of measures to be implemented, as well as to empower citizens (SET, 2022). Citizen engagement can vary from informing through posters or flyers; consulting with surveys

or workshops; involving by community building up to collaborating with artists and empowering citizens to run the specific interventions (SET, 2022) (see Study case 03 in Chapter 3.1). If the strategy aims to target a certain group, understanding the actual needs and wants of citizens is extremely helpful, as the example in Ottawa demonstrates (see Study case 04).

Study case 04: Ottawa, Canada

Creating a 15-Minute City vision with public participation

During the creation of its 15-Minute Neighbourhoods strategy, The City of Ottawa consulted citizens and relevant interest groups in two phases. Based on their first conceptual ideas for 15-Minute Neighbourhoods they consulted a working group of local equity-seeking groups to get their feedback on the concept. Based on the initial concept and feedback from the working group, the city conducted two online surveys (see Figure 10). One of the surveys specifically targeted residents in rural areas, to find out how important certain amenities are, which transport modes they use to reach them, whether any amenities are missing in their neighbourhood, and which street design characteristics are important to them. Two valuable outcomes of the entire consultation process were the focus on mobility barriers, especially regarding winter maintenance, as well as a focus on the needs of rural parts of the city. In the second phase, results from the survey, accessibility analysis, and the analysis of the friendliness of the pedestrian environment from the project were presented and discussed.
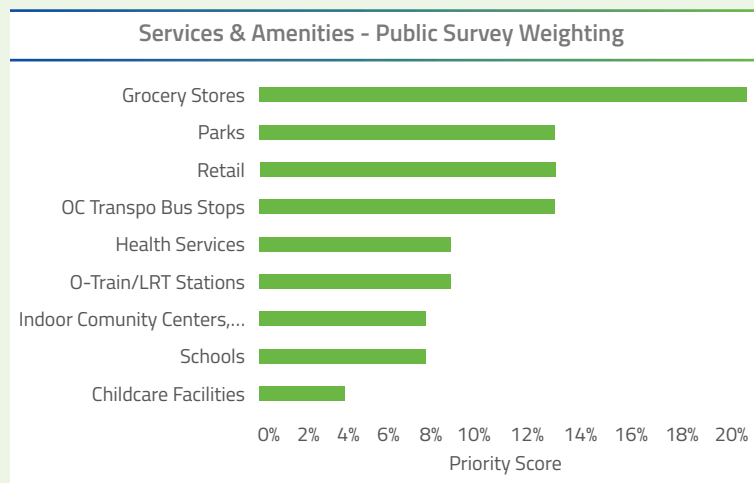

Figure 10: Results from a survey on the prioritization of services and amenities by residents of Ottawa

Source: City of Ottawa, 2021c

Besides citizens and other stakeholders, planning practitioners from local administrations should also be involved in the process. Planning practitioners have a deep understanding of the relevant amenities as well as existing rules and regulations, including accessibility and improvements of the infrastructure and urban environment. Thus, they are valuable partners for developing a local ±15Minute-City strategy and can provide important insights into the needs of the populations, the feasibility of the concept, and potential problems for the introduction of the concept. In the following section we want to introduce a practical application that we ran with planning practitioners from the five pilot cities (Amsterdam, Ghent, Madrid, Milan and Munich) to understand which destinations are relevant for a ±15Minute-City.

Practical application 01:
Workshop "The ideal ±15-Minute City" with planning practitioners

For this report, we conducted workshops with planning practitioners from the Cities of Ghent, Amsterdam and Milan (in person), and the City of Madrid (online). Whereas Munich was split into two groups: one for the city of Munich and the region of Munich (both online).

We wanted to gain insights into perspectives that planners from different local contexts might have towards the ±15Minute-City. The workshops focused on the identification of relevant destinations for a ±15Minute-City. Which amenities do planning practitioners consider as essential? And why? For the Munich-workshop specifically, we invited planners from both the City of Munich and surrounding municipalities in the region of Munich to understand the perceptions of planners from smaller towns.

For the creation of their ideal ±15-Minute City, we used the exercise of the 'flowers of proximity' which was developed by Ana Gil Sola and Bertil Vilhelmson as part of their research on sustainable accessibility (Gil Sola & Vilhelmson, 2019). We asked the participants to allocate a wide range of amenities within circles that represent different walking times (5 minutes, 15 minutes, 30 minutes). The participants placed the amenities within circles that represented travel times they find acceptable to reach them. Each participant had 10 minutes to create an individual flower for their context and then each group created one common flower based on the individual results with six categories (Education, entertainment, living, working, commerce and healthcare) with destinations. Also, participants were free to propose new destinations according to their context. The result of this exercise from the workshop from Madrid can be seen in Figure 11. All other flowers of proximity can be found in Annex III.
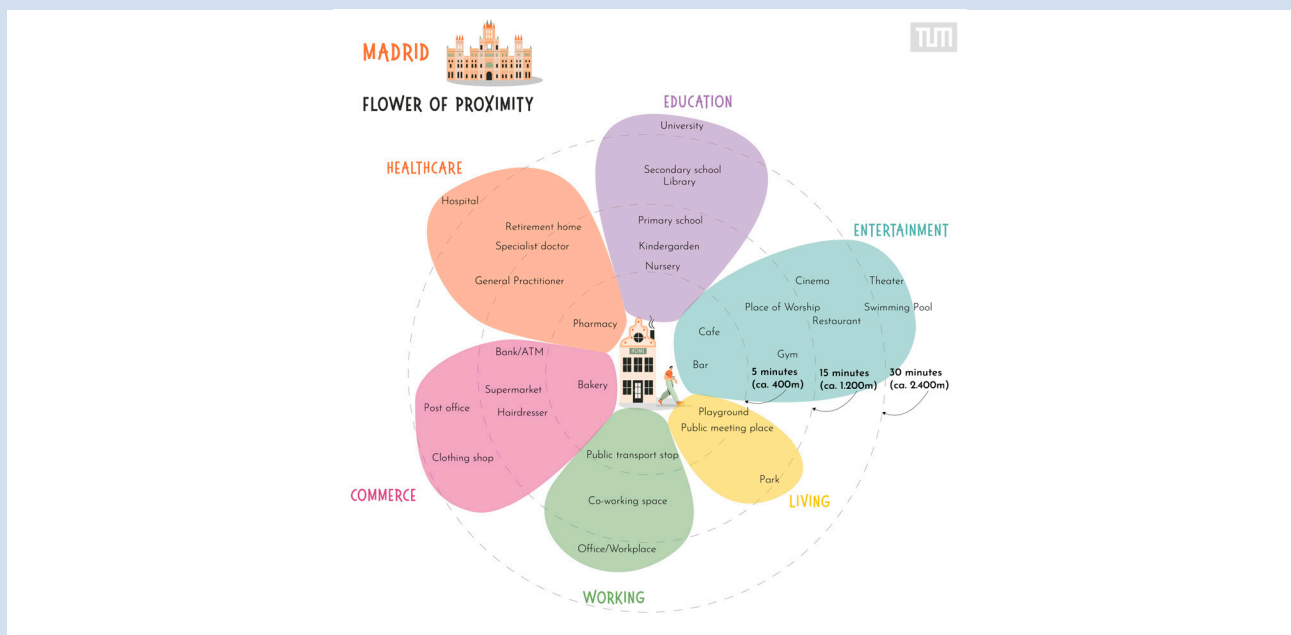

Figure 11: Flower of proximity from the workshop with planning practitioners from Madrid

Even though planners with different backgrounds and from different countries and spatial contexts (i.e., Munich region) participated, there was a consensus on many destinations. For healthcare, pharmacies and general practitioners were included within a 15-minute, and by some even in a 5-minute, radius. The participants also noted the importance of locating these two destinations close to each other since the activities are usually related. In the function of education, there was a consensus to include primary schools, nursery schools, and kindergartens within a 15-minute radius. Libraries were included by two out of the six workshop groups. None of the groups included neither secondary schools nor universities within the 15-minute radius. Surprisingly, the groups agreed on most destinations in the entertainment category: Restaurants and cafes, as well as gyms and sports grounds were included by all groups while bars were only excluded by the group from the region of Munich. Cinemas, theatres, places of worship and swimming pools were included only by one or two groups.

In the 'living'-category, parks, public meeting places and playgrounds were all included within the 15-minute catchment area. The group of the City of Munich added youth centres as a new destination since these are important places for young people under 16 or 18 who are not yet allowed to visit bars or other amenities. Public transport stops, which were included in the 'working'-category, were the only category all groups placed within a 5-minute radius. While the workshop groups from Amsterdam, Ghent, Milan and Madrid included co-working spaces within a 15-minute radius they were outside of it in the two workshop groups from Munich. The category with the largest discrepancies was 'commerce'. Bakeries, supermarkets, and banks/ATMs were included by all groups within their 15-minute cities and butchers and greengrocers by all groups except for Madrid. Only the two workshop groups from Munich and the workshop group of Milan included post offices as part of their 15-minute cities and some groups also included hairdressers.

Overall, we found a large consensus on the relevant destinations for ±15-Minute City across different groups irrespective of their background. Nevertheless, the differences between them demonstrate the need to refine the ±15-Minute City concept based on the specific context it is implemented in. The exercise of the flower of proximity is, of course, not limited to planning practitioners. Cities could use this exercise (or a similar one) to gather information about the ideal ±15-Minute City also from their citizens. This is especially helpful to identify the needs of different user groups.

6.2. Step 2: Measure it
Indicators and tools to evaluate
±15-Minute Cities for ALL

After creating a first vision of a ±15-Minute City (Step 1) it is important to develop fitting measures with which the status quo can be evaluated, areas of need identified (see Chapter 6.3), and later the progress evaluated. The most important outcome of the ±15-Minute City should be the increased use of sustainable transport and, accordingly, a reduction in the use of private, motorized vehicles and vehicle kilometres travelled. While these output measures constitute the eventual goal of a strategies success, a city's transition towards the goal of a ±15-Minute City must also be measured. In the following section, we want to introduce methods that measure a city's level of accessibility to essential services, which incorporates the principles of proximity and diversity, as well as its walk- and cyclability.

Measuring the access to services is crucial since one of the main goals of the ±15-Minute City concept is the provision of essential services and public transport in the proximity of one's home. Ideally, the services that were identified in Step 1 are considered in this analysis. Most of the reviewed ±15-Minute Cities (see Annex I) apply an approach in which the city is divided into a raster grid. For each grid cell, a calculated is performed for certain pre-defined destinations (e.g., parks, schools, restaurants, doctors, supermarkets etc.) and whether they can be reached within a pre-defined time or distance radius (e.g., 10 minutes, 15 minutes, 20 minutes). The maximum score, which is equal to the number of destinations or categories in which they are grouped, indicates that all pre-defined destinations can be reached. Some scores also account for the proximity of destinations by giving nearby destinations a higher score than destinations that are further away. Kirkland (United States), for example, awards 3 points to destinations within 200 metres, 2 points if they are within 400 metres, and 1 point if they are within 800 metres. The maximum score would then indicate that all destinations can be reached within 200 metres or less. In the practical section of this chapter, we will also introduce a method that uses the average travel times to destinations as a measure of proximity (see Practical application 02).

While these scores can help to assess the status quo and identify areas of need (see Chapter 6.3), they are also helpful in redefining a ±15-Minute City vision in its initial stages and thus can serve as feedback to the first steps of the roadmap (see Figure 9). For example, the City of Edinburgh has decided on a 10-minute radius in its strategy because its accessibility analysis revealed that most areas are already within 20 minutes of all essential services (see Study case 05).

Study case 05: Edinburgh, United Kingdom

Measuring accessibility to refine a 20-minute neighbourhood strategy

To clarify its vision for 20-Minute Neighbourhoods, the City of Edinburgh undertook an accessibility analysis for two competing interpretations of the term. The first interpretation sees the 20-Minute Neighbourhood as being bounded by a 20-minute one way trip from home (20-minute radius) while the second interpretation defines the 20-Minute Neighbourhood as 20-Minute round trip journeys from home (10-minute radius). To solve the debate, the city measured the access to six services (local centre, food shop, general practitioner, primary school, local open space, play area) for both interpretations. The resulting maps are presented in Figure 12. The map on the left depicts the access within a 20-minute radius while the map on the right depicts the analysis with a 10-minute radius. Areas that have access to all services are considered 20-Minute Neighbourhoods. Based on the results, most areas of Edinburg already have access to essential services within 20 minutes while gaps are presented when considering the 10-minute radius. Accordingly, Edinburgh decided to go for the more ambitious interpretation of the 20-Minute Neighbourhood that considers a 20-minute roundtrip, i.e., a 10-minute radius from home.
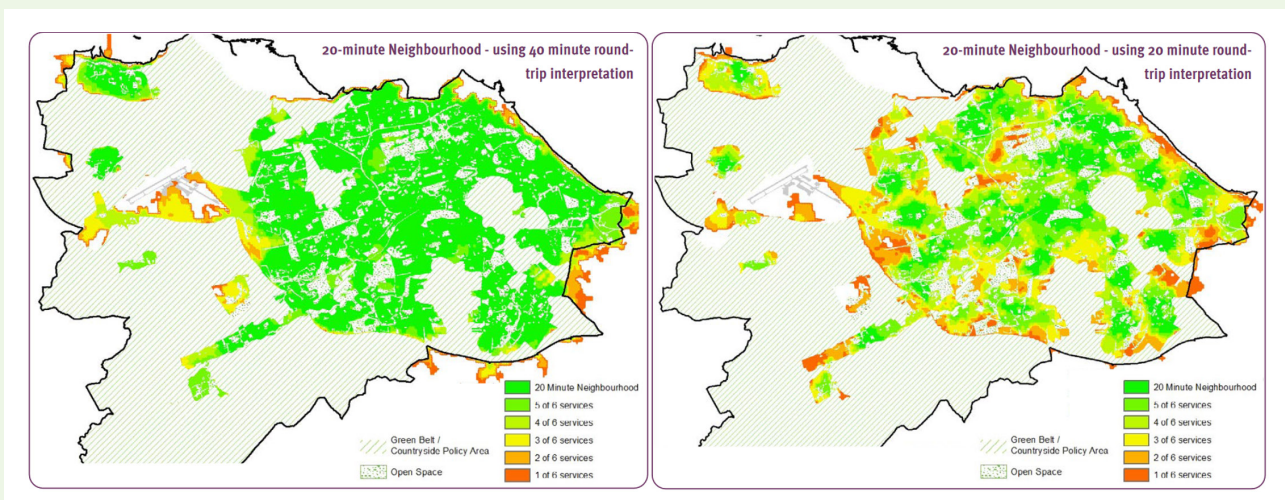

Figure 12: Comparison of accessibility analyses for a 40-minute and 20-minute round-trip interpretation of the 20-Minute Neighbourhood concept in Edinburgh

Source: The City of Edinburgh Council, 2021b, p. 47

Walkability and cyclability can be measured either on the level of the grid cells (or building blocks) and on the level of individual street links. When they are measured on the level of grid cells there is usually a focus on features of the street network, mainly connectivity, within a pre-defined radius around the cell. Typical features are the presence of sidewalks, the sidewalk or bike facility density, the connectivity of streets, and the intersection density. When measuring on the level of individual street links, walkability and cyclability can be assessed by a wide variety of indicators such as type of pavement, the volume of traffic, the traffic speed, the presence of blue and green infrastructure, the presence of shops along the street, the slope of the street and so on.

A limitation with the street link-based analysis is the need for higher-quality data which requires many different data sets that are usually not readily available on a fine resolution. Figure 13 shows a walkability analysis by the City of Ottawa. Such an analysis can help to identify deficiencies in the attractiveness of the walking and cycling networks as well as the attractiveness of public space. Obviously, it is also recommended to consider barrier free design in such analyses to identify streets that are insufficiently equipped for people with mobility impairments (see Chapter 4).
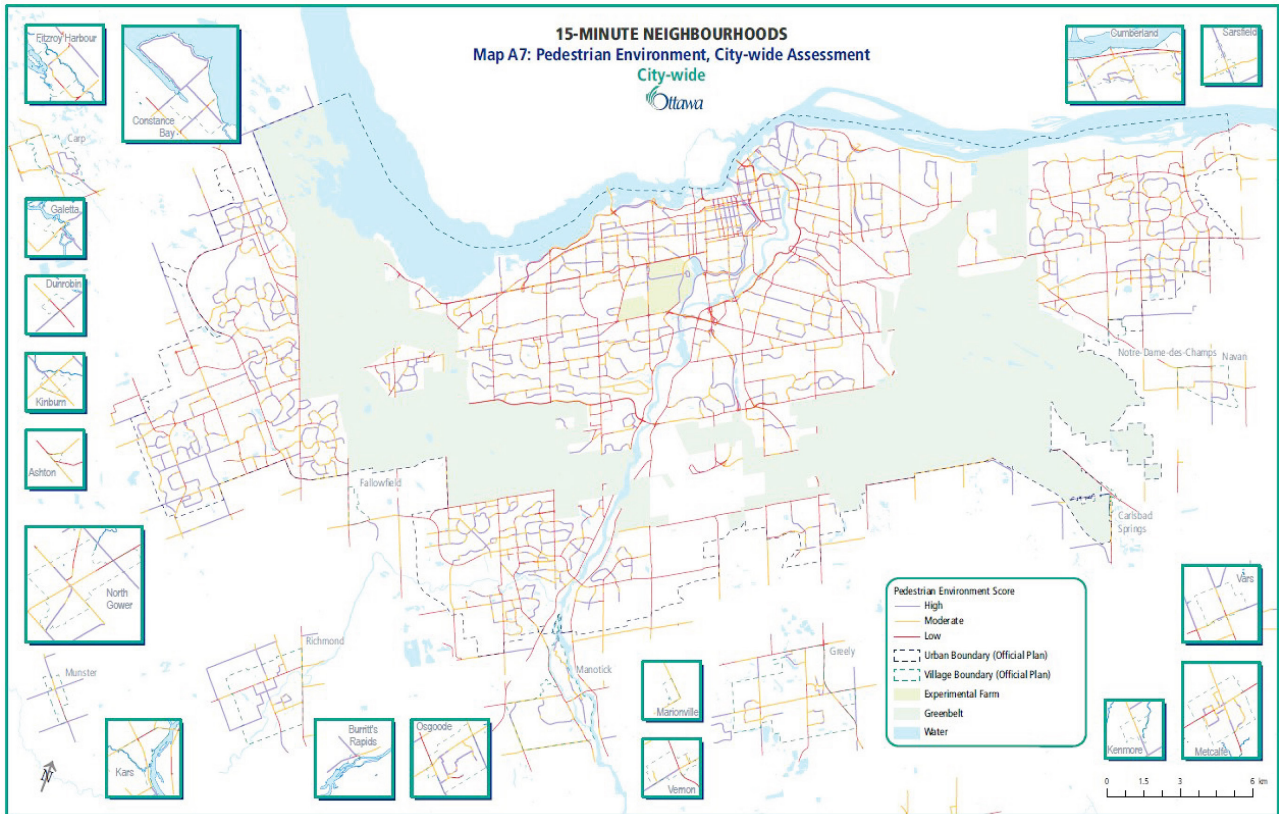

Figure 13: Walkability analysis for the City of Ottawa

Source: City of Ottawa Planning, Infrastructure and Economic Development, 2021b, Map A8

To demonstrate the creation and usefulness of accessibility measures, we have created an accessibility index that we applied to five case studies: Amsterdam, Ghent, Madrid, Milan and Munich. The methodology and results are presented on the practical application 02.

Practical application 02: Accessibility analysis of cities

To better illustrate the potentials of such analyses we have conducted an accessibility analysis for five cities (Amsterdam, Ghent, Madrid, Milan, Munich). The analysis' goal was to measure the walking accessibility to a wide range of services. For each city, it was calculated whether these services are accessible within 20-minutes and in which time the services are accessible on average. The results were then also compared between the five cities based on the share of people that have access within certain travel times (less than 5 minutes, 5 to 10 minutes, etc.) and the average population-weighted travel time of each city.

The analysis was conducted with data from OpenStreetMap for both the points of interest (POIs) and the walking network. Instead of using a GIS-software such as Esri's ArcGIS or QGIS, we used the coding language R and the r5r-library for the network routing. This way, the analysis can be replicated for other areas if the OpenStreetMap data for the area has a sufficient quality. Of course, OpenStreetMap data is not as complete as data from official sources. However, for our task and given the different cities that we wanted to compare we preferred using a single data source.

Based on the essential functions of Moreno, the results from the workshops (see Chapter 6.1), and the available data, we created a list of relevant destinations and grouped them into six categories. Because we found insufficient data for working places, we included public transport as the sixth essential function to replace it. In total, we categorised 23 destination types of places (see Table 5). Because we were not able to reliably distinguish between different types of doctors and schools, we had to include all doctors and schools. Ideally, only general practitioners and elementary schools would've been considered. It was also not possible to reliably distinguish between kindergartens and nurseries.

Table 5: Destination categories of each essential function considered for the ±15-Minute City accessibility analysis

Living	Public Transport	Healthcare	Education	Commerce	Entertainment
▪ Park	▪ Rail Stop	▪ Doctor	▪ Kindergarten	▪ Supermarket	▪ Café
▪ Playground	▪ Bus Stop	▪ Dentist	▪ School	▪ Other Food Stores	▪ Restaurant
▪ Place of Worship		▪ Pharmacy	▪ Library	▪ Bakery	▪ Sports Facility
▪ Community Centre				▪ Hairdresser	
				▪ Chemist	
				▪ Post Office	
				▪ Bank/ATM	
				▪ Convenience Stores	

The accessibility calculation was performed on the level of a raster grid with hexagons of 100m width. For each raster cell, we calculated the travel time to the nearest instance of each destination category. Based on this, we further classified a grid cell as being part of a complete neighbourhood or an incomplete neighbourhood. In our analysis, we defined complete neighbourhoods to have access to

1. at least 20 different destination categories and

2. at least one destination category of each of the six essential functions within 20 minutes by foot.

We further classified the complete neighbourhoods based on the average travel time to the closest destinations that can be reached within each category. The complete neighbourhoods can be classified into

- 5-Minute Neighbourhoods (average travel time of 5 minutes or less)

- 10-Minute Neighbourhoods (average travel time between 5 and 10 minutes)

- 15-Minute Neighbourhoods (average travel time between 10 and 15 minutes)

- 20-Minute Neighbourhoods (average travel time between 15 and 20 minutes)

The results of the accessibility analysis for each city are presented in figure 14. It shows that large parts of the five surveyed cities can already be considered as 5-Minute or 10-Minute Neighbourhoods. The maps of all cities, but especially of Milan and Munich, show a strong concentration of high accessibility in the city centres but also in many smaller centres in other parts of the cities. Areas with a very low access to essential destinations are usually located on the outside of the cities, mostly in industrial areas (western part of Amsterdam) or larger green spaces (northern parts of Ghent and Madrid). Ghent is the city with the largest area of incomplete neighbourhoods which we will further examine in chapter 6.4 (identifying areas of need).
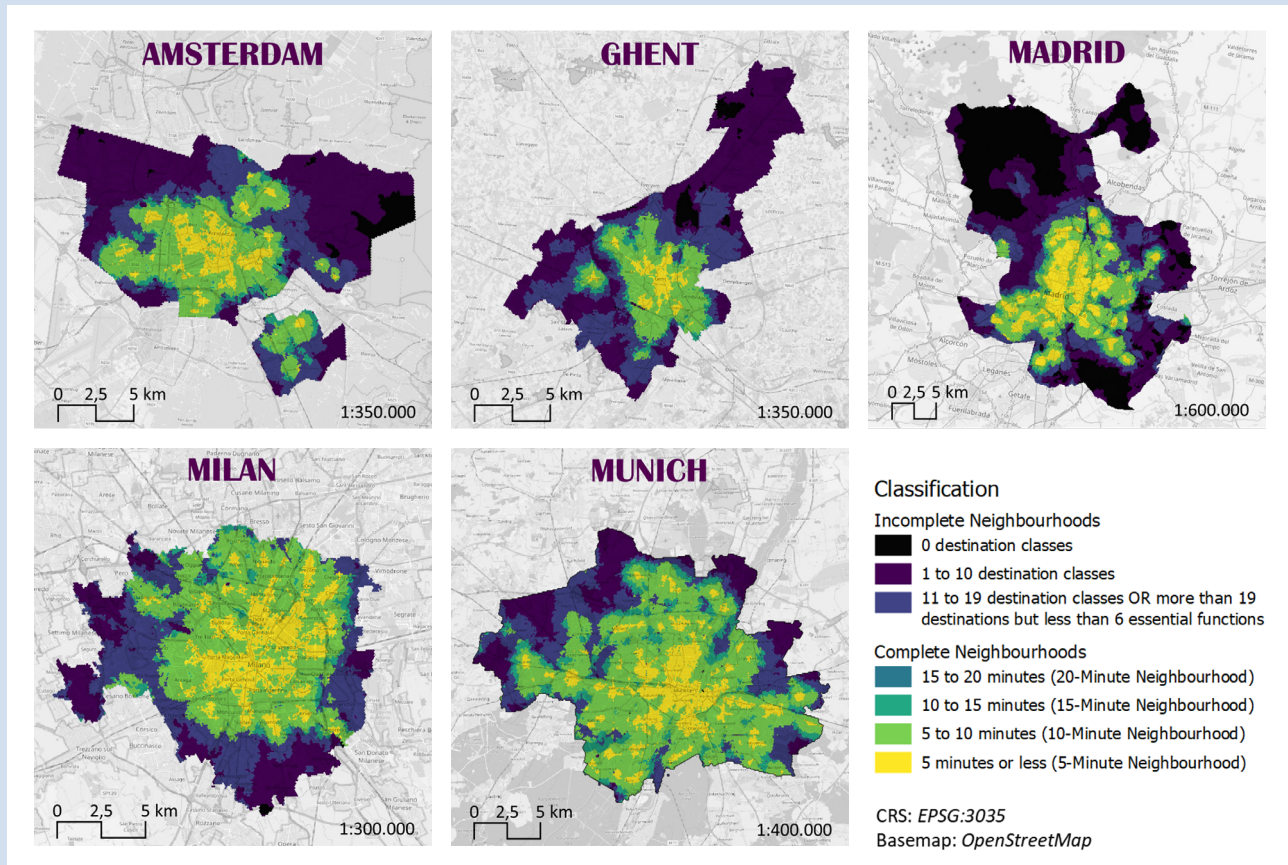

Figure 14: Maps of the accessibility to essential services for Amsterdam, Ghent, Madrid, Milan and Munich

Note: Due to a lack of available data the newly incorporated district of Weesp was excluded in the case of Amsterdam

Comparing Cities with a ±15-Minute City Score

A problem with these maps is a lack of comparability between different cities since there is no information on how the population is distributed. To make the results comparable, we included population data on the building level to calculate:

1. The share of the population within each travel time category.

2. The population-weighted average travel time to all destinations and to the six essential functions.

Because we did not have access to raw population data on a fine resolution (as buildings or building blocks) we disaggregated population data to residential buildings based on official population data, land uses, and point of interest areas (see Pajares et al., 2022 for a similar but more refined approach to population disaggregation). The population data was obtained from the cities' open data portals on the level of districts. This data was disaggregated to all residential buildings based on their footprint. Buildings were classified as residential if they were not on a non-residential land use (e.g., industry or parks), did not have a non-residential function (e.g., schools or churches), and did have a certain minimum footprint of 20 square metres. The population on the building-level was then aggregated to the grid cells of the accessibility analysis. Based on this, we had an estimation of the number of people per grid cell and calculated the share of people within different travel time categories (under 5 minutes, 5 to 10 minutes, 10 to 15 minutes, over 15 minutes) as well as the population-weighted average travel time for each city. It should be noted that, again, only travel times of up to 20 minutes were considered.

The results of the ±15-Minute City Score for the five cities are presented in Figure 15. In total, all cities performed very well in this analysis with ranges from 75 % (Ghent) to up to 94 % (Munich) of the population living within 15 minutes of essential destinations. It is noteworthy, that the categories of "under 5 minutes" and "5 to 10 minutes" have the highest individual share of persons in each city. This confirms the results of the maps that already showed high accessibility (see Figure 14). The city of Madrid has both the highest share of people who live on average within 5 minutes of each essential destination (around 50 %) and the lowest average travel time (around 5 minutes). However, there is a low variance between the average travel times of the five cities with Ghent's 6,3 minutes being the highest.

This analysis highlights the high accessibility that most European cities offer to their citizens, especially in historic town centres. It also raises the question of what is still missing in many cities for people to continue using cars instead of active modes of transportation. A possible explanation is the challenge in existing structures of European cities. In the European case, it may be less about creating access to destinations and more about changing the urban environment and the layout of our streets (i.e., improve walk- and cyclability and reduce barriers). Since we only considered a limited set of destinations the analysis might need to be expanded and refined based on peoples' actual travel behaviour. For example, we did not include workplaces as a potential destination.

Such accessibility analyses can, nevertheless, help to better understand the state of accessibility to destinations in a city and form the basis for identifying which areas need interventions and which measures might be appropriate to deal with these needs.
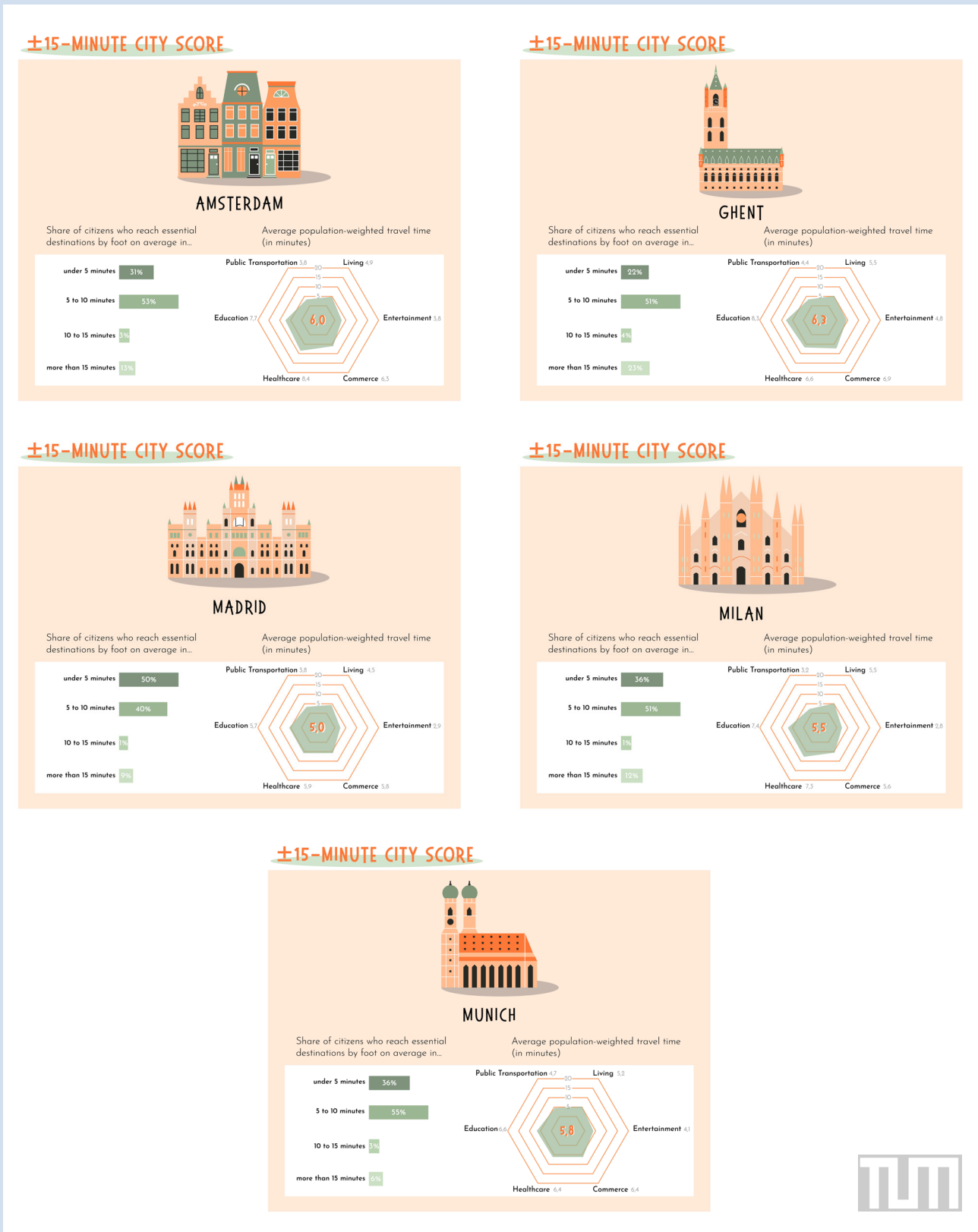
±15-MINUTE CITY SCORE

AMSTERDAM

Share of citizens who reach essential destinations by foot on average in...

under 5 minutes	31%
5 to 10 minutes	53%
10 to 15 minutes	5%
more than 15 minutes	13%

Average population-weighted travel time (in minutes)

Public Transportation 3,8 — Living 4,9
Education 7,7 — **6,0** — Entertainment 3,8
Healthcare 6,4 — Commerce 6,3

±15-MINUTE CITY SCORE

GHENT

Share of citizens who reach essential destinations by foot on average in...

under 5 minutes	22%
5 to 10 minutes	51%
10 to 15 minutes	4%
more than 15 minutes	23%

Average population-weighted travel time (in minutes)

Public Transportation 4,4 — Living 5,5
Education 8,3 — **6,3** — Entertainment 4,8
Healthcare 6,6 — Commerce 6,9

±15-MINUTE CITY SCORE

MADRID

Share of citizens who reach essential destinations by foot on average in...

under 5 minutes	50%
5 to 10 minutes	40%
10 to 15 minutes	1%
more than 15 minutes	9%

Average population-weighted travel time (in minutes)

Public Transportation 3,8 — Living 4,5
Education 5,7 — **5,0** — Entertainment 2,9
Healthcare 5,9 — Commerce 5,8

±15-MINUTE CITY SCORE

MILAN

Share of citizens who reach essential destinations by foot on average in...

under 5 minutes	36%
5 to 10 minutes	51%
10 to 15 minutes	1%
more than 15 minutes	12%

Average population-weighted travel time (in minutes)

Public Transportation 3,2 — Living 5,5
Education 7,4 — **5,5** — Entertainment 2,8
Healthcare 7,3 — Commerce 5,6

±15-MINUTE CITY SCORE

MUNICH

Share of citizens who reach essential destinations by foot on average in...

under 5 minutes	36%
5 to 10 minutes	55%
10 to 15 minutes	3%
more than 15 minutes	6%

Average population-weighted travel time (in minutes)

Public Transportation 4,7 — Living 5,2
Education 6,6 — **5,8** — Entertainment 4,1
Healthcare 6,4 — Commerce 6,4

Figure 15: City-wide comparison of the accessibility to essential services for Amsterdam, Ghent, Madrid, Milan and Munich

6.3. Step 3: Identify areas of need

Before taking actions, it is crucial to understand which actions are needed at which location. Identifying disadvantaged areas is an important step that helps make planning more just since actions are taken at the right locations and where people experience inequalities (see Chapter 4). Local planners and decision-makers, usually have profound knowledge of the conditions in the territories for which they are responsible. Often, the relevant locations and neighbourhoods are well known. Still, especially in larger territories, it can be useful to use spatial data and spatial analyses to better understand the specific needs of areas and identify the places which should have a higher priority.

The accessibility and walkability measures introduced in chapter 6.3 can be one starting point for this. They help to identify locations with gaps in their access to services or their walk- and cyclability (e.g., insufficient sidewalk widths). This **gap analysis** is the first indicator that helps identify the areas which need interventions. For example, we have identified large areas in Ghent where residents have access to 10 to 15 destinations (see Figure 16). Even though they have greater access to many essential destinations including healthcare, education and public transport, the access to commerce and entertainment is lacking. Another step to this could be investigating which measures (e.g., densification) could help create conditions that attract businesses and other service to settle in these areas.
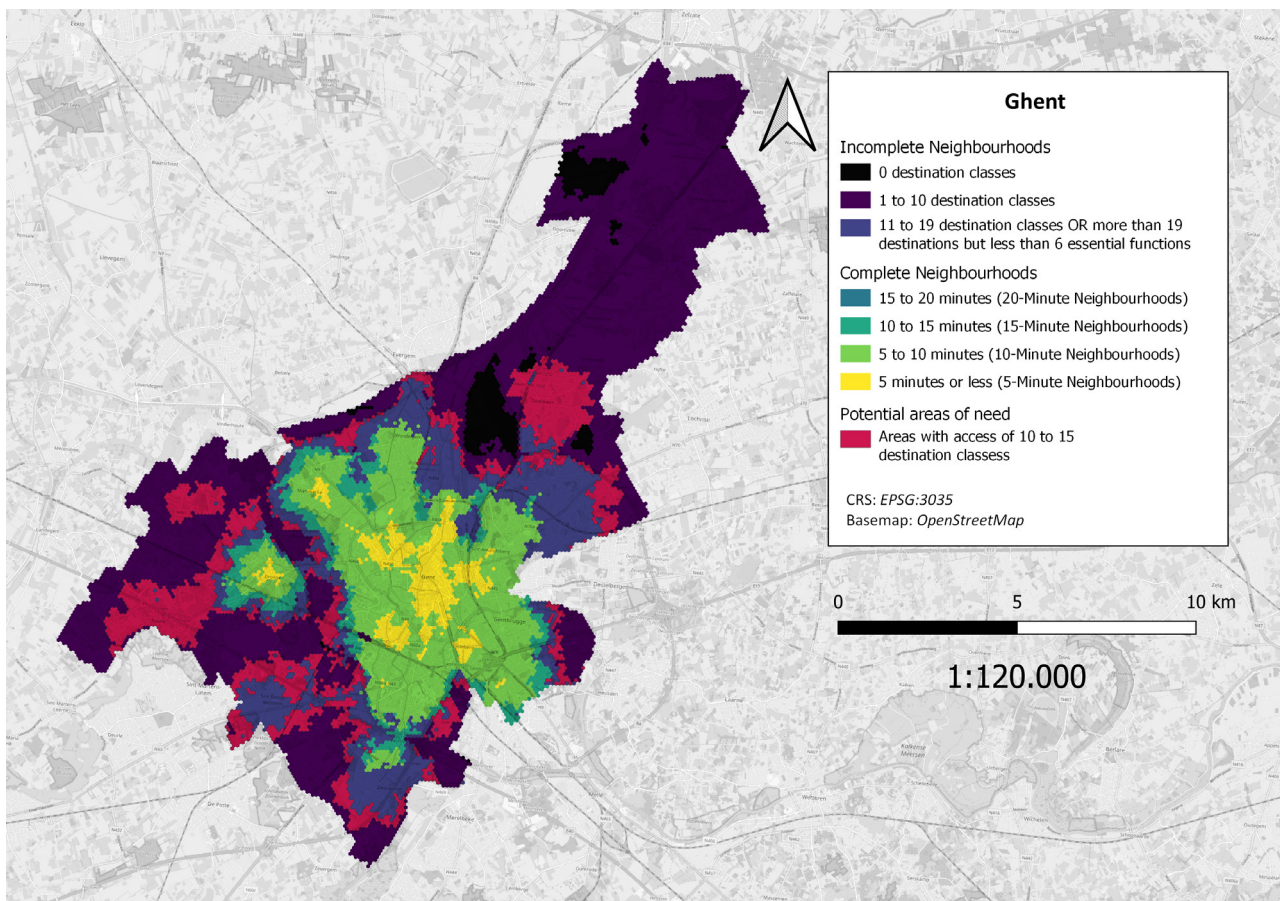
Figure 16: Potential areas of need in the city of Ghent

Areas that have a high accessibility could also use further improvements in other aspects. As discussed in chapter 6.3. there might be areas with high accessibility but poor conditions of walkability and cyclability. If data on both accessibility and walk- and cyclability is available, analyses can compare **areas with a high accessibility but poor walk- and cyclability and vice versa.** Research on urban planning has shown that proximity to services and to public transport, mixed land use, density and walk- and cyclability have only a small effect on reducing automobile travel individually. However, the combination of these factors creates synergies that can lead to effects that are bigger than the sum of its parts (see Ewing & Cervero, 2010). Such an overlay of the two characteristics has for example been done by the City of Ottawa in the creation of its 15-Minute Neighbourhood strategy (see Figure 17).
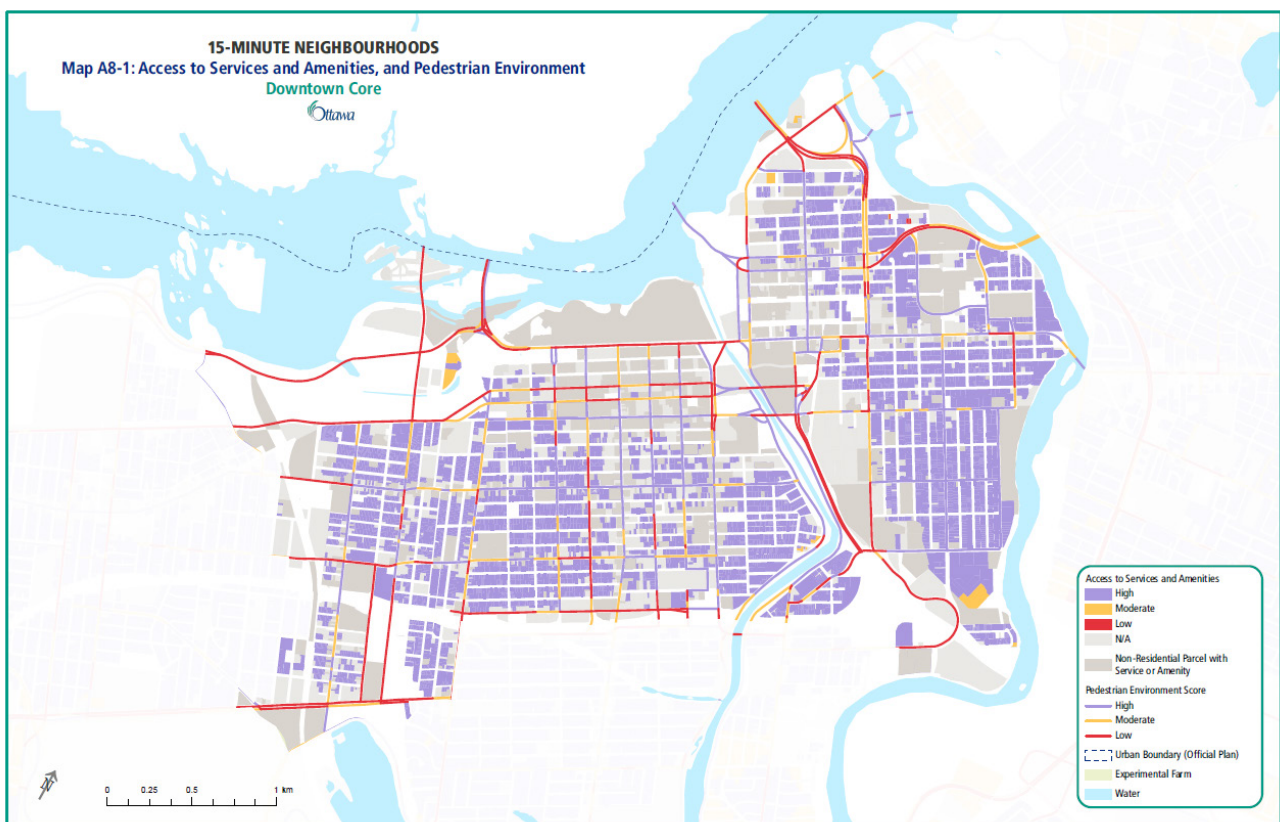
Figure 17: Combined accessibility and walkability map of Ottawa's Downtown Core

Source: City of Ottawa Planning, Infrastructure and Economic Development, 2021b, Map A8-1

In many cases, questions will arise on the prioritisation of locations (e.g., neighbourhoods) since financial and human resources are often limited. There are many factors that can be taken into account here: the number of visitors to an area, the population density, the expected benefits in terms of emission savings and saved kilometres travelled by car and so on. While all of these are important criteria, cities should give special consideration to areas with a higher **presence of vulnerable people** (see Chapter 4). Such an approach is recommended to counter the often-heard criticism that the 15-Minute City concept is mostly beneficial to already well-off population segments. A prioritisation based on the presence of vulnerable people was, for example, done by

the Council of Edinburgh when it decided on the pilot neighbourhood centres for its 15-Minute Neighbourhood strategy (see Study case 06).

Study case 06: Edinburgh, United Kingdom

Selection of priority areas based on districts' multiple levels of deprivation

In 2021, the Council of Edinburgh developed a 15-Minute Neighbourhood strategy. The strategy focuses largely on the development around Edinburgh's historic neighbourhoods. The council decided to consider social deprivation as a factor for identifying where the strategy should be focused using the Scottish Index of Multiple Deprivation (SIMD). The SIMD, developed by the Scottish Government, measures the level of deprivation across seven domains – income, employment, education, health, access to services, crime, and housing – and combines them into a single score. Figure 18 shows an exemplary map for the district of Granton based on its high level of deprivation. Eventually, 7 of 19 neighbourhood centres were chosen based on their level of deprivation and a further 4 on their rurality (The City of Edinburgh Council, 2021c).
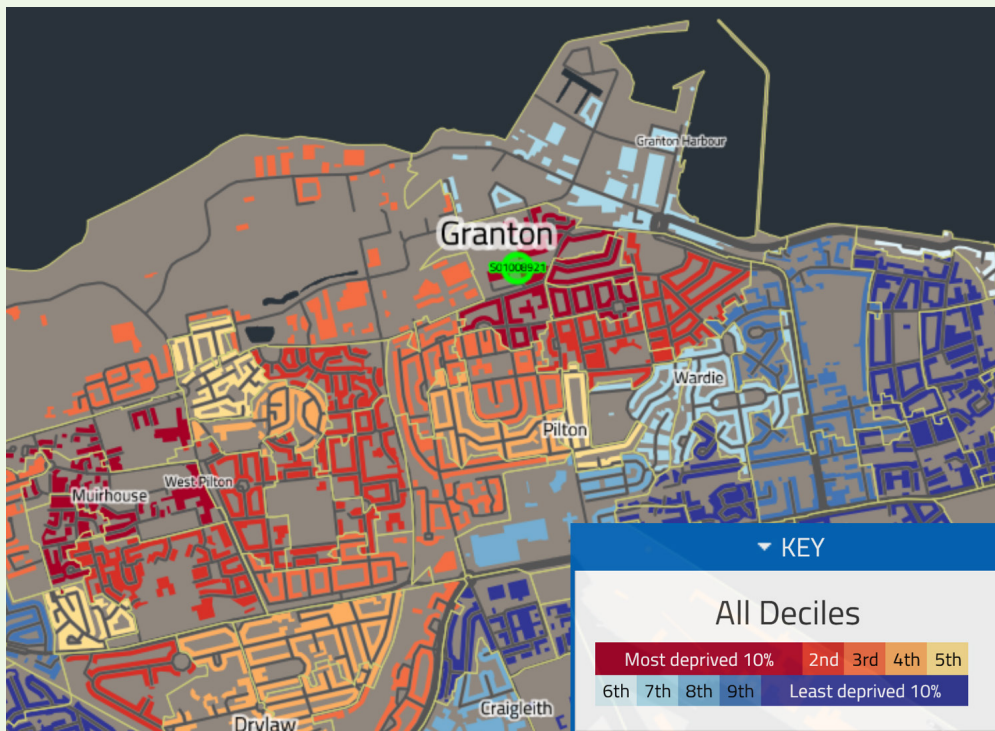
Figure 18: Scottish Index of Multiples Deprivation in the district of Granton, Edinburgh

Source: Scottish Government, 2020 (Contains public sector information licensed under the Open Government Licence v3.0)

6.4. Step 4: Create an Action Plan

Once the areas of need are identified, it is finally time to create an action plan. Such an **Action Plan** (step 4) should be based on the strategic objectives of the ±15-Minute City vision (step 1) and contain the tools to evaluate the strategy (step 2), focus areas based on the needs analysis (step 3), and measures that are taken to achieve the ±15-Minute City goal. Action plans usually include "what", "who" and "when". After identifying the areas of need in your city, the action plan should consider: actors' responsibilities, a timeline for activities and measures, and budgets to achieve the main vision objectives that would be depending on each city context and needs. Additionally, it should include a citizen's engagement process and evaluation plan that runs even before and after street interventions are implemented.

In the following section, we will introduce some measures that can be taken to improve certain aspects of cities to transform them into ±15-Minute Cities with a specific focus on inclusiveness and the needs of different groups of people.

Introducing inclusivity in the ±15-Minute City Action Plan

As discussed in chapter 4, for the ±15-Minute City to be considered a human centred model and be a viable and feasible strategy in the long term, it must include policies and actions that address vulnerable social categories. In doing so, structural inequalities can be addressed within societies which previous models failed to achieve. Even though its focus is on people-centred urban development, the concept tends to give priority to spatial and environmental observations, neglecting (even though, not intentionally) socio-economic aspects, such as demographics, social compositions, employment, and income (TUMI, 2021). Following this line of thought, within our study the ±15-Minute City model should include redesigning streets and public space in neighbourhoods in a way that benefits people of all backgrounds, ages, and abilities.

Based on the literature review that we have synthesized in chapter 4 we made a collection of the main challenges that the most vulnerable social categories face, in the way how cities are designed nowadays, and how a ±15-Minute City strategy could address them in planning models. As already mentioned in chapter 4.3, we have categorised the following social demographic groups as vulnerable in term of specific needs that might not be considered: older adults, children, people with disabilities, people with a migrant background, women, caregivers, and low-income groups.

Table 6: A user's needs-based assessment for an inclusive ±15-Minute City for ALL

Challenges	Affected user Group	Policy recommendations	Urban design recommendations	Related Guide / Program
Need access to destinations out of the ±15-Min City radius to access work, specialised health or social services among others.	▪ Older adults ▪ People with disabilities ▪ Caregivers	Ensure a good public transport connections service all around the cities.		
Lack of universal accessibility and barrier-free spaces Language barriers, disorientation, and social segregation	▪ Children ▪ Older adults ▪ People with disabilities ▪ Migrant background ▪ Caregivers	Design for all concepts (e.g., getting rid of physical, sensory, and cognitive barriers)	▪ Implementation of ramps, wind barriers, tactile surfaces ▪ Wayfinding, signals and information points	▪ Berlin Design For All
Environmental exposure (air pollution, noise, thermal extremes) influencing the walkability and cyclability as a mode of transport.	▪ Children ▪ Gender/Women ▪ Older adults ▪ People with disabilities	Promote bioclimatic redesign of public spaces, to improve environmental variables (e.g., weather, noise, air quality)	▪ Introduction of vegetation, water fountains, installation of awnings in first level ▪ Shelter for sun, rain and wind	▪ Guide for planning healthy cities (Spain)
Vulnerable to being socially isolated (fear of leaving their homes due to unwelcoming external environments)	▪ Children ▪ Older adults ▪ Migrant background ▪ Low-income groups	▪ Provide public spaces to promote interaction among users with different ages and background ▪ Design streets that foster interactions for children and facilitate outdoor activities	▪ Safe routes to school ▪ Urban equipment (seating, support points, public restrooms) ▪ Creation of meeting points (street experiments) ▪ Urban gardening spaces ▪ Opening of school yards and other semi-private spaces for the use of all	▪ ¨Oasis yards¨ in Paris ▪ Global Bio Gardens Solidarity Project (Germany)
Safety and protection from road traffic	▪ Children ▪ Older adults ▪ People with disabilities ▪ Caregivers	Traffic Calming Measures and speed limit regulation	▪ Speed limit, curb extensions, chicanes, narrow lanes, speed humps, tactile surfaces, pedestrian safety islands	▪ NACTO Design Guidelines ▪ Safe routes to school Programms
Security and protection from crime, violence, and sexual harassment Women might be afraid of walking at night	▪ -Gender/ Women	Improve sense of security and respect for all users	▪ Public lighting, activate streets, avoid "blind" facades, street surveillance	▪ Feminist city (Barcelona) ▪ Caring cities (Rosa-Luxemburg-Stiftung) ▪ Her City Tool Box (UNIHABITAT)

High walkability and accessibility are accompanied by increased housing value	Low-income groups	▪ Affordable access to housing and public transport ▪ Social housing plans ▪ Freeze rental prices or housing market		▪ Shipping Containers Housing (UK) ▪ Freeze Your rent Program (NYC)
Need to move around the city to look for work, access to public transportation that they can afford	Low-income groups	▪ Policies that promote local businesses development and local job offers ▪ Aids and discounts for unemployed people to access public transport	▪ Co-working spaces ▪ Pop-up markets	▪ Discounts for jobseekers (UK) ▪ LIFE Program (California)
Shortage of public toilet access and inadequate infrastructure.	All	▪ Implementation of a shared bathroom program ▪ Reinforce the planification of public toilets around the city	▪ Local business, restaurants and bars open their toilettes to public under the public sharing toilette (e.g. mapping them or adding stickers on their entrances ▪ Maintenance and renovation of existing public toilettes	▪ Die nette Toilette (Germany) ▪ Community Toilette Schemme (London)

6.5. Step 5: Implementing by phases

When developing the timeline within the Action Plan, it is important to keep in mind a long-term vision to achieve a visible change in the city. Hence, the importance of not considering the implementation of a measure only once but to have a long-term strategic vision, while introducing immediate measures such as street experiments and localised street interventions that prove to have positive results in a shorter period. This can allow stakeholders and practitioners to monitor them, collect feedback, evaluate, and gain valuable insights for the final redesign project. It is considered important to at least test the plan by implementing it in the city in the short term in order to validate the potential long-term measures.

In the following table we have collected a series of recommendations for the implementation plan by phases from street experimentation up to public investment works.

Table 7: Planning by phases - from street experiments to a ±15-Minute City vision.

Phase	Time period	Approach	Measures and materials	Specific examples
Short-Term	< 2 years	From raising awareness and demonstration projects (one day interventions) up to street experimentation following the tactical urbanism concept on streets and public spaces	**Low-cost materials** ▪ Surface treatment (temporary or traffic paint, traffic tape) ▪ Barrier elements (traffic cones, plastic lane separators) ▪ Traffic control ▪ (wood or plastic barricades) ▪ Greenery (plastic or wooden planters, synthetic turf) ▪ Recycled materials (wooden pallets and crates, tires) ▪ (For further reference see Tactical Urbanists guide by Lydon et all)	**Bike lanes** ▪ Pop-up bike lane with traffic tape or paint and implementation of bike preference signs with a cardboard stencil. **Curb extensions** ▪ Paint curb extensions
Medium-Term	2-5 years	From street experiments up to localised small scale interventions to streets and public spaces	**Moderate-cost interventions** ▪ Surface treatment (traffic or thermoplastic paint, cement interventions). ▪ Barrier elements (plastic lane separators, metallic or plastic bollards) ▪ Traffic control (plastic or concrete barricades) ▪ Greenery (big concrete planters, synthetic turf and real turf, plant trees) ▪ Traffic control ▪ (wood or plastic barricades) ▪ Greenery (plastic or wooden planters, synthetic turf) ▪ Recycled materials (wooden pallets and crates, tires) ▪ (For further reference see Tactical Urbanists guide by Lydon et all)	**Bike lanes** ▪ Formalisation of cycle lane by painting the entire lane with paint buffered from the vehicle road with plastic bollards and metal or plastic stencils for bike signs. **Curb extension** ▪ Formalise the curb extensions with cement and metallic bollards
Long-Term	5-10 years	Permanent redesign of streets and public spaces following a masterplan	**High-cost (public investment work)** ▪ Change of surface treatment by the implementation of new material, for example cobblestone which is also traffic calming ▪ Barrier elements and traffic control turn into total or partial traffic closure ▪ Incorporation of vegetation in the project and tree planting ▪ Traffic control (plastic or concrete barricades) ▪ Greenery (big concrete planters, synthetic turf and real turf, plant trees) ▪ Traffic control ▪ (wood or plastic barricades) ▪ Greenery (plastic or wooden planters, synthetic turf) ▪ Recycled materials (wooden pallets and crates, tires) ▪ (For further reference see Tactical Urbanists guide by Lydon et all)	**Bike lanes** ▪ Permanent implementation of a cycle lane with the correct infrastructure segregating it from the vehicle road and accompanied by long-lasting street markings and traffic signs. **Curb extension** ▪ Integration of sidewalk and curb extension in a complete street redesign

Driving change through street experiments by Street Experiments Tool (SET)

Driving change in our cities is not an easy task, it is highly complex as it involves different domains: the bureaucratic processes of making policy changes, obtaining building permits, the time it takes to develop an exhaustive masterplan and physically implement it. There is also the risk that proposed solutions may be inadequate without a thorough process of citizen participation that involves the interests of the community. In the end, time and money have been wasted without achieving the desired impact.

It is said that in times of crisis, one must take this period as an opportunity to see the creativity and innovation emerge to confront the challenges ahead. This is precisely what cities around the world have started to do: to experiment with their city streets and with their public spaces. By experimenting, they adapted and offered solutions to the restrictions of physical contact and mobility that their citizens were facing during the strict lockdowns of the COVID-19 pandemic.

City street experiments are defined "an intentional, temporary change of the street use, regulation and/r form, aimed at exploring systemic change in urban mobility, away from `Streets for traffic´, and towards `streets for people´" (Bertolini, 2020, p. 2). Cities began to experiment with their streets on their public space with temporary materials to propose immediate solutions following the concept of tactical urbanism. Tactical urbanism is an approach to neighbourhood building and activation using short-term, low-cost, and scalable interventions and policies (Lydon & García, 2015).

We present street experiments as a tool to offer quick solutions to specific city challenges while making them more resilient due to their capacity for adaptability. There are three specific principles that street experiments can help to achieve the ±15-Minute City: walk- and cyclability, public spaces and placemaking, and revitalising local economy to ensure proximity to services and mix-land use.

Below we present some examples on how street experiments can help to achieve the ±15-Minute City:

- During the lockdown restrictions, **mobility** was very limited and public transportation was considered unsafe in terms of health. As a response, Bogotá, Milan, Berlin, Paris, Munich, and many other cities enabled the implementation of pop-up cycle lanes to avoid congestion in public transport, offering the possibility of moving around safely while allowing social distancing. Further, the benefits from avoiding pollution and promoting active mobility made the pop-up cycle lanes a popular success. Nowadays many cities are implementing cycle lanes permanently increasing their cycling network and having a higher modal split number of bicycle users.

- Having access to parks and **public space** is considered a privilege that unfortunately not all citizens have, especially in densely populated cities. As an issue of mobility, access to consumption-free spaces to interact and stay are very limited and not available to the entire population. To remedy this, many cities started to close the streets to traffic and open them to people. For instance, in Munich, the Summer Streets program partially or

completely closed streets to cars. The city brought public spaces and play streets to people in front of their homes, enabling new spaces to stay and interact with others. Offering spaces for interaction fosters **placemaking** to happen.

- During the outbreak of the pandemic **local economy** was severely affected, restaurants, bars and small businesses around the world closed for months due to strict lockdown measures, without receiving income. A strategy that many cities started to follow was the implementation of the already known "Parklets" a landscaped and small gathering area, often in the place of former on-street parking spaces (Lydon & García, 2015). *Schanigärten*, were a similar commercial parklet in Austria and Germany to allow safe reopening in the outdoors, letting small business economies thrive. Not only did the implementation of parklets help to keep local economies active, but also the implementation of Pop-Up Markets also helped to bring missing products such as food and goods to certain areas where there is a lack of supermarkets. The low-cost measures mentioned above compared to traditional planning can provide quick and effective solutions to cities in transition towards the ±15-Minute City.

STREET
EXPERIMENTS
TOOL

For more information about street experiments as a tool to achieve the ±15-Minute City visit the Street Experiments Tool (SET) website: www.streetexperiments.com

7. Conclusion

Following fast technological, economic, social, and cultural growth, cities see the need to reinvent themselves over time, and so do the concepts upon which our cities are built in. Clearly, the 15-Minute City concept is not a radically different concept in city planning. However, given the fast pace that the concept grew and how fast it has been embraced not only by politicians and professionals but also by the citizens, it should be an indicator that it was about time to address failures in modern city planning. Most of these failures are linked to the car-oriented city model which has increased inequalities in our built environments, not only based on who can afford private car mobility, but also in terms of universal accessibility (barriers) and accessibility by proximity to main basic services. By bringing citizens to the centre of the concept, the 15-Minute City aims to provide people with all the necessary destinations within ±15-Minutes from their homes, walking or cycling. This analysis of the ±15-Minute City concept has brought up some very interesting points which can be taken into consideration for further analysis of the concept when identifying both, the positive impacts of the concept and the challenges in its implementation:

Positive impacts of redesigning streets in line with the ±15-Minute City concept on health, economy, social and environmental aspects

- Urban regeneration improving accessibility in neighbourhoods by walkability and cyclability increases **social cohesion** and a sense of place (placemaking). Simultaneously, mixed uses and activities make the area safer and bring a higher **perception of security** to its users.

- Active mobility modes, such as walking, and cycling promote **mental and physical health**. Moreover, these active modes are also considered more **environmentally friendly**, which helps bring positive impacts in terms of environmental pollution, directly affecting the health of the citizens living in the neighbourhood.

- Helps to reduce air pollution and the reduction of greenhouse gas emissions.

- Walkable environments have shown a positive correlation with **the enhanced value of local services, the creation of new job opportunities**, and the **support of local businesses and street markets.**

Challenges in the implementation of the ±15-Minute City:

- The concept risks spurring **new waves of gentrification** in our cities if a focus is not put on the ubiquity of the concept and its prioritization of the less disadvantaged and less served areas of the city.

- Having been planned around planning models that favour a clear division of functions in a territory, **suburban areas have strict land-use limitations**, making it difficult to implement a ±15-Minute City model.

- There is a need to **coordinate interests and investments among different administrative units** to achieve ±15-Minute Cities in both the city core and suburban areas, to avoid more territorial disbalances in terms of service provision.

- Due to their non-urban character households, suburban areas pose a **morphological challenge** (single-family households; residents spread out on a larger territory).

Suffice it to say, the concept is at a very infant stage of development and implementation where many cities worldwide have embraced it, but there is not a clear way how governments can implement it and make it part of their territorial development agendas. This lack of clear politics around it presents a risk as much as an opportunity. Given the fuzziness that still exists around the concept, taking Moreno's definitions of the 15-Minute City as a basis, as well as focusing on human-centred planning, this study **has identified the following key elements** around which we want to build up our 15-Minute City implementation road map.

The study has identified the following common planning principles around a ±15-Minute City

1. **Proximity to essential services:** Residents can access essential services within a reasonable time by foot, bicycle, or other non-motorised devices.

2. **Proximity to public transport:** Residents have public transport nearby and free of barriers, to reach areas outside of their home's vicinity without having to rely on a car.

3. **Density:** The population and employment density of an area supports the existence of local businesses and services.

4. **Mixed land use:** Residents find a variety of land uses that fulfil all their daily needs and urban functions close to their homes.

5. **Walkable and cyclable streets:** Walking and cycling paths are well connected, free of barriers and comfortable for pedestrians, cyclists, and all other non-motorised road users.

6. **Public space and placemaking:** Co-creation of places together with the community to strengthen the connection and identity to new destinations according to their needs.

7. **Inclusiveness:** All residents are able to move safely and free of barriers in public spaces and make use of services, irrespective of their individual capabilities, age, gender or origin.

8. **Ubiquity:** All these characteristics, should be so widespread that they are available to each resident all around the cities, irrespective of their socio-economic and demographic status.

When developing the common principles for a ±15-Minute City and considering new policy and redesign recommendations the question **'For whom?'** had a central role. The answer clearly focused on a **'for ALL'** approach. To achieve the diversity of people and inclusivity goal, in addition to the traditional accessibility by proximity framework based on proximity to services, the implementation should include indicators such as design for all (free of barriers), safety, people's ability, freedom, and affordability. The ±15-Minute City must ensure access to essential services for ALL groups of society regardless of their abilities and socio-economic, demographic, or cultural factors.

Implementation of a ±15-Minute City

Planning practitioners need suitable tools to find neighbourhoods that need walkable access to basic needs. Hence, co-designing and co-creating the ideal ±15-Minute City with its inhabitants is crucial. The "Flowers of Proximity" have proven to be an easy and fun way of starting this discussion. They allowed the comparison of different perspectives on the ±15-Minute City by planning practitioners from diverse backgrounds and cities. This exercise can, in the future, also be used as a starting point to co-design visions of the ±15-Minute City together with all stakeholders. However, this vision should not be set in stone but must be tested based on analyses of the proximity to essential services and other important factors such as walk- and cyclability.

A ±15-Minute City analysis of five European cities (Amsterdam, Ghent, Madrid, Milan, and Munich) has revealed that they can be considered 10- or even 5-Minute Cities because of the high proximity to essential services. However, we also found that, especially on the fringes of the analysed cities there are still areas which do not experience the same levels of proximity as the urban centres. This, again, highlights the need for context-dependent interventions to achieve the goal of ±15-Minute Cities. While there are questions of densification and improving proximity to destinations in the suburbs, there should be a higher emphasis on promoting liveable urban spaces as well as walkable and cyclable streets to reduce the use of cars in areas with already high accessibility.

During the pandemic the value of urban space became evident, and we questioned the use of the space in our cities, seeing it as a limited resource. Since then, our streets have experimented temporary redesign to take the best advantage of the space available. Street experiments can help as a tool to achieve the vision that cities have around the ±15-Minute City even with low budget, to help to pave the way to the ±15-Minute City. To select sites for the implementation of street experiments and other measures, it is important to put more emphasis on areas that face specific challenges, such as social deprivation, to reduce inequalities across cities and regions. Even though European cities are at the forefront of implementing ±15-Minute Cities, there is still a lot of work ahead. The planning principles and roadmap presented in this study can support cities and planning practitioners so that they can take a step forward to meet the goal of designing **human-centred**, more **accessible**, **just**, and **liveable** neighbourhoods and cities for ALL

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Annex I – ±15-Minute Cities

Table 8: Overview of ±15-Minute Cities

City	Country	Name	Website	Planning Documents
Buenos Aires	Argentina	15-Minute City (Ciudad de 15 minutos)	https://cooperacion-urbana-federal.buenosaires.gob.ar/ciudad-de-15-minutos	
Dublin	Ireland	15-Minute City	https://www.dublincity.ie/residential/planning/strategic-planning/dublin-city-development-plan/development-plan-2022-2028	In development (see website)
Edinburgh	Scotland	20-Minute Neighbourhoods	https://www.edinburgh.gov.uk/future-council/need-20-minute-neighbourhoods	The City of Edinburgh Council, 2021a, 2021b, 2021 c
Eugene, OR	United States	20-Minute Neighbourhoods	https://www.eugene-or.gov/506/20-Minute-Neighborhood	City of Eugene, 2010, 2012, 2020
Hailsham	United Kingdom	10-Minute Town		Hailsham Town Council, 2020
Kirkland, WA	United States	10-Minute Neighbourhoods	https://www.kirklandwa.gov/Government/Departments/Planning-and-Building/10-Minute-Neighborhood-Analysis	City of Kirkland, Washington, 2021
Melbourne	Australia	20-Minute Neighbourhoods	https://www.planning.vic.gov.au/policy-and-strategy/planning-for-melbourne/plan-melbourne/20-minute-neighbourhoods	The State of Victoria Department of Environment, Land, Water and Planning, 2017, 2019
Milan	Italy	15-Minute City (Città a 15 minuti)	https://hailshamneighbourhoodplan.co.uk/	Commune di Milano, 2020
Ottawa	Canada	15-Minute Neighbourhoods	https://engage.ottawa.ca/the-new-official-plan/news_feed/15-minute-neighbourhoods	City of Ottawa Planning, Infrastructure and Economic Development, 2021a, 2021b
Paris	France	15-Minute City (Ville de quart d'heure)	https://www.paris.fr/dossiers/paris-ville-du-quart-d-heure-ou-le-pari-de-la-proximite-37	
Portland, OR	United States	20-Minute Neighbourhoods		City of Portland, Oregon, 2012
Rome	Italy	15-Minute City (Cittá dei 15 minuti)	https://www.comune.roma.it/web/it/dipartimento-decentramento-servizi-delegati-e-citta-in-15-minuti-citta-dei-15-min.page	
	Singapore	20-Minute Towns	https://www.lta.gov.sg/content/ltagov/en/who_we_are/our_work/land_transport_master_plan_2040.html	Land Transport Authority (LTA) Singapore, 2019
Surrey County	United Kingdom	20-Minute Neighbourhoods		Surrey County Council, 2022
Tempe, AZ	United States	20-Minute City		City of Tempe, Arizona., 2014
Utrecht	Netherlands	10-Minute City (Tien-minutenstad)	https://omgevingsvisie.utrecht.nl/de-koers/ruimtelijke-strategie-utrecht-2040/samenvatting/	Gemeente Utrecht, 2021

Annex II – Related planning concepts that preceded the 15-Minute City

Table 9: Related planning concepts that preceded the 15-Minute City

City	Timeline	Main characteristics	Similarity with 15-Minute City	Examples	Reference
Plan Cerdà. City blocks	1859	Orthogonal grid for equitable distribution of services and balance between built and open spaces in each city block.	Equitable distribution of services	Barcelona, Spain	(Cerdá, 1867)
Lineal city	1885	Link different urban centres by means of a main avenue with developed plots of land on both sides.		Madrid, Spain	(Navacues, 1969)
Garden city	1926	Balance between urban concentration, rural areas and nature.	Close proximity to services	Letchworth, England	(Howard, 1902; Marchigiani & Bonfantini, 2022)
Neighbourhood unit	1926	Hierarchical system of urban amenities based on the neighbourhood unit, many neighbourhoods form the city.	Neighbourhood scale	New York, USA	(Perry, 1929)
Broadacre City ¨City-country¨	1932	Theoretical model. Low density.			(Wright, 1932, 1935)
Polycentric city	1945	Cities has multiple growth nuclei around which growth take place	Polycentric cities, even distribution of services	Chicago, USA	(Harris and Ullman, 1945)
Time geography	1970	Is a theory that specifies the constraints on human activity imposed by fundamental limits on human mobility and interaction in space and time	Daily life, travel time		Hägerstrand (1970)
New Urbanism	1979	Distribution of workplaces, stores, schools, parks and all facilities essential to the daily lives of residents, all located within easy walking distance in a compact and diverse manner.	Neighbourhood level, services access at walking distance	Seaside, USA	(Audirac & Shermyen, 1994; Katz, 1994;Ellis, 2002; Patterson & Chapman; 2004)
TND (Traditional Neighbourhood Design)	1986	Variety of housing types, a mixture of land uses, an active centre, a walkable design and often a transit option within a compact neighbourhood scale area	Neighbourhood scale, variety of uses at walking distance	Florida, USA	(Freiman, 1994; Langdon, 1999)
Human-scale city (people-centred planninng)	1987	Take human senses as a starting point and how people move.	Walking, cycling. People centred planning	Buenos Aires, Argentina	(Gehl, 1987;2013; Ewing, R., & Handy, S, 2009)

| Concept	Year	Description	Focus	Examples	Reference
TOD (Transit Oriented Development)	1993	Reorganize an area functionally around public transit options	Pedestrian friendliness, high density, mixed land use	Curitiba, Brazil Toronto, Canada Houston, USA	(Calthorpe, 1993)
Chronourbanism	1997	Time based urban planning	Daily life, travel time	Barcelona, Spain Paris, France	(Asher, 1997)
Liveable communities	1999	A liveable community is one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options	Access to services	Portland, USA Seattle, USA Denver, USA	(Pollak, 1999; Kihl et al., 2005)
Walkable city	2005	Focus on the quality of the pedestrian environment to promote walking. Six criteria are presented for design of a successful pedestrian network: 1 connectivity; 2 linkage with other modes; 3 fine grained land use patterns; 4 safety; 5 quality of path; and 6 path context	Walking, cycling, mix and accessible land use services	Copenhagen, Denmark	(Southworth, 2005)
Great city	2012	Is a new smaller, distinct satellite city in its outskirts, where everything will be within a 15-minute walk of the pedestrianised centre and connected to current urban centres via mass transit.	Everything is a 15 min walk	Shanghai, China	
Superblock	2013	It is structured by a network of streets where motorized speed is limited to 10 k/h and intended to collect all the land uses inside. The conceptual model is divided in four main concepts: social cohesion, complexity, compactness and functionality and sustainability	Accessibility and mix of land uses, proximity, walking and cycling.	Barcelona, Spain Vitoria, Spain	(Agencia de Ecología Urbana de Barcelona, 2022)
1-minute City: Future Streets and Street Moves	2020	Hyperlocal level. Interactive kit consisting of expandable modular wooden platform. Citizens can create their playgrounds, gyms, gardens, social hubs, etc		Stockholm, Sweden	(Ruíz & Solis, 2021; Smart City Sweden, 2021)
Vital neighbourhoods	2021	30 min city strategy. It integrates a network of green corridors with pedestrian and cycle-priority roads	Pedestrian and cycling priority	Bogotá, Colombia	(Secretaría Distrital de Planeación, 2021)

Annex III – Flowers of proximity
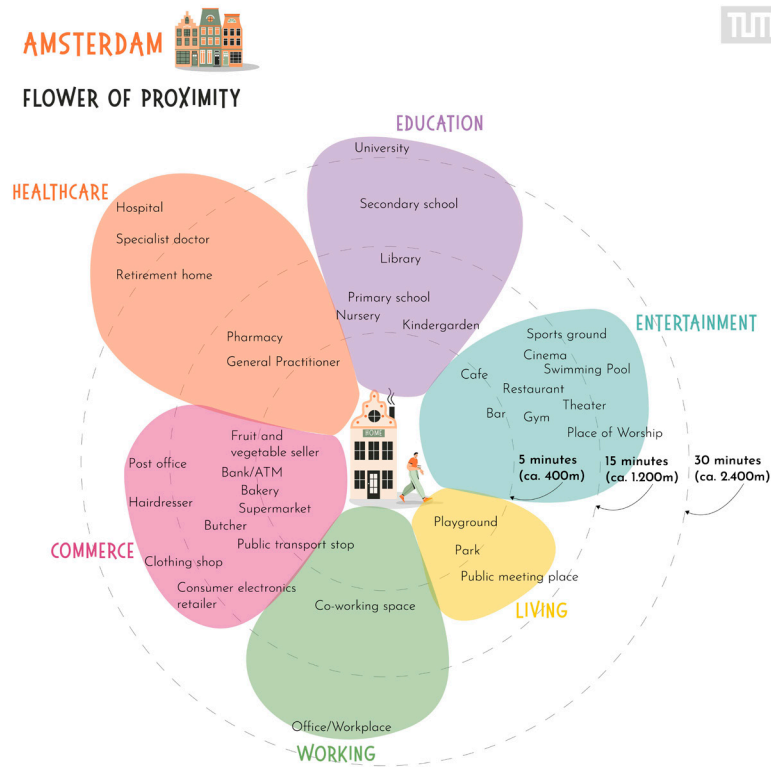
Figure 19: Flower of proximity from the workshop with local planning practitioners from Amsterdam
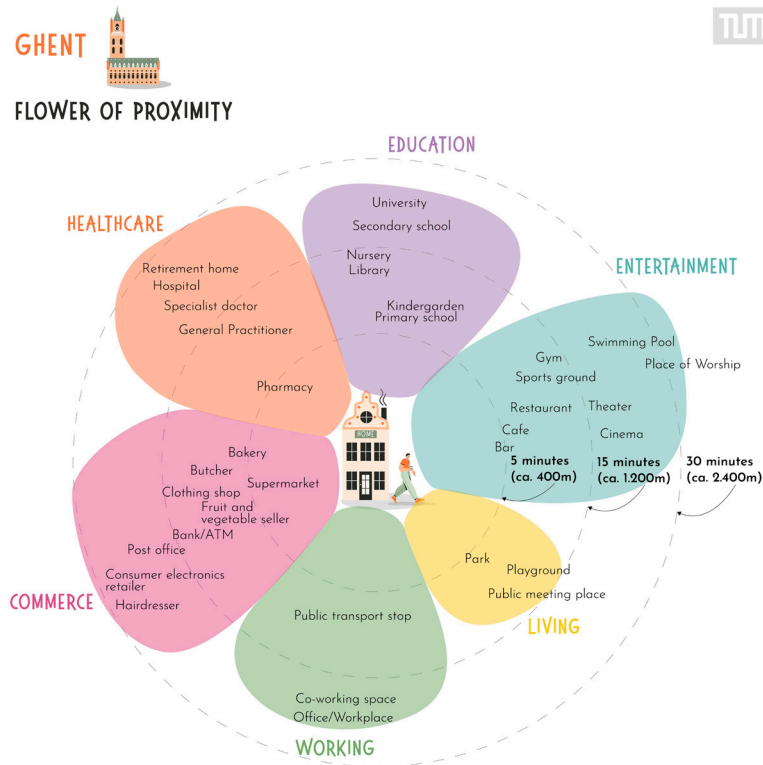

Figure 20: Flower of proximity from the workshop with local planning practitioners from Ghent
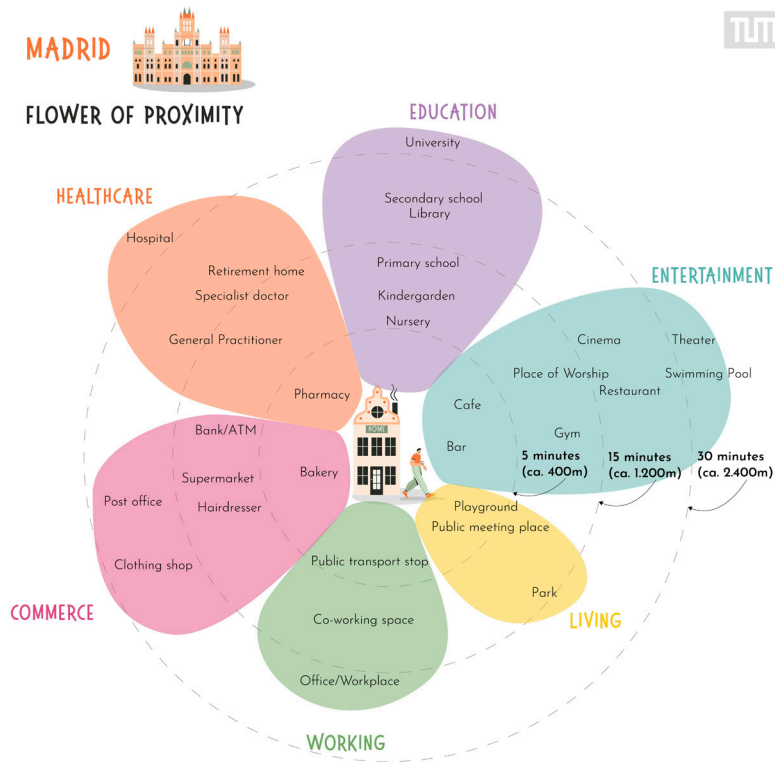
Figure 21: Flower of proximity from the workshop with local planning practitioners from Madrid
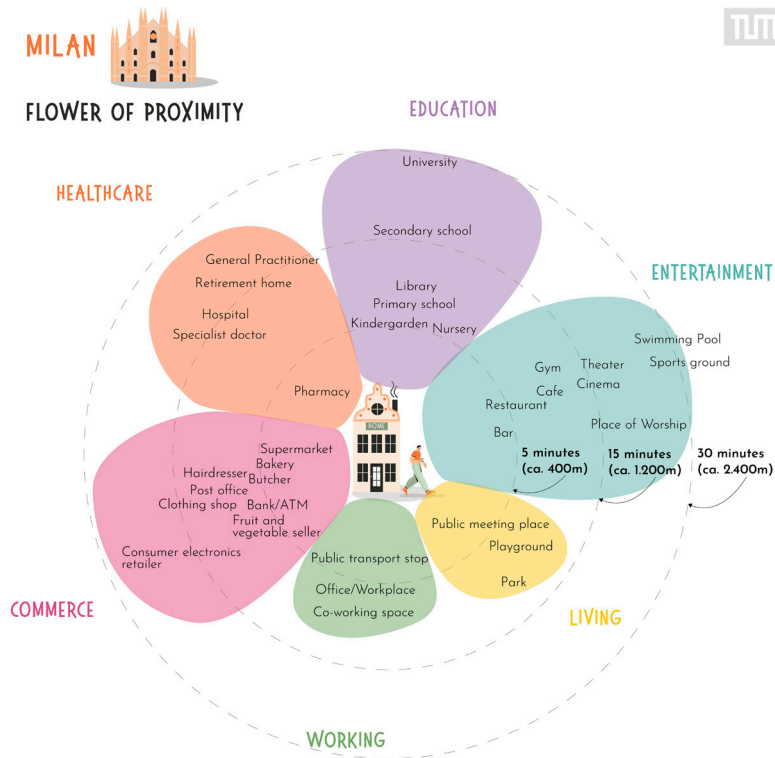

Figure 22: Flower of proximity from the workshop with local planning practitioners from Milan
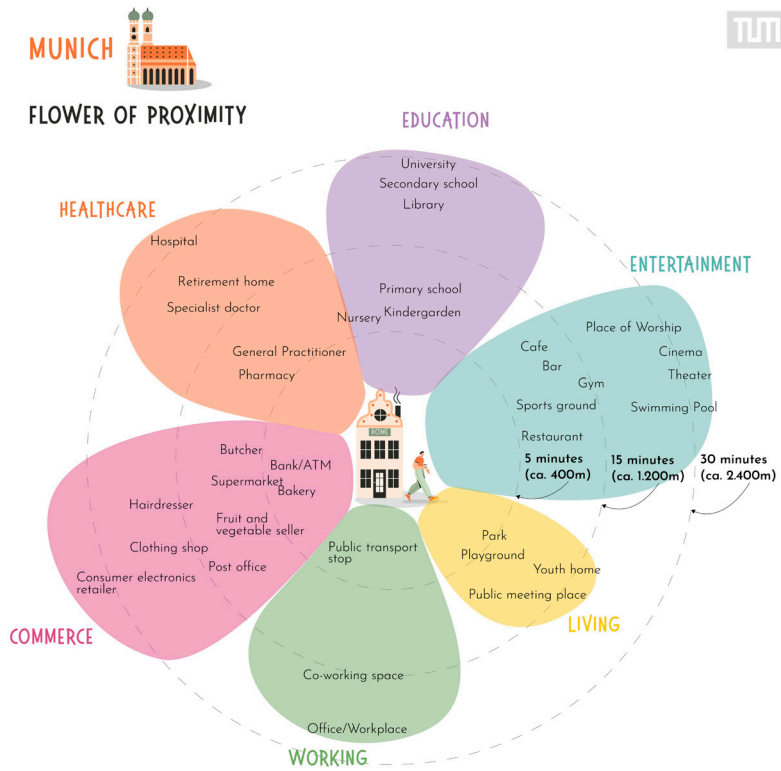
Figure 23: Flower of proximity from the workshop with local planning practitioners from the City of Munich
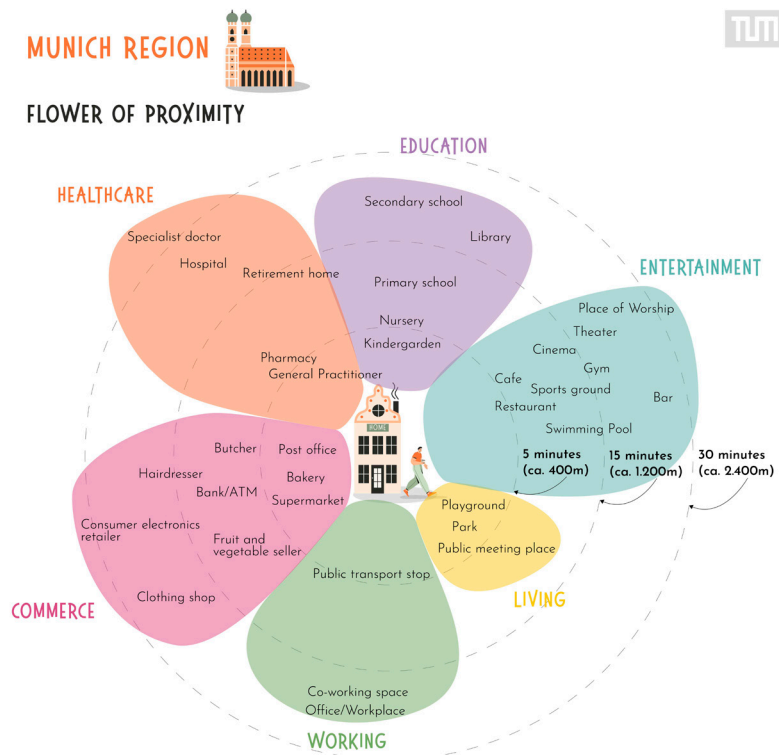

Figure 24: Flower of proximity from the workshop with local planning practitioners from Munich Region