Interreg
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CityWalk

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CityWalk

Walkability Guide

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1 Introduction

1.1 The CityWalk project

Sustainable urban mobility is an important issue today. As a consequence of the steadily growing urban population, the number of cars exponentially increases on city roads. This puts an immense pressure on municipalities due to several negative phenomena connected to – and caused by – excessive car-use: air pollution, noise, health problems arising from a sedentary lifestyle, lack of high-quality public spaces, etc. Experience from recent years shows that **the only effective and lasting solution for sustainable urban mobility is creating the ideal conditions for the use and promotion of alternative, environmentally friendly modes of transport**.

Within the framework of the CityWalk project, 17 partners from 9 countries (Austria, Bulgaria, the Czech Republic, Croatia, Hungary, Romania, Serbia, Slovakia and Slovenia) work together to help make the cities of the Danube Region become more liveable and safer through increasing the role of active modes of transport – especially walking and cycling – in the urban transport mix. Accordingly, **the most important objective of the project is to improve the key conditions of walkability** and create an integrated **'pedestrian-friendly city'** concept. The consortium covers an extensive part of the Danube area and therefore is capable of collecting and structuring a wide range of good practices and professional resolutions into a comprehensive methodology – the quality is also assured by the close cooperation of local, regional and national partners (city municipalities, development agencies, research institutions, etc.).

In addition to the **Project Management (WP1)** and **Communication (WP2)** activities, the project is structured around three main work packages closely related to walkability.

- **WP3 (Walkability Planning)** is aimed at establishing a professional context for the project activities and delivering tools that enable the partner cities to prepare their own local walkability plans. The main deliverables under this WP include a Baseline Study, supported by a set of infographics and a presentation material; a Walkability Planning Guide, accompanied by a 2-day training course – and using the methodology outlined in the Guide, the partner cities will prepare their Local Walkability Strategy and at least one Neighbourhood Walkability Plan.
- **WP4 (Walkability Toolkit)** develops practical tools that can be used immediately and efficiently by the partner cities (and other cities within – and outside – the Danube Region) to improve the key conditions of walkability. The toolkit will involve a **Walkability Guide** (this document); a Good Practice Catalogue; a walkability index which helps quantifying the pedestrian-friendly nature of different urban neighbourhoods; and an online walkability assessment tool with a related mobile application.
- **WP5 (Tests, Policy Integration)** focuses on pragmatic measures that – based on the resources developed under WP3 and WP4 – will result in specific improvements which can be adapted after the project in non-partnership cities, too: small scale, low budget pilot

actions in all partner cities; testing and fine-tuning the WP4 Walkability Toolkit in real-world conditions; and drafting policy recommendations at the local, national and EU level.

1 CityWalk project summary

Project at a glance		
Project title	Towards energy responsible places: establishing walkable cities in the Danube Region	
Related DTP priority	Better connected and energy-responsible Danube Region	
Related DTP specific objective	Support environmentally friendly and safe transport systems and balanced accessibility of urban and rural areas	
Start date: 1 December 2016	**End date:** 31 May 2019	
Total budget	**ERDF contribution**	**IPA contribution**
€2,229,590.5	€1,669,430.16	€225,721.75
List of partners	*Lead partner:* • Scientific Research Centre Bistra Ptuj (SI) *ERDF co-funded partners:* • First Hungarian Responsible Innovation Association (HU) • Development Centre of the Heart of Slovenia (SI) • Cassovia Life Sciences (SK) • City Municipality Varaždin (HR) • Municipality of Oradea (RO) • Varna Free University "Chernorizets Hrabar" (BG) • Regional Development Agency of the Pilsen Region (CZ) • Municipality of Weiz (AT) • Varna Municipality (BG) • Municipality of Nyíregyháza City with County Rank (HU) *IPA co-funded partners:* • City of Valjevo (RS) • Chamber of Commerce and Industry of Serbia (RS) *Associated strategic partners:* • City Municipality Ptuj (SI) • City of Stříbro (CZ) • Ministry of Construction, Transport and Infrastructure in Serbia (RS) • Nyíregyháza Industrial Park Ltd. (HU)	

1.2 Walkability Guide

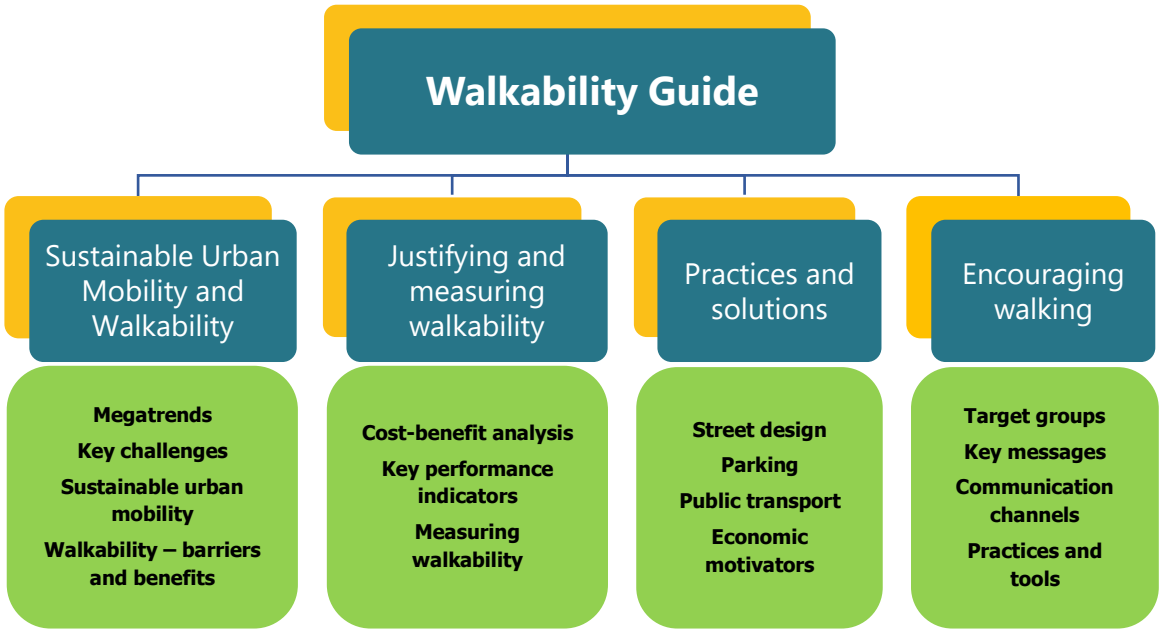
This Walkability Guide is the main deliverable during the first activity (Design Walkability Guide) of the CityWalk **Walkability Toolkit** Work Package (WP4). It is meant to be **a user-friendly tool for city leaders and local professionals responsible for developing urban transport systems**. It provides justification for sustainable urban mobility and analyses the benefits through showcasing specific ideas that can be used by both the project partners and cities outside the current partnership.

Small and medium-sized cities often do not have the experience, capacity and knowledge to efficiently deal with urban mobility challenges, especially in less developed regions. They need **low-cost/high-reward solutions that can be tested easily and yield quick results**. Using this Guide – and based on the knowledge of their local situation –, they can take specific, already proven steps to shift toward the use of active transport modes.

The content of the Guide was developed using:

- recent **research results** presented in the Baseline Study;
- prior experiences, **good practices** from Europe and elsewhere, gathered in the Good Practice Catalogue;
- the conclusions of the **Walkability Planning Guide**;
- and **input from the partner cities** during project implementation.

2 The main chapters – and their sub-chapters – in the Guide



The Walkability Guide consists of **4 main chapters**. Chapter 2 and 3 aim to establish a **theoretical and statistical background**. **Chapter 2** defines **sustainable urban mobility** – analyses the recent trends that make it an ever more important issue (e.g. demographic changes), explains the common challenges getting in the way, and determines the role of walkability in achieving an ideal state. **Chapter 3** will focus on **measuring walkability**: why it is important, what are the most important indicators that can characterize a city's level of walkability, and how can these values be incorporated into a single walkability score – all this based on the lessons learned from developing the walkability index in WP4 (Activity 4.2).

Chapter 4 and 5 are about **practical ideas and solutions**. **Chapter 4** is structured around **four intervention areas** – they have the most potential to actually affect an area's walkability and are often severely overlooked: street design, parking management, public transport and economic motivators. First, the subchapters ascertain the most relevant problems in the topic and what detrimental influence they have on urban mobility. After identifying potential solutions to solve – or

at least mitigate – these problems, the Guide contains a visually pleasing, practical description about every recommendation (using real-life examples for comparison and further study, pictures, etc.), highlighting how to implement the measure and what are its most important benefits (and potential drawbacks). At each subchapter's end, a summarizing table is provided to compare the individual intervention ideas by:

- their costs – the Guide mostly focuses on presenting low-cost solutions, but to be completely thorough, more complicated and resource-dependent interventions will be included, too;
- the required time – all measures yield fast results, nevertheless, their implementation process can sometimes be more time-consuming;
- the possibility of conflict (i.e. opposition) – redesigning an unused urban area into a nice park will probably gather city-wide approval but reducing parking spaces (however justifiable it may be) will almost certainly anger people; it is useful to know the individual measures' potential impact on public opinion beforehand, if city officials want to counter it in time;
- a timeframe for the refund/benefits of the investment – every intervention has a different way of affecting the issue at hand: sometimes the results can be immediate, but in some cases, a longer time is required to reach the goal of the measure.

3 Summarizing categories for the individual measures recommended by the Guide

low costs	fast implementation	smooth implementation	quick results
medium costs	requires more time	can incite some conflict	needs more time to work
high costs	time-consuming	significant opposition	longer investment

This table will be present at every subchapter's end in Chapter 4.

Chapter 5 deals with the above mentioned **public opinion**. **Communication and awareness raising** are important – both in the case of general objectives (e.g. motivating people to exercise – walk, run, bike – more, educating them about the environmental effects of too much car-use), and when implementing walkability-related projects (informing citizens about the changes, the temporary inconveniences and the overall benefits, involving them in the planning process, etc.). The Guide provides useful advice concerning the target groups, the key messages, the possible communication channels and practices/tools.

2 Sustainable Urban Mobility and Walkability

2.1 Megatrends

According to the Cambridge Business English Dictionary, a **global trend** (or megatrend) can be defined as a *'general development or change in a situation that affects many countries of the world'*. The forecast of future processes is often based on analysing global trends: predicting the future has several scientific methods like futurology, scenario planning, simulation and extrapolation, but most of the research methods are relying on current data and trend analyses. Based on the resulting hypotheses and assumptions, the findings are further scrutinized and extended for the future – the farther the time horizon is, the less reliable the forecast will be. It is important to highlight that megatrends have a significant effect on urban life, thus, on mobility and walkability due to the urban challenges they generate, therefore, introducing and analysing trends are relevant here because they significantly influence the future risks and opportunities of urban development in the 21st century.

4 International studies related to global trends

Reports	Definition of megatrend	Megatrends
Trend Compendium 2030 (Roland Berger Strategy Consultants, 2017)	Megatrends will shape the world over the next 20 years and have a broad impact on how we do business.	Changing demographics; Globalization & future markets; Scarcity of resources; Climate change; Dynamic technology & innovation; Global knowledge society; Sharing global responsibility
Megatrends 2015 – Making sense of a world in motion (EY)	Megatrends are large, transformative forces that impact everyone on the planet: each has the present and future capacity to disrupt and reshape the world in which we live in in surprising and unexpected ways.	Digital future Rising entrepreneurship Global marketplace Urban world Resourceful planet Health reimagined
The Global Risks Report 2018 (13th Edition – World Economic Forum, 2018)	A trend is defined as a long-term pattern that is currently evolving and could contribute to amplifying global risks and/or altering the relationship between them.	Changing climate; Degrading environment; Rising urbanization; Growing middle class in emerging economies; Rising geographic mobility; Rising cyber-dependency; Ageing population; Rising income and wealth disparity; Increasing polarization of societies; Shifting power; Changing landscape of international governance; Increasing national sentiment; Rising chronic diseases

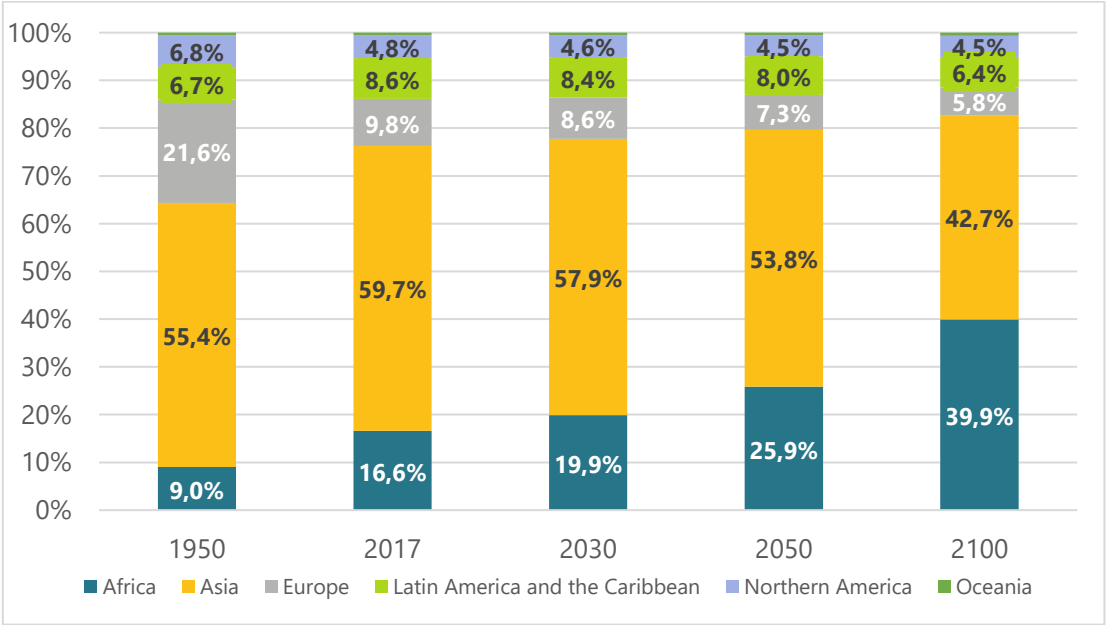
Introducing megatrends in detail however is not the main goal of this document. This subchapter is based on three international studies carried out in recent years, identifying similar and partially different processes as global trends – the differences are derived from the varying focus of the studies and the permeability between the main trends and sub-trends (see the figure above). Based on these international studies, we can define the changing **demographics**, globalization, the changing **natural environment** and **digitalization/technological innovation** as global trends.[1]

2.1.1 Changing demographics

The changing world demographic structure is a significant trend which has an effect on most countries in the world, and it also affects other global trends directly. Three subtrends can be distinguished within this megatrend: the **increasing world population**, **ageing societies** and **urbanization**.

2.1.1.1 Increasing world population

5 Share of the population of world regions (according to the medium-variant projection)



Source: United Nations (2017)

The current world population of 7.6 billion is expected to reach 8.6 billion in 2030, 9.8 billion in 2050 and 11.2 billion in 2100, according to the medium-variant projection.[2] Fortunately, the rate of population growth is showing a downward trend in absolute and relative terms. The scale and direction of this population change will vary between different countries. It is expected that half of the world's population growth will be concentrated in just nine – mostly developing – countries until 2050: India, Nigeria, the Democratic Republic of the Congo, Pakistan, Ethiopia, the United Republic

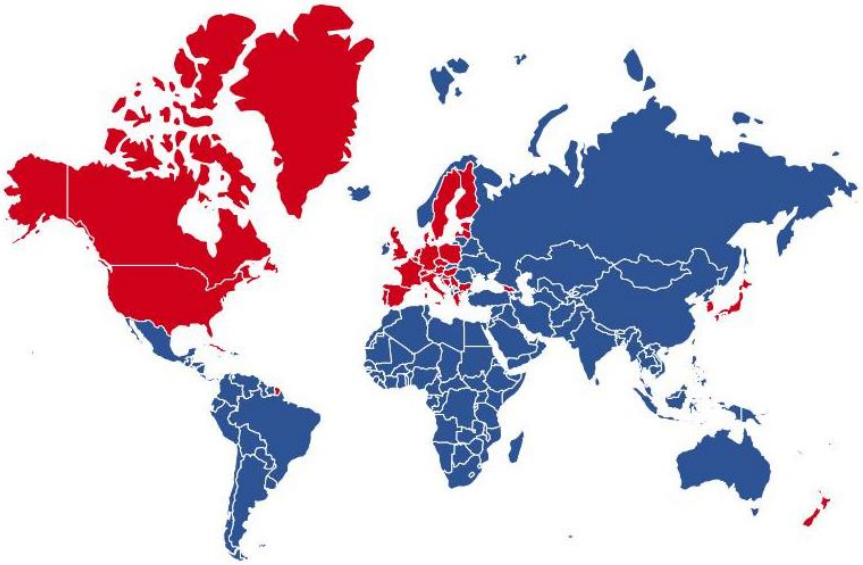
[1] We will not go into detail about globalization because it only has indirect effects on urban mobility.
[2] United Nations (2017): World Population Prospects – The 2017 Revision, Key Findings and Advance Tables. **http://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html**

of Tanzania, the United States of America, Uganda and Indonesia. In line with this, the population of the developed world – especially the population of Europe – will decline.

2.1.1.2 Ageing societies

Lower fertility rates, a higher life expectancy and lower mortality rates of the middle-aged and elderly people lead to an ageing population. The number of people aged 60 or above is expected to more than double, rising from 962 million in 2017 to 2.1 billion in 2050. According to the United Nations' World Population Ageing study, the tendency that the share of elderly people increases while the share of people under 14 decreases will continue globally. As a result, 34 countries will be super-aged[3] in 2030.

6 Super-aged (red) countries in 2030



Source: **www.moody.com**

2.1.1.3 Urban world

The process of urbanization refers to the population shift from rural to urban residency. Globally, more people live in urban than in rural areas – in 2018, 55% of the world's population, to be exact. Today, the most urbanized regions in the world include Northern America (82%), Latin America and the Caribbean (81%), Europe (74%) and Oceania (68%). In contrast, the level of urbanization in Asia is around 50% and 43% in Africa. Nearly half of the world's urban population lives in cities with fewer than 500,000 people, but at the same time, 1 in 8 lives in one of the 33 megacities of the world (with more than 10 million occupants). The number of megacities and the population living there will only increase in the future. Growth in this urban population is driven by both the upward shift of the percentage living in urban areas and the overall population increase. The global urban population grows rapidly and in an ever-accelerating pace. While in 1950, 30% of the world's

[3] In a super-aged country, more than 1 in 5 people are aged 65 or older.

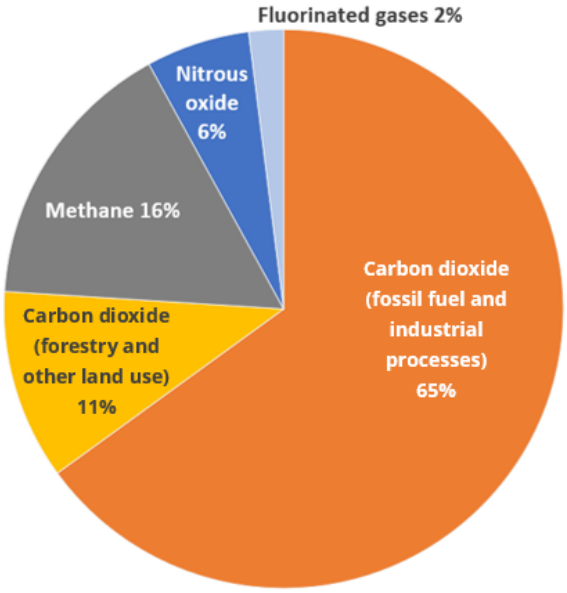
population was urban, by 2050, 68% are projected to be.[4] The share of urban population in developed countries will be more than 80%.

2.1.2 Changing natural environment

We consider this global trend as several, closely connected subtrends like **global warming and climate change** and the **scarcity of resources**. It is important to highlight that there is a strong, bi-directional connection between these subtrends and urban mobility.

2.1.2.1 Increasing CO^2 emissions – global warming and climate change

7 Global key GHG emitted by human activities (2010)



Source: **IPCC** (2014)

The increasing concentration of greenhouse gases (GHG) is the main driving force of global warming since there is a strong correlation between CO^2 emissions and temperature rise. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide and ozone. The vast majority of carbon dioxide emissions produced by human activities come from the combustion of fossil fuels; agriculture, deforestation and other land use changes are the second largest contributors. The global carbon dioxide emission will probably increase during the next decades. According to the "business as usual" scenario, the CO^2 emissions in 2030 will be 45 Gt, 25% higher than in 2015. Global temperature will increase by almost 4°C by the end of this century, compared to its pre-industrial level. The increasing global temperature leads to rising sea levels and even with a relatively minor average temperature and sea level increase, the nature, frequency and intensity of extreme weather events are expected to change. To go for an ambitious scenario with a temperature increase of only 2°C in the long run (this way, the effects of climate change could

[4] United Nations (2015): World Urbanization Prospects – The 2014 Revision & World Urbanization Prospects – The 2018 Revision. **esa.un.org/unpd/wup/Publications/Files/WUP2018-KeyFacts.pdf**

become manageable), CO^2 emissions need to be reduced by nearly 20% (to 29 Gt) until 2030 and 15 Gt until 2050. Global warming and climate change affects the entire world, but their regional impacts differ: due to fewer resources, developing countries will face more negative consequences.

2.1.2.2 Scarcity of resources

The global population growth – mainly in the number of middle-class consumers – and economic development will significantly increase the demand for energy, commodities, food and water: competition for these limited resources will intensify. The global energy consumption rises more slowly than in the past but will still increase by 30% between today and 2040 – this is the equivalent of adding another China and India to today's global demand (**World Energy Outlook** 2017). The demand for energy resources will grow until 2030 in general, but the proportions will shift: the use of liquid fuel will decline – due to the increased supply of unconventional energy resources (shale oil and gas), the role of renewable energy will grow rapidly as clean technologies become more cost-competitive. Raw materials (agricultural commodities, livestock, energy, metals) number more than third of the goods in global trade and are the basis of economic development and growth. Calculating with their current rate of consumption, the life of non-renewable resources – especially some rare materials – is limited.

2.1.3 Digitalization and (technological) innovation

The expansion of digitalization and technological innovation will accelerate until 2030, because the number of daily-used digital devices is continuously growing, and the adaptation of new technologies is becoming faster, while innovation cycles shorten. Forecasting future innovations is usually risky and there is no consensus on what kind of new innovations will shape the world, however, the directions of future technological developments can be defined. Basic innovations often come in certain cycles, called Kondratiev waves. The theme of the next cycle leading up to 2030 will be Life Sciences, with ICT having a significant role.

2.1.3.1 Digitalization

Digitalization as a trend does not mean only technological innovation but also new models like sharing economy and telecommuting, which fundamentally change how we do business, how we live and how cities and the economy work.[5] 60% of the world's population will be mobile-only internet user in 2030, while only less than 1% were in 2010. The speed of the internet will also grow exponentially: the average broadband speed from less than 1 Mbps to more than 100 Mbps. Ubiquitous computing will bring the Internet of Things to life, where interconnected devices and objects can be operated from anywhere. There are several different **predictions** but the current number of 8.5 billion IoT devices will probably double or triple by 2020.

2.1.3.2 New technologies and innovations

Digitalization and robotics will change our life dramatically. Robots will take over certain everyday jobs what nowadays usually people (an unskilled workforce) do. Telecommuting supported by digitalization will result in the total transformation of the world of work. The continuing miniaturization of products will make nanotechnology central to the future: it will impact many industries, such as ICT, the automotive and the medical sector, providing even smaller and more powerful components. The development of ICT, the growing number of smart devices, the intensifying role of social media and the wider use of IoT technologies make a new type and level of digital interaction among people possible. Conclusively, new technologies have a huge potential to transform entire industries.

[5] Partridge, A. (2016): A Digital City Future – Adapt or Die. TechTown Baseline Study, URBACT

2.2 Key urban mobility challenges

Transport is an essential part of modern life and a precondition of a well-functioning economy (generating substantial income), but we all know now that it comes with a major cost in increased greenhouse gas emissions and air pollution. **Cities have to work on meeting the mobility needs more efficiently, on reducing the need for motorized transport and developing more effective and environmentally friendly mobility solutions to create a sustainable system providing a healthy and liveable environment for their residents.** Despite every effort, some current and future global trends work against these urban development needs – hereinafter, key urban mobility challenges and potentials will be summarized.

- The growing urban population and **urban sprawl** leads to increasing urban mobility needs which result in enormous **congestions**, especially in city centres and along the main arterial roads and junctions. Sustainable urban development practices and conscious governance are needed to stem the tide. Efforts must be made so that urban districts and smaller quarters serve the everyday needs of their residents completely. By designing and developing **mixed-use and human-scale urban areas**, urban planners and city managers can establish liveable residential locations, "villages within the city" which contributes to strengthening the citizens' local identity. Commercial units, community spaces and workplaces should be within a walking distance from residential dwellings.
- **Intermodal development** should be implemented at main transport hubs, and real estate developments should be promoted in the vicinity of existing but not-overloaded transport corridors in order to increase the efficiency of **public transport**.
- To provide sustainable mobility, a **modal shift**, a change in the modal shares[6] is necessary. Cities should set modal share targets for **a balanced and sustainable transport mode mix** – developing the conditions of sustainable transport modes, modifying the regulatory environment that affects the cost of different transport modes and forming society's attitude to inspire a change.
- **Motorized transportation**, especially automobiles, is a **growing burden** on cities. Car traffic has a significantly negative health and environmental impact; it greatly contributes to the evolution of the sedentary lifestyle. Automobiles occupy useful urban areas and maintaining the road infrastructure is a considerable budget line in municipalities. Fortunately, **hybrid and electronic vehicles** will have an increasing role in urban mobility and **car sharing systems** become more and more popular – the scarcity of resources (the depletion of fossil fuels) only accelerates these processes.
- In the course of modernizing the transport infrastructure, **people with the needs** of all pedestrians (including people with disabilities, the elderly, families, parents with strollers, etc.) must be taken into account – the preconditions of comfortable and easy urban mobility should be granted for all.
- Digitalization and technological innovations will have an influence to **make urban mobility smarter, safer and more sustainable**. Among other things, smart mobility systems can

[6] The modal share is the percentage of travellers using a particular type of transportation.

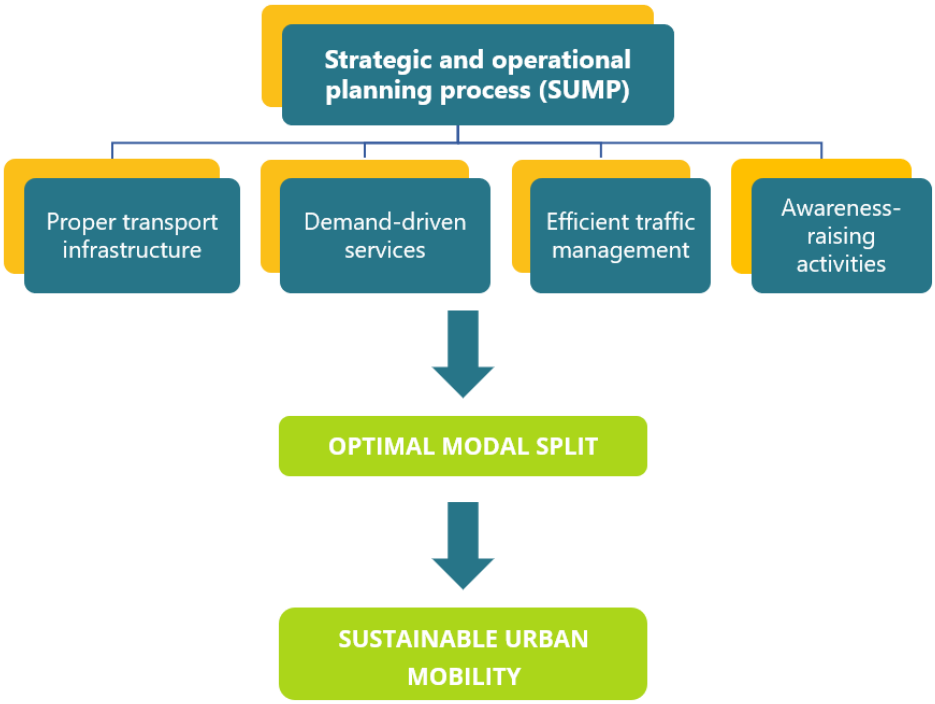
warn the people participating in transport about the possible dangers, prevent emerging traffic jams by controlling the traffic lights and improve the efficiency and accuracy of public transport. Digitalization – through the changing consuming, shopping and commuting habits due to online reservations and telecommuting – contributes to reducing mobility needs, thus, it can partially compensate for urbanization and the overall population growth. It also supports the faster spread of shared mobility systems.[7]

[7] MEGAKOM (2017): Innovatív alacsony költségvetésű és megtérülő városfejlesztési megoldások feltérképezése (Nyíregyháza)

2.3 Making urban mobility more sustainable

As it was detailed in the previous chapter, urban areas across Europe and the world face multiple challenges resulting from transport and traffic. To solve these problems, cities should develop and adopt an **integrated and comprehensive approach** which makes urban mobility more sustainable.

8 Key elements of sustainable urban mobility



The first step is to develop a **strategy for urban mobility** based on a detailed and in-depth analysis of the current state and processes, resulting in a clear vision and a comprehensive set of tools. In 2013, the European Commission published guidelines[8] for developing Sustainable Urban Mobility Plans (SUMPs) to provide a consistent and easy-to-adopt approach for cities and functional urban areas. These guidelines define the basic principles, key steps and milestones of the planning process from identifying the scope of the document through setting the goals and defining the measures to implementing the interventions and concluding the final impact assessment. The main characteristic of SUMPs is "Planning for People": its people-centric and participative approach distinguishes it from traditional transport planning.

Although the guidelines do not specify the areas of interventions, we can clearly outline the main topics that should definitely be addressed to achieve sustainable urban mobility.

- Changing the **transport infrastructure** is a long-term and costly process: car-centred networks have to be transformed into people-centred transport systems, which make cities

[8] COM (2013) 913 final, Urban Mobility Package 2013, ANNEX 1, Brussels, 17 December 2013

more liveable and livelier at the same time. Investment projects ideally prefer alternative modes of transport (e.g. establishing parking spaces in the optimal number and at optimal locations, bike roads and paths, bus lanes), reduce the cost of travel, improve the accessibility of certain locations and change land use patterns. In connection with the transport infrastructure, energy efficiency is one of the most recent issues to be solved – to overcome our reliance on fossil fuels: for instance, alternative fuel-driven vehicles need a fast-charging network, or traffic signals can be implemented through solar energy solutions.

- Proper infrastructure is a necessary condition but not sufficient for sustainable urban mobility by itself. **Transport services** should be offered – services which fit the needs of all people using roads, bike lanes, sidewalks and public transport facilities to the greatest possible extent. These include – among others – easy orientation, up-to-date information, reliable and predictable public transport, innovative parking solutions, shuttle services and smart technologies such as bike- or car-sharing systems; ideally, they can reduce the need to own a car. Beside passenger transport, we cannot forget about urban freight transport. Last-mile delivery requires innovative ideas to prevent congestions towards and in retail areas, moreover, the increasing popularity of online shopping has led to more delivery trucks visiting residential areas.
- Efficient **traffic management** gives the organizational and operational framework for fluent and smooth movement within a city. Public and private service providers have to coordinate and complement each other's offers. Progressive smart solutions are particularly important in traffic management (e.g. sensors to monitor traffic patterns and provide people with real-time information).
- People use urban areas for movement, and they want to reach their destination as quickly and conveniently as possible. If the citizens are aware of the advantages and benefits of low-carbon modes of transport, their behaviour can be significantly influenced. The range of possible **awareness raising activities** is wide from needs assessments and surveys to campaigns, walkshops, flash mobs, social media movements and other events. Their common feature is that they all help change people's perception of sustainable urban transport. To turn more attention to the cleaner modes of transport, these communication and PR tools should be carried out continuously and with the active participation of the citizens.

All of these interrelated areas are necessary for achieving an **optimal share between the different transport modes** – and that is the foundation of economically, socially and environmentally sustainable urban mobility.

2.4 Walkability as a key element of sustainable urban mobility

2.4.1 Barriers

In the previous chapters, the idea that the only solution to the current problems affecting cities is reaching a balanced modal split – with an emphasis on the alternative, environmentally friendly modes of transport (cycling, but especially walking) – came up several times. Efforts made in this

direction, however, encounter serious barriers in many cases – some of them have already been mentioned in this document. Below, we look at these hindering factors which a city faces if it wants to achieve lasting results in a little more detail, focusing on three distinct categories: the prevalent **attitudes** regarding cars, the available **infrastructure** and the **legislation** framework.

The most pressing problem – and the hardest to overcome – is **society's love of cars** and car use. The number and scope of the PR and promotional activities built up around cars has become truly enormous – it is difficult for the advocates of walking to catch up.

9 Personal messages of car advertisements

Source: Jaguar Cars, Honda Motor Company Ltd., BMW, Porsche AG

The rational arguments in support of owning a car – such as the autonomy and comfort associated with them – were supplemented with intangible, subjective feelings over the previous decades which the campaigns of specific car brands only reinforce: having a car has become a **status symbol** and is **subconsciously linked together with well-being, success in private life and career progression**. Furthermore, for some people, driving a car is not just a means to get from point A to point B – **it is more about the experience, the excitement and passion**. The only way to dismantle this barrier is trying to build a similar experience around walking through awareness raising and communication activities (see **Chapter 5**).

Another serious obstacle is **the sheer volume of infrastructure devoted to cars**. The current situation in most cities is that the layout and characteristics of the streets are designed with consideration to the drivers – and only them. It is hard to implement measures inciting people to walk more if the basic structure of the city cannot support it. This situation can manifest in several ways:

- **zoning** – the residential, commercial, recreational, industrial, etc. functions are assigned to different parts of the city, making walking an unreasonable choice of mobility (especially if public transport is also neglected);
- **wide roads** – the buildings along a street restrict the available space for urban transport flows and since the most important goal for decades was to facilitate the fast movement of cars, the resulting wide roads only left room for narrow sidewalks – if any;
- **frequent stopping points** – the long waiting times at pedestrian crossings are clearly meant to cater to the drivers' needs, and make a walk in the city a cumbersome and time-consuming experience – hardly an argument for favouring it; and
- **few green areas** – to let more cars pass through an area, cities sometimes limit and acquire space from every other land use, which can include public resting places, recreational parks, etc. – exactly the things needed to make walking an attractive choice of transport for the citizens.

Chapter 4 provides some instructions on how to change this status quo in a meaningful way through adapting cost-efficient and already proven methods.

Last but not least, there is a **lack of legislation supporting walkability interventions**. Not much can be done to advance the cause of walkability, if at the same time, other development projects still favour motorized transport and do not consider pedestrians an important target group. Most cities need **a guideline listing the general rules of urban mobility initiatives** which can be referred to in the case of different implementation activities – a project with the objective of widening a road in the downtown area cannot get an approval if these rules state that the pedestrians' interests are a priority factor in every decision, for example. To set up regulations like this is a long process, but it is crucial for reaching long-term results.

2.4.2 Benefits

To offset the barriers detailed above, walkability brings several key benefits to the table on every level – personal, local and global.

2.4.2.1 Economic benefits

Without repeating the same reasonings prevalent in **Chapter 3.1**, we have to mention two important factors that are often overlooked:

1. A walkable city **attracts talent**ed people. More and more educated millennials move to urban cores – most of them choose their place of residence first, then look for work locally, and according to a recent study, 63% of them want to live in a city where they do not need to own a car.[9] Therefore, a city that provides a walkable urban lifestyle will have a competitive edge on the market for a high quality workforce.
2. The **available jobs** in a city will be better (and more) in a walkable environment. Beside the fact that a research team from London proved that pedestrians usually spend 70% more than drivers, driving the economy, a study in Baltimore also found that each dollar spent on pedestrian facilities created 57% more jobs compared to the investments in highways.[10]

2.4.2.2 Health benefits

It is not a surprise, that *"walkable communities are slimmer communities"*.[11]

10 Driving a car and using the escalator to reach a treadmill defeats the purpose

Source: Jeff Speck (2018)

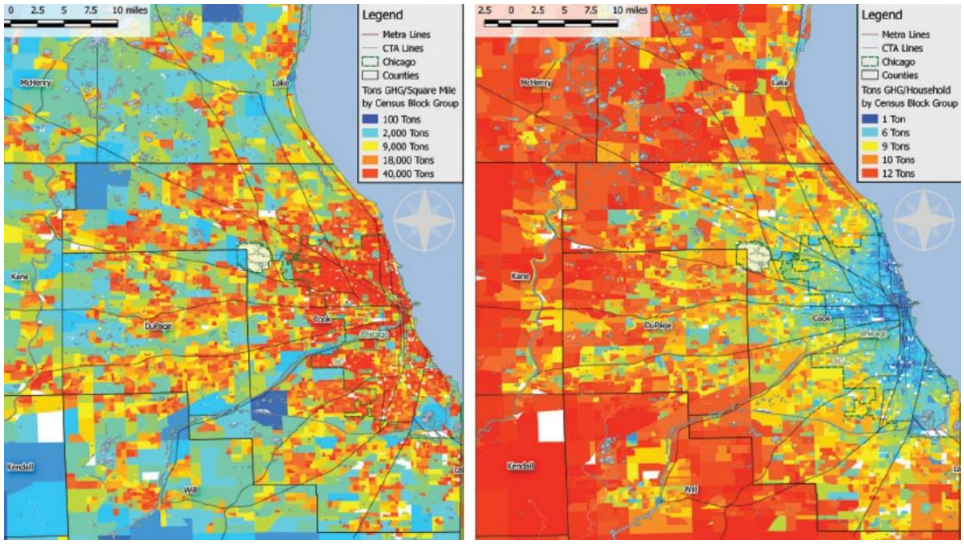
[9] John Greenfield (2017): If The Future Will Be Walkable, How Do We Make Sure Everyone Benefits? StreetsBlog Chicago
[10] Heidi Garrett-Peltier (2010): Estimating the Employment Impacts of Pedestrian, Bicycle and Road Infrastructure. University of Massachusetts at Amherst, pp. 1–2
[11] Jeff Speck (2018): Walkable City Rules. 101 Steps to Making Better Places. Island Press, Washington, p. 4 (epub)

The likelihood for individual **obesity** decreases 4.8% every km of walk per day and the activity actually reduces the risk of all-cause **mortality** by up to 20%. This is especially true for some diseases, like high blood pressure and cholesterol, stroke and colon cancer. Walking also helps to strengthen bones, reduces the risk of injuries from falls and increases muscle flexibility and joint movement. Treating these illnesses and problems is expensive for society, and their existence causes significant pain to the afflicted individuals – an environment attractive enough to actively walk in can benefit everyone. Counting the number of **traffic accidents**/car crashes and **premature deaths attributed to air pollution**, we can safely say that walkability saves lives.

2.4.2.3 Environmental benefits

There was a time in recent history, when an environmentalist mindset meant an anti-city mentality. Only the refinement of carbon mapping (realizing that the best way to measure carbon emissions is per household not by area) made it clear that **the smallest environmental footprint someone can have is actually in the densest cities**. This phenomenon is called location efficiency (Jeff Speck, 2018). Since a significant portion of this footprint consists of tailpipe emissions, the more walkable a city is, the less it makes its residents pollute (air, noise, heat, etc.).

11 Chicago – measuring GHG per square mile (left) and per household (right)



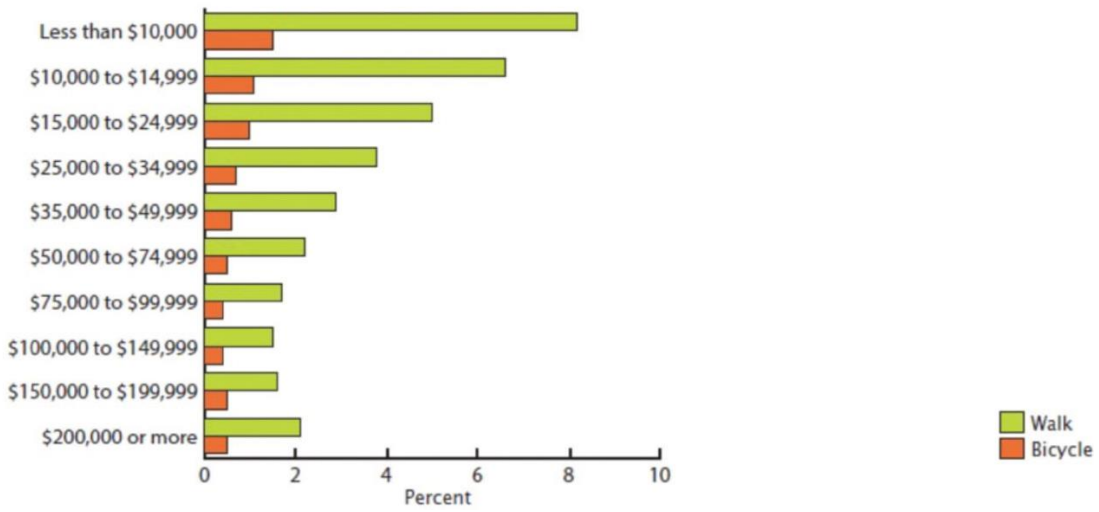
Source: Peter Haas, Center for Neighbourhood Technology

2.4.2.4 Social benefits

Cities with a walkable environment and a wide offer of traffic modes contribute to **social equality** and **community development** in several ways:

- Walkability helps the **elderly** to remain self-sufficient longer, since they are not isolated from the different amenities – every important destination is available to them on foot in a relatively short time.
- **Children** will become independent sooner, too – going to school by walking is perceived as an attractive choice of transport mode if the city is safe and compact.
- **People with disabilities** also benefit: most of them cannot drive a car but if they have the chance to walk everywhere, they do not have to rely on help to managing their everyday activities.
- If we look at social status, it becomes clear that **low-income families** favour walking and cycling (they are the least expensive transport modes for an individual) – any improvement centred around walkability will serve them well.

12 Walking and cycling to work by household income



Source: U.S. Census Bureau, American Community Survey (2008–2012)

- Replacing a long, boring commute by car with a short walk *"makes a person as happy as if he or she had found a new love"* (Jeff Speck, 2018). Walking regularly also improves self-esteem, mood, contributes to a positive mindset and reduces stress. Remarkably, while people on lightly travelled streets count 3 friends, people on busy streets averaged only 0.9.[12] A true **community** can only form if the residents interact with each other – this is exactly what walking and cycling provide.

[12] Appleyard, D., et al. (1981): Liveable Streets. University of California Press, Berkeley

3 Justifying and measuring walkability

3.1 Justification: cost-benefit analysis

Improving the walkability of a city or a neighbourhood clearly has beneficial economic and fiscal effects – both at an individual and the macroeconomic level. Most measures to improve the conditions of active transport forms – walking and cycling - reduce the direct or indirect costs of transport while creating positive – but not necessarily quantifiable – externalities. Walkability interventions can also be differentiated on the basis of their impact which can be detected in the short, medium or long term.

13 Direct and indirect financial effects of walkability

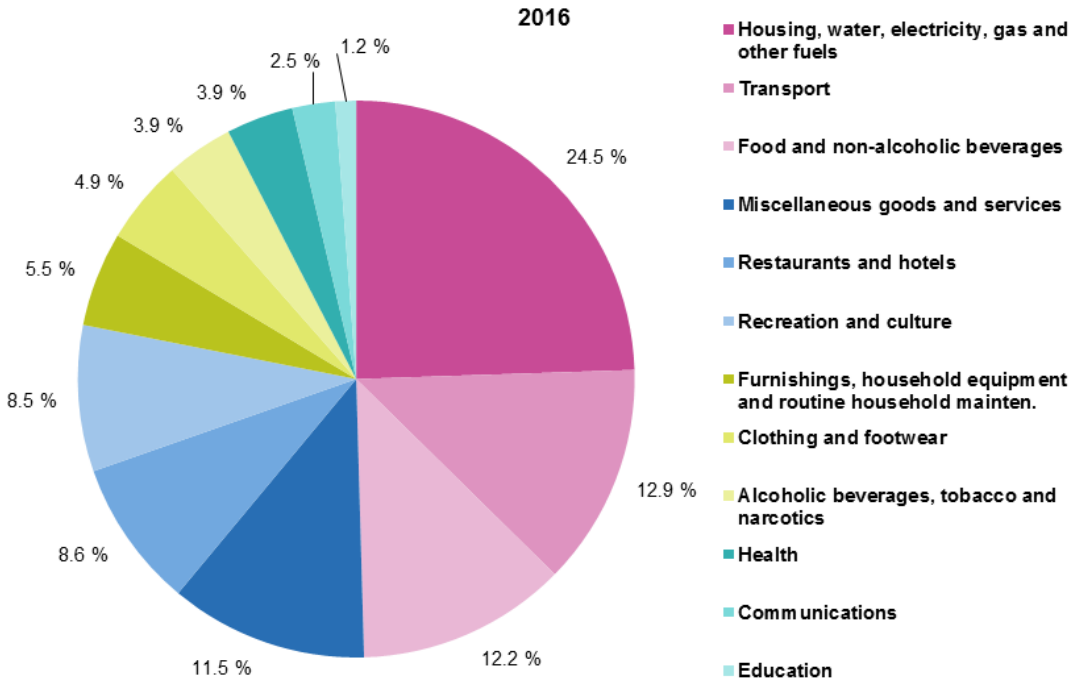
	Direct monetary effect	Externalities
Individual level	Cost-cutting in connection with car purchases, maintenance, taxes and other related expenses Reduced purchase of fuel	Cost savings resulted from spending less time in congestion Revenue growth of businesses along the main pedestrian routes Local economic growth due to consumer savings that can be spent on other goods or services Reduced health expenditures because of improved air quality and better physical and mental status Mitigated illness-caused loss of income Increase in the value of properties
Macroeconomic level	Cost-effectiveness of the pedestrian infrastructure compared to the car-oriented infrastructure, both in terms of development and maintenance	Cost savings resulted from spending less time in congestion Reduced tax revenues from car-related taxes Increased tax revenues resulted from the appreciation of the district and the properties Possibility to increase revenues of public transport operators Increased tax revenues resulted from economic growth Reduced health and social expenditures due to the improved air quality and better physical status Cost savings resulted from more efficient land use patterns

The table above shows the synergic and multiplier financial effects present in walkable cities – understanding and promoting them could contribute to a modal shift from motorized to non-motorized transport modes.

3.1.1 Direct monetary effects of walkability

According to the **Eurostat's data**, **the average household of the EU28 countries devoted approximately 13 euro cents out of every euro to transportation in 2016** – only preceded by overheads. These amounts are also significant at a macroeconomic level: the households' spending on mobility reaches 7% of the GDP. Vehicle purchases account for the highest share from the costs, and the type of the owned car also influences the volume of insurance, fuel, maintenance, repair and other variable costs. Renting/leasing vehicles and public transportation represent a much smaller proportion within the transportation expenditures.

14 Household expenditures by consumption purpose



Source: **Eurostat**

In a walkable city, mobility outflows can be cut significantly: **one American research** shows that households in an automobile-dependent settlement spend 50% more on transportation (>$8,500 yearly) than households in communities with more sustainable land use and multimodal mobility systems (<$5,500 yearly). At the macroeconomic level, **the main public savings result from the lower investment and maintenance costs of sidewalks and other pedestrian-friendly facilities** compared to motorized transport – primarily due to the different technical requirements (e.g. use of materials, load-bearing capacity): the cost of roads reach approximately $6,000,000 per mile, which is only $250,000 in the case of sidewalks. These savings can be expended on other interventions to make cities more liveable.

3.1.2 Externalities of walkability

Externalities are more difficult – but not impossible – to monetize. Most of the indirect effects prevail both at the household and public level, and they interact with each other in many ways.

- If there are fewer congestions, **people can spend their time and money on other activities** (shopping, recreation, etc.), and their productivity increases, too (therefore, they can earn more money) – all of these accelerate the local economy and induce spill-over effects.
- **People actually being on the street** – this in itself already **increases the income of businesses** along the most attractive pedestrian routes. A Canadian survey states that after some interventions (widening sidewalks, removing half of the on-street parking spaces), 75% of the companies observed that their business improved or at least stayed the same. Higher profits show up in the public revenues (taxes and other charges), too.
- Traffic habits are changing: 56% of the X and Y generation prefers living in a walkable neighbourhood (this is 'only' 46% in the case of elderly people) (Greenfield, 2017). As a consequence, **improved community liveability increases the property values** within a walkable district or city. In the USA, the **Walk Score algorithm** states that one additional point given to a city grows the price of a residential real estate by 0.9% on average.[13]
- The space required for walking is sixty times smaller than for solo driving. Therefore, in a walkable environment, the land used for roads and parking facilities can be reduced which creates more **cost-effective and sustainable land use patterns**. Furthermore, the land use density influences the maintenance of the transport facilities: in a dispersed settlement, the operating costs of roads are higher by 18% than in a compact city (Litman, 2017).
- **Walking** is considered a physical activity that **improves health** and reduces obesity. A lot of studies attempted to quantify its individual and public cost savings: an additional 8.3 minutes of walking per day could reduce obesity-related medical – private and public – expenditures by as much as $5,500 per capita.[14] Each additional person walking 15 minutes more per day results in savings of $3.24 (Australian dollars).[15] In addition, the lower level of air pollution decreases the probability, frequency and severity of respiratory diseases as well as the treatment costs for them.

3.2 Key performance indicators and walkability index

3.2.1 The need for good indicators

What makes a city, a neighbourhood or a street walkable? One can list many attributes of truly walkable cities. However, if we want to judge the level of development of walkability conditions, general attributes are not sufficient: we need **quantifiable indicators**. Indicators in the context of walkability have various major functions; they:

[13] Litman, T. (2017): Evaluating Transportation Land Use Impacts Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns. Victoria Transport Policy Institute. 72 p. **http://www.vtpi.org/landuse.pdf**

[14] Edwards R. D. (2008): Public transit, obesity and medical costs: assessing the magnitudes. Prev Med. Jan 2008; 46(1):14-21 pp.

[15] Matan A., et al. (2015): Health, Transport and Urban Planning: Quantifying the Links between Urban Assessment Models and Human Health. Urban Policy and Research. 2015; 33(2):145–159 pp.

- can help to understand and describe the current status of walkability and its key conditions;
- enable us to set measurable goals to develop different aspects of walkability;
- facilitate the monitoring and evaluation of the implementation of walkability interventions; and
- facilitate comparison between cities, or even between different neighbourhoods within the same city.

Various concepts exist to measure walkability – walkability indices being one of the most popular and widely used among them. Walkability indices are composite indicators that can attach one single value (describing the level of walkability) to a given urban area. The most well-known such index is **Walk Score** – widely accepted and used in the USA, Canada and Australia. The basis of calculating Walk Score is the distance to various amenities from any given address. Such amenities include businesses, shops, parks, cultural institutions, schools and other common destinations. It is a robust system, supported by an extensive database: Walk Score may be assigned to any given address, neighbourhood or city in the above-mentioned countries.

Composite walkability indicators have their value, but if we want to better understand the factors influencing walkability, we need to look behind the one single number attempting to capture the level of walkability. Therefore, in addition to calculating a walkability index (using – for instance – the methodology we have developed and propose in **Chapter 3.3**), it is important to collect, measure and analyse at least a basic set of walkability indicators – key performance indicators. Below we propose a concept of **key performance indicators** (KPIs) of walkability.

3.2.2 Key performance indicators proposed

In an ideal world we could develop and use a set of indicators that describes perfectly every important aspect and condition of walkability. Given the complexity of the issue, and the factors that influence walkability, this is certainly not possible. Having a set of key performance indicators that captures the most important aspects of walkability, however, is both necessary and possible.

A good set of key performance indicators needs to meet at least the following criteria:

- **Relevant** – describes both the level of walkability as well as its key conditions;
- **Reliable** – coherently measurable over time, in the same way even by different observers;
- **Quantifiable** – numeric values can be attached to them using available methods and tools;
- **Available** – preferably relies on existing data already measured regularly (accessible in official statistics or local databases), or on data that are easy and inexpensive to measure.

The set of key performance indicators we propose meet the above criteria, while form an integrated system with the CityWalk Walkability Index and the CityWalk Online Tool. This means that by measuring the proposed key performance indicators we not only have a good overview of the walkability situation of our city, but also can use these data as inputs to the CityWalk Online Walkability Tool. By feeding the input data into the Online Tool, we receive a single number – the CityWalk Walkability Index, describing the level of walkability in our city.

The proposed set of key performance indicators relies on data from different sources:

- data from local transport studies;

- data from official national and local statistics;
- locally measured data; and
- data from dedicated survey.

3.2.2.1 Data from local transport studies

The only indicator that is not used as an input to the CityWalk Walkability Index is the modal split. In most cities, modal split figures are measured on a regular basis to describe the actual situation of the urban transport system and available from local transport studies. The **modal split** (or modal share) is **the percentage of travellers using a particular type of transportation or the number of trips using said type**. Modal split indicators present the distribution of trips between:

- walking;
- cycling;
- private motorized vehicle; and
- public transport.

3.2.2.2 Data from official national and local statistics

Name of the indicator	Unit of measurement	Optimal value	Source	Justification/note
Surface area of pedestrian only zones compared to the area of the city	percentage	high	official statistics	Pedestrian-only zones offer an optimal environment for walking. They are important elements of safe, comfortable and interesting walking environments.
Length of pavements with solid surface	km/1000 people	high	official statistics	The quantity and quality of pavements – sidewalks – are important prerequisites of a walkable area, making walking both safer and more comfortable.
Length of cycling network	km/1000 people	high	official statistics	A key condition of good walkability is the availability of "pedestrian accelerators" – means of transport that can help pedestrians to efficiently and quickly bridge longer distances. Good conditions for cycling mean that people are not forced to use motorized vehicles when they need to travel farther.
Number of playgrounds	number/km^2	high	official statistics	The quality of public space, the availability of public facilities, community spaces, playing areas for children and adults are also important ingredients of a walkable city.
Number of public sports facilities	number/1000 people	high	official statistics	
Number of crimes	number/1000 people	low	official statistics	People will walk only if they feel safe and protected in the streets – both against crimes and transport accidents.
Number of crimes committed in public space	number/1000 people	low	official statistics	
Number of road accidents	number/1000 people	low	official statistics	
Number of road accidents involving pedestrians	number/1000 people	low	official statistics	

Number of public seatings	number/km^2 and seat/1000 people	high	local statistics	Pedestrians – especially elderly people or those with disabilities – need places to stop and rest – sometimes even sit down – from time to time when walking.

3.2.2.3 Locally measured data

While the indicators available in national and local statistics already give an indication regarding some factors of walkability, they do not describe some other important ingredients. Therefore, we suggest the use of some fairly easy-to-measure indicators to complement data from statistics.

Name of the indicator	Unit of measurement	Optimal value	Source	Measurement method
The rate of accessible pedestrian crossings for disabled people compared to all the crossings in the city	percentage	high	own measurement	Count the pedestrian crossings accessible to people with wheelchairs AND the visually impaired (lowered curbs, sound/embossed signals, etc.).
Average waiting time to cross a street	minute	low	own measurement	Choose 3 large and 3 average-sized pedestrian crossings in your city and measure the average waiting time between two light changes from the point of view of pedestrians.
Average width of pavements	m	high	own measurement	Choose 10 pavement sections that are frequently used by pedestrians, measure their width and average the results.
Frequency of public transport	minute	low	own measurement	Choose 5 busy public transport stops (bus or tram stop, underground station) on popular public transport routes and – based on the timetables – calculate the average vehicle following time, then average the 5 results.
Number of direction signs of pedestrian zones	number/1000 people	high	own measurement	Signs indicating the distance/walking time to certain services and facilities, identifying a walking route (a tourist route that continues in the city, for example), signs informing drivers about pedestrian zones, etc.

3.2.2.4 Data from dedicated survey

While statistical indicators and easy-to-measure data can capture various aspects of walkability, they do not reflect how walkable people actually feel the city. High quality pedestrian infrastructure can create an objectively walkable environment, but **people only walk more if they FEEL that walking is useful, safe, comfortable and interesting**. So, if one intends to understand the barriers of walkability, it is useful to have an understanding also of the perception of residents regarding walkability.

The best way to get information regarding perceptions is to deliver a survey among residents. If a survey is done, it is probably a good idea to make it as comprehensive as possible (we propose specific survey questionnaires in the Walkability Planning Guide developed in the project), but when it comes to the set of key performance indicators, we suggest the use of the scale-indicators presented in the table below. The survey can be delivered online or offline (paper-based) as well. We propose to combine the two channels to cater for the needs of various target groups. Representative completion is not necessary, the suggested minimum sample size is 100 people. The question to be asked in the questionnaire is the following: **To what extent do you agree with the following statements? (1 = not at all, 6 = totally).** After collecting the filled-in questionnaires, average the scores of the answers.

Statement	Scale	Optimal value	Source	Justification
There are many services, shops within walking distance (10 minutes) from my residence.	1-6 scale	high	questionnaire	Usefulness is a key criterion of walkability. A walk is useful if most destinations – services, community facilities – are easy to reach on foot. These two questions focus on the perceived pedestrian accessibility of services, facilities.
It is easy to access most of the services in the city on foot.	1-6 scale	high	questionnaire	
It is easy to reach the city centre from most parts of the city by walking, on bicycle or by combining walking with public transport.	1-6 scale	high	questionnaire	When pedestrians need to bridge longer distances, they want to combine various modes of transport. It is good if that can be done without using a personal motorized vehicle.
I feel safe when I walk in the city during daytime.	1-6 scale	high	questionnaire	Safety is a crucial condition of walkability. You can use statistical indicators to objectively judge safety level, but it is also important that people actually FEEL safe in the streets.
The city streets are well lit during night.	1-6 scale	high	questionnaire	
I feel safe when I walk in the city during night.	1-6 scale	high	questionnaire	
It is safe to cross streets in the city.	1-6 scale	high	questionnaire	These questions reveal the perceived road safety.
It is safe to bike in the city.	1-6 scale	high	questionnaire	
Sidewalks are wide enough, without major barriers.	1-6 scale	high	questionnaire	People only walk if they feel that walking is comfortable – these three

The quality, condition and maintenance of sidewalks are good.	1-6 scale	high	questionnaire	questions focus on the basic conditions of comfortable walking.
It is easy to find sitting facilities (benches, chairs) in most parts of the city.	1-6 scale	high	questionnaire	
It is easy and cheap to park in the city centre.	1-6 scale	low	questionnaire	This is a trick question: easy and cheap parking in the city centre is the enemy of good walkability. Active parking policy – making car-users pay for the use of valuable public space in the city centre – contributes to reduced car-use and improved walkability.
I find the city environment very nice, attractive for walking.	1-6 scale	high	questionnaire	People like to walk if they find the city environment interesting. This question intends to capture this quality.

3.3 Measuring walkability – the CityWalk Walkability Index

As we pointed out in **Chapter 3.2.1**, composite walkability indicators – walkability indices – are increasingly used to describe the level of walkability in a given urban area. Indices are composite indicators that intend to capture the level of walkability with one single number. Their weakness is that, in themselves, they do not say much about the factors, infrastructure elements that need to be improved in order to achieve better walkability. They still have a major benefit, though: they give an "at a glance" view of the level of walkability – they capture the level of walkability of an urban space in one single number, so they are useful in easily and quickly measuring, describing and comparing the level of walkability.

3.3.1 The need for a CityWalk Walkability Index

As we have already pointed out earlier in this Guide (as well as in the Baseline Study prepared as part of WP3 of the CityWalk project), while there is no one globally accepted walkability index methodology, there exist various – mostly commercially developed – walkability indices:

- The most widely known is the already mentioned **Walk Score**, an index based on the distance to amenities such as grocery stores, schools, parks, libraries, restaurants and coffee shops.
- **Walkability** is a customizable set of indices, based on an algorithm that relies on factors like street type, intersection complexity, point-of-interest accessibility, population density, etc.
- **Walkonomics** is a web application combining open data and crowdsourced information to rate and review the walkability of each street. Walkonomics have ratings for every street in England and New York City.
- **RateMyStreet** is a website that – similarly to Walkonomics – uses crowdsourced data in combination with Google Maps to enable users to rate their local streets from a walkability perspective.

- **Walkability App** has been developed by Clean Air Asia. It facilitates city-dwellers to rate the walkability of a street based on 9 qualitative parameters. Though it is a street-level rating system, the average of all the street scores in a city becomes the city score.

So, there is no shortage of walkability indices around the world. And still, one of the outcomes of the CityWalk project is a walkability index. The reasons for developing a new index are the following:

- There is **no single one standard index that is accepted globally**; the methodologies, approaches behind the various indices are quite different, even though they have some elements in common.
- Almost all existing indices have been **developed with large cities** – metropolises **in mind**, with no attention to the special needs and features of small- and medium sized towns.
- At the moment no walkability index is used or accepted in the **Danube Region**.
- None of the existing indices can be **used easily and quickly by an average smaller town** at its own initiative without either buying an expensive software, subscribing to a service or carrying out a complex research.

Considering all these challenges, the team behind the CityWalk project decided to develop a CityWalk Walkability Index.

3.3.2 Key criteria behind the CityWalk Walkability Index

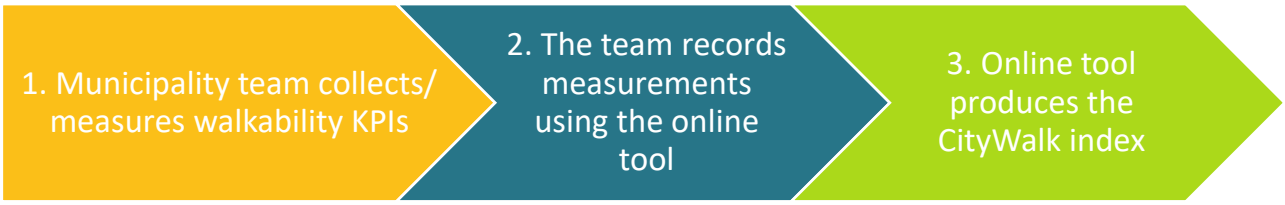
Following the review of existing walkability indices, understanding their strengths and weaknesses, as well as the needs and limitations of smaller towns in the Danube Region, we set the following criteria before starting to develop the index:

- **Simplicity**: since the index is aimed at small- and medium-sized towns in the Danube Region (and also elsewhere, if there's interest), where there are limited capacities, the index needs to be simple (certainly without being simplistic) in its construction, enabling committed professionals in small and medium-sized towns to measure its values.
- **Usability**: usability is also a key criterion of the index – it needs to be easy-to-use, with proper support tools available to help those who are interested to apply it in their towns.
- **Robustness**: being simple and easy-to-use are not excuses for not having a solid methodological background – the index needs to rely on a professionally robust methodology.
- **Relevance**: the index needs to capture the key attributes of walkability (useful, safe, comfortable and interesting walk).
- **Measurability**: by measurability, we mean two things: a) the CityWalk Walkability Index needs to express the level of walkability in a given town or neighbourhood in one single value, and b) the measurement of the index can be repeated by using the same methodology.
- **Comparability**: the index needs to enable comparing the level of walkability of cities, or neighbourhoods within the same city.
- **Interoperability**: as the CityWalk Walkability Index is an integral part of the CityWalk Walkability Toolkit, it needs to be interoperable and avoid overlaps with the other tools in the toolkit.
- **Accessibility**: the use of the index needs to be accessible to any town interested free of charge.

3.3.3 The concept behind the index

Building on the criteria presented above, the index has been developed based on the following simple concept:

15 The process of the CityWalk Walkability Index



- Step 1: the dedicated team (or even one person from the municipality with some experience in working with statistical data) collects/measures the Walkability Key Performance Indicators presented in detail in **Chapter 3.2.2**.
- Step 2: the collected/measured data are recorded using the **CityWalk online tool**. The online tool offers a simple, user-friendly template to input the collected data.
- Step 3: after providing all necessary data, the online tool automatically calculates the value of the CityWalk index using advanced statistical algorithms.

The concept we have designed does not require special knowledge, major capacity or extensive efforts, offers a smooth user experience, while also enables the integrated use of various walkability-related data. Once the data are collected and measured, they can be used as the basis for the walkability analysis – highlighting problem areas, challenges and the most important barriers of walkability –, thus, they can serve as an input to the Local Walkability Strategy of the town (its preparation is supported by the CityWalk Walkability Planning Guide). They can also be used – as described above – to calculate the CityWalk Walkability Index. As more towns use the online tool, more benchmark data will be available to compare the walkability performance with other towns.

The CityWalk index is a useful value to give an indication of the overall walkability of any town – but it is more than that: calculated on a regular basis (while walkability interventions are being implemented), its value over time can provide a feedback on the progress of walkability and success (or failure, for that matter) of the implemented walkability interventions. Thus, it can also be used as a tool to monitor the implementation of the walkability strategy. (It is important to note, that while the process calculating the index is fully automated, the detailed description of the statistical methods applied is available to anyone interested.)

A more detailed description of the CityWalk Walkability Index can be found in a separate Methodology document.

3.3.4 The practical steps of measuring walkability

Above we have described the concept, methodology and key elements of walkability KPIs and the CityWalk index that together form an integrated system of measuring walkability. In this subchapter we walk through the 12 steps to take to use the proposed approach by any municipality.

1. Head to the website of the online tool (**https://rri.hu/citywalk/calculator**).
2. Familiarize yourself with the site structure, download the description of the index.
3. Study the index methodology and the KPIs (presented here in **Chapter 3.2.2**).
4. Download the data table to collect and record statistical data measurements and the questions for the survey from the website of the online tool.
5. Collect the available data from official national statistics and local databases.
6. Carry out the required measurements in the city, following the instructions in the table of locally measured data.
7. Carry out the questionnaire survey (use online and offline channels).
8. Input the data calculated from the results of the survey in the data table.

9. Once all data are recorded:
    a. Use the KPIs to support the preparation of your town's walkability strategy.
    b. Input the data in the online tool to calculate the CityWalk index.
10. Compare the value of the index with the benchmark average available on the website to understand the level of walkability of your town relative to other towns using the online tool.
11. Use the index value to set walkability improvement goals in your city – aim to get a better value!
12. Repeat regularly – use the values to monitor and communicate progress.

4 Practices and solutions to improve walkability

4.1 Designing pedestrian-friendly streets

4.1.1 Identification of challenges and solutions

Street design plays a vital role in walkability – cars will undoubtedly dominate urban spaces if:

- streets are overcrowded and loud – or, on the contrary, deserted;
- pedestrians get a – real or false – impression of being unsafe;
- sidewalks are narrow and fragmented; and
- the urban environment does not attract people to public spaces.

Street design can be considered as a specific way of urban communication. Any effective communication should fulfil some criteria: it should be (among others) simple, interesting, concise, continuous and non-discriminatory – all of these attributes characterize street design, too. Additionally, street design can influence the walkability of a settlement in both a positive and a negative direction – the following problems occur if street design tools are not properly used:

- **Street design concentrates on the roads and the movement of motorized traffic.** Until the last decades, motorized transport has dominated the design of streets; other such as social, leisure, retail and commercial functions were considered less significant. Urban planners were committed to facilitate motorized transport instead of creating liveable and living places. The dominant patterns of urban development resulted in separated areas with different functions, which increase the dependence on car usage.
- **Walking on the streets creates (a perception of) risks.** In some cities and districts, pedestrians are in danger, or at least they perceive the urban spaces as perilous. Threats on the streets can be interpreted in two ways: traffic-related crashes and crimes while walking. Worldwide, almost 300,000 pedestrians lose their lives on the roads each year.[16] The number and probability of pedestrian collisions increases in proportion to the number of intersections between roads and sidewalks. Several factors raise the risks (some of them will be discussed in more detail below): the high speed of the vehicles, the behaviour and inattention of both drivers and pedestrians, deficiencies of the pedestrian facilities and roadway design, the inadequate visibility of pedestrians, etc. The other aspect of walking safely is the number of crimes and the resulting fear – a low level of public safety affects walkability adversely. It is a proven fact that fewer violent crimes are committed on vivid streets full of people than on empty, abandoned streets.
- **Inadequate pedestrian infrastructure reduces the permeability of urban spaces.** Pedestrians face physical obstacles – some of them are resulted from the 'normal' operation of the urban transport system such as crossings and intersections; however, in many cases, obstructions can originate from the lack of pedestrian crossing facilities, misaligned traffic

[16] WHO (2013): Pedestrian safety: a road safety manual for decision-makers and practitioners. 114 p.

lights, thoughtlessly placed objects (street furniture, lamp posts, traffic sign poles, etc.) or even a crowded sidewalk if its width is not proportionate to the number of pedestrians. These phenomena and professional recklessness – despite the best intentions – inflict cumbersome problems. In addition, if the walking paths and traffic signs seem ostensibly or obviously confusing and incomprehensible, pedestrians will tend to avoid them.

16 Inadequate pedestrian infrastructure and traffic signs

Source: **https://nextcity.org**, **www.delmagyar.hu**

- **A non-aesthetic streetscape does not attract people to the public spaces.** Abandoned parks, dilapidated buildings, the lack of street furniture, inappropriate green areas, noise pollution caused by motorized transport – these make cities and streets unappealing. Is it sufficient to create captivating streets exclusively in downtowns? This is a misconception: residential areas, business districts and other parts of cities should also be attractive enough to keep the people living and working there satisfied and their environment liveable and comfortable.

Main challenges	Potential solutions
Car-dominant urban planning	SUMPs and Co. Pedestrian-friendly street layout
Unsafe streets and unsafe walking	Traffic calming Well-designed street lighting
Inadequate and obstructed pedestrian infrastructure	Permeable walking lanes
Unattractive urban environment	Urban "afforestation" Street furniture as design element Urban art

4.1.2 Detailed description of adaptable practices

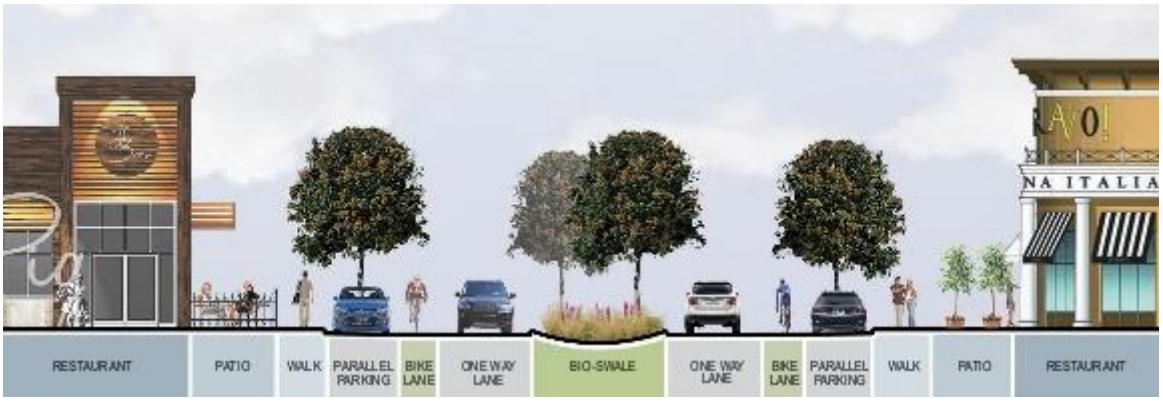
4.1.2.1 Pedestrian-friendly urban planning

Effective street design should ensure optimal connectivity for all groups of street users and for all modes of transport. New approaches of urban planning can reduce the car dependency of cities. Sustainable Urban Mobility Plans provide a strategic framework for creating sustainable urban transport systems and placing an emphasis on active forms of transport. However, city planners, regulators and traffic engineers can and should go much further with city-level walkability strategies and neighbourhood-level walkability plans. Nevertheless, **SUMPs and Co.** do not mean too much if they are not combined with creating mixed-use urban areas, so efficient street design in the long term demands a comprehensive, holistic approach.

Nowadays, lots of cities redesign their existing street structure to better provide a multitude of essential functions. A **pedestrian-friendly street layout** includes fewer or narrower lanes for cars, wider sidewalks, a greenbelt, bike paths, dedicated bus lanes, etc. All of these – not necessarily costly and time-consuming – measures combined provide additional space for pedestrians, which results in more sustainable land use patterns, too. **Some guidelines** define the optimal width of a sidewalk – a space *"large enough for two people walking side by side"*[17] – to be approximately 5 feet or 1.5 m, which has to be widened further according to other functions (e.g. benches, bus stops, shop windows, parking vehicles). Sidewalks basically consist of three parts: a frontage zone, a pedestrian zone and a street furniture/curb zone – the presence and width of these zones depend on the type of land use pattern (e.g. narrower in residential districts and wider in commercial areas).

[17] National Association of City Transportation Officials (2018): Urban Street Design Guide (**https://nacto.org/publication/urban-street-design-guide/street-design-elements/sidewalks/**)

17 Cross section of a possible street layout



Source: regenerative-studio.co

4.1.2.2 Safer public environment

Well-designed street lighting is one of the key aspects to feeling and moving safely in an urban environment. Adequate public lighting discourages illegal acts, contributes to the aesthetic appeal of the streets, reduces light pollution and facilitates the safe movement of people and vehicles. Naturally, there is no need for street lighting during daytime. Smart systems turning on and off involve automated sensors which detect the motion of pedestrians and vehicles as well as the degree of darkness. In addition to that, luminaires and light sources with high optical efficiency should be installed to increase the net luminous flux spreading out on the streets. Placing natural and artificial objects (trees, bushes, columns, posters, etc.) is also a determining factor: they cannot obstruct the visibility. This is particularly important in the junctions of roads, cycling routes and sidewalks, in the case of non-standard pavement profiles or unregulated parking spaces. A safer environment for walking attracts more pedestrians and cyclists who provide a constant source of income for the restaurants, outdoor cafes and other businesses there.

Visibility in itself is not enough if the cars simply move too fast. **Traffic calming** measures offer a wide range of solutions from reduced vehicle speed through speed cushions to narrowing the roads in and near pedestrian-only areas. Some design elements can influence the perception and behaviour of drivers (e.g. edge markings or materials that visually narrow the road or types of land use associated with greater numbers of people). Although we would expect that after traffic calming techniques such as road diets, the frequency and dimension of congestions will increase, the **numbers** reveal the exact opposite: in roads with less than 20,000 vehicles per day, these interventions have minimal or even positive effects on the road capacity.

4.1.2.3 Permeable urban spaces

People show a higher willingness to walk if they can reach their destination quickly and comfortably. **Permeable walking lanes** mean (among others) easy orientation, predictability, short waiting times at junctions, smooth surfaces and barrier-free movement. Different types of junctions demand different solutions, but first of all, they should be designed with consideration to the pedestrians' needs. Not only the challenges resulting from long waiting times at traffic lights or the lack of crossing facilities should be properly handled but also other innovative comfort features should be introduced. For instance, fast pedestrian lanes address one of the most irritating aspects of walking, slow movement; in contrast, smartphone addicts can use text-walking lanes without impeding or endangering other pedestrians: of course, this – in some cases – can increase the risk of accidents by generating dangerous situations between pedestrians and cars, especially in the intersections.

4.1.2.4 Public space decor

Green spaces are important determinants of well-being. **Urban "afforestation"** has various beneficial effects on the urban environment in view of the fact that trees improve the air quality, provide shade, decrease the heat island effect, mitigate evaporation, reduce water runoff, even absorb noise to some extent and (naturally) create a more attractive view. In case of proper selection and planting:

- trees help drivers discern the border between the street and the sidewalk;
- one tree produces enough oxygen for two people[18]; and
- businesses on streets with trees on them are able to attain a higher profit compared to their competitors occupying other streets (+12%).[19]

Accordingly, one key aspect of liveability and walkability is the size of green areas per capita and their accessibility (i.e. how many percent of the population live within a 15 minutes' walk of a recreational area). However, the results of one research conducted in New York show that investments in afforestation produce significantly lower benefits than expected ($12 vs. $172). It should also be noted that – from a walkability perspective – frequent small green areas are much better than huge parks/forests.

Street furniture is a key design element of the urban landscape. However, the functions and users of the public spaces should be considered: different types of street furniture are needed on a crowded street with predominantly transit traffic than in a park with a recreational function. Street furniture determines the character, impression and usability of public spaces – this is the reason for defining not only the principles but also the technical requirements regarding inter alia their material, design and placement. They contribute to differentiating between districts/streets/parks based on their functions and creating public spaces with a comprehensive image and unified character. In case of too much or inappropriate(ly located) furniture, a park can seem to be cluttered and the furniture will be under-utilised. In contrast, well-chosen and well-placed street furniture improves

[18] AARP Liveable Communities – Walkable and Liveable Communities Institute (2014): Street Trees. **A Liveability Fact Sheet**. 4 p.
[19] Burden, D.; Walkable Communities, Inc.; Glatting Jackson (2006): **Urban Street Trees** – 22 Benefits, Specific Applications. 21 p.

the attractiveness and interactivity of public spaces by motivating pedestrians to stop, rest and use them.

18 Street furniture as a design element

Source: **https://slowottawa.ca**

Streets provide a unique space for community activities for various groupings of citizens, as well as cultural activities, which can be embodied in **urban art**, public art or street art. These types of art always use the features and characteristics of local places: their results reflect on the given urban environment and add extra meaning or underlying messages to them.

The works of art can be:

- legal, semi-legal or illegal;
- permanent or transient;
- made on a contractual or a voluntary basis; and
- results of flash mobs or other community events.

Numerous good practices are available on the internet, but we can highlight a few examples: light-, water- and firewall painting, yarn bombing (or guerrilla knitting), waste sculptures, etc.

19 Water painting in Seoul

Source: **https://www.dandad.org/awards/new-blood/2015/pantone/2779/project-monsoon/**

4.1.3 Evaluation and comparison of practices


low costs


fast implementation


smooth implementation


quick results


medium costs


requires more time


can incite some conflict


needs more time to work


high costs


time-consuming


significant opposition


longer investment

Name of practice	Cost-effectiveness	Time required for the implementation	Potential for conflict	Timeframe of benefits
SUMPs and Co.				
Pedestrian-friendly street layout				
Well-designed street lighting				
Traffic calming				
Permeable walking lanes				
Urban "afforestation"				
Street furniture as design element				
Urban art				

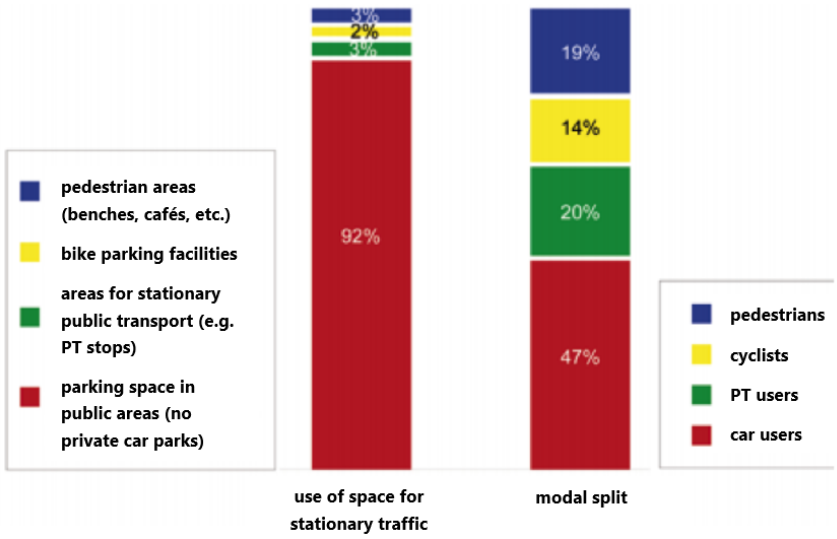
4.2 Active parking management

4.2.1 Identification of challenges and solutions

'Traditional' city parking policies – managing the supply of parking spaces and determining parking fees – favour cars: the most important consideration is to guarantee a readily available and free-of-charge (or at least underpriced) parking supply. This attitude influences the modal choice of citizens, attracting even more car use and fostering automobile dependency. We already know the detriments of excessive car use (e.g. congestion, air pollution, health problems caused by lack of exercise) from previous chapters, but the parking supply itself induces additional problems.

- **Parking takes up valuable public space.** Each parking space consumes 15-30 m^2, and the average driver uses 2 to 5 different parking spaces every day.[20] Public space has a high value, particularly in city centres; according to Donald Shoup, an economist and a research professor of urban planning at UCLA, "*the cost of all parking spaces in the U.S. exceeds the value of all cars and may even exceed the value of all roads.*"[21] Therefore, public space – as a priced (and scarce) resource – should be utilized carefully, not automatically given over to parking cars for free, especially when their privilege is not supported by the modal split (see the figure below).

20 Use of space for stationary traffic and modal split in Graz, Austria



Source: Austrian Mobility Research 2011 and City of Graz 2013

[20] Robert Pressl et al. (2015): 16 Good Reasons for Parking Management. PUSH&PULL, p. 5 (pdf)
[21] Donald Shoup (2011): The High Cost of Free Parking. Routledge, p. 189 (pdf)

- **Minimum parking requirements limit economic development.** Replacing a failed shop with a new restaurant frequently requires building additional parking lots – even if funds are available, we are talking about properties of a limited size. In addition, this '*parking-induced commercial stasis*' is based on faulty assumptions: it is not uncommon that the newly established parking spaces are operating with a 30-40% occupancy rate, due to nearby metro stations or apartment complexes which make public transport, cycling and walking more attractive in the area – these attributes are usually not considered when determining minimum parking requirements.[22] Eliminating these standards, or at least switching to maximum values is a key to driving economic growth and reducing car use.
- **Cheap curbside parking can kill local businesses.** Shop-owners often think that free parking in front of their properties will bring in more customers. This is a serious misconception – if parking is not carefully regulated, usually two things happen:
    - the parking spaces will be overrun by long-term parkers (sometimes – surprisingly – by the shopkeepers themselves) going home or to work; this is a prevalent problem in several towns in the UK[23];
    - and visitors coming by car face difficulties finding a parking space close to where they want to be – the knowledge of this possibility can scare away potential customers, even if the nearby parking lots are empty in reality.
- **Increasing the extent of paved areas contribute to the urban heat island effect.**[24] Replacing green areas with materials such as concrete and asphalt – with significantly different heat capacity and surface radiative properties – allows these surfaces to absorb more solar radiation and give off more heat. Additionally, decreasing the amount of vegetation lessens the cooling influence of trees which would otherwise mitigate the effect.

[22] Jeff Speck (2012): Walkable City – How Downtown Can Save America, One Step at a Time. North Point Press, p. 79 (pdf)
[23] Robert Pressl et al. (2015): 16 Good Reasons for Parking Management. PUSH&PULL, p. 11 (pdf)
[24] Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (2015): Sustainable Parking Management – Annex A of the Handbook 'Navigating Transport NAMAs'. TRANSfer, p. 1 (pdf)

Main challenges	Potential solutions
Scarcity and high value of public space	In-lieu payments Reducing the number of parking spaces Off-street parking places (multi-level) to replace on-street parking
Mandatory parking spaces with a low occupancy rate	Parking cash-out Switching to biking and other facilities
Cheap (and thus congested) curbside parking	Occupancy rate-based parking fee system
Urban heat island effect	Park(ing) Day Earmarking

4.2.2 Detailed description of adaptable practices

4.2.2.1 Saving and restoring public space

As we established before, public space is rare and therefore very valuable. The use of it can either make an area more attractive and interesting or drive away potential visitors. Giving it away free-of-charge for parking cars may satisfy current parking demands but parking lots are rarely aesthetically pleasing – filling a historic or recreational downtown area with them and changing its layout and visuals is counterproductive if nobody wants to go there anymore.

One possible way of preventing this outcome is the introduction of **in-lieu payments** for local businesses and restaurants. Without changing their mandatory parking requirements, the city can give them the opportunity to contribute financially to a shared parking lot within a comfortable walking distance. The in-lieu fee is determined by the value of the land and the nature of the parking lot (underground structure, asphalt surface lot, etc.): in Carmel-by-the-Sea, California, from where this initiative originates, the fee is $27,520 per parking space, but it typically ranges from seven to ten thousand dollars in other American cities.[25] The parking supply stays the same, but its relocation creates a virtually car-free downtown area and – since everybody arrives on foot – ensures vibrant street life through constant sidewalk activity. Compared to private parking lots, the new shared facilities are used more efficiently – the same parking space can serve an office worker during the day, a customer of a restaurant in the evening and a resident overnight. If occupancy rates change and fewer parking spaces are needed, the city can adjust its in-lieu fees – or just keep the difference and use it for other projects related to parking management (see **Chapter 4.2.2.4**).

Another solution could be **reducing the number of parking spaces** in the downtown area outright, but this is a long process – the city of Copenhagen have done it over 40 years, cutting the total number of parking spaces by a small percentage each year. City officials should realize that the real demand is not for parking, per se, but for access to a location[26] – and this can be met by building underground facilities on the city's outskirts and pedestrianizing several streets to make walking a

[25] Donald Shoup (2011): The High Cost of Free Parking. Routledge, pp. 102-103, 230, 239 (pdf)

[26] In some cases, relocating a few traffic attractors from the city centre can be a partial solution.

more attractive and comfortable option for reaching a destination (or providing biking facilities to motivate the citizens to leave their car home altogether). Based on a similar attitude, the proportion of people driving to work fell from 22% to 16% in the Danish capital. It is important to note that reducing the parking supply alone will not work – a city aiming for lasting results has to keep in mind that solving the challenges presented by the 'sudden' lack of parking spaces requires a consistent city-wide parking management concept to ensure the effectiveness of this measure.

Changing the ratio between on-street parking and off-street lots could also free the streets from parked vehicles, leaving more space for pedestrians, cyclists, greenery and street furniture. This does not necessarily lead to a decrease in the total number of parking places; still, it would be a welcome change in any city. Additionally, multi-level (like fast park) facilities could free even more space and enable more appropriate land use. The parking facilities can be made more acceptable aesthetically with green walls, etc.

4.2.2.2 Utilizing parking spaces

When faced with needlessly maintaining under-utilized parking spaces, there are two complementary ways to handle the situation:

1. Short-term solution – The city should implement policies to 'recycle' – reuse – the unoccupied parking areas for other purposes, lessening the burden on the municipality and the businesses that have to provide them to their customers or employees (often for free, due to regulations).
2. Long-term solution – The city should also implement policies focusing on business development in the future to prevent the creation of even more unnecessary parking spaces.

One long-term preventive measure is the **'parking cash-out'**, a Californian invention. Directly reducing the number of mandatory parking spaces may be a too sudden move, meeting significant opposition – not to mention that changing the legislation can take a long time –, but it can be done indirectly by providing the right motivation. The essence of the parking cash-out method is encouraging businesses and their employees to relinquish their mandatory parking spaces in exchange for an adequate financial compensation – the amount would correspond to the value of the parking space. Citizens who usually travel to and from work by car despite living close to their office can be motivated by this economic incentive to look for alternative modes of transport. Businesses can significantly reduce their construction costs without these unnecessary parking spaces[27], and the resulting public space can be used for other development purposes by the city (green areas, pedestrian facilities, outdoor cafés, etc.).

[27] A hotel in Palo Alto, California with 107 rooms was required to provide 0.67 parking spaces per unit (room) – a moderate amount –, increasing its construction costs by 38%. Source: Donald Shoup (2011): The High Cost of Free Parking. Routledge, p. 150 (pdf)

21 Smart use of an unoccupied parking space

Source: FGM-AMOR 2015 and Brimberry Designs 2018

As a short-term and immediate solution, **switching to biking facilities** is one way to reuse an unnecessary parking space (see the pictures above). Bike parking takes up ten times less space and costs 30 to 300 times less – its mere availability makes people more likely to choose cycling as a travel mode. According to a study in Toronto, the „if you build it, they will come" thinking works, and customers who bike to local businesses spend more money overall than those who drive.

4.2.2.3 Managing curbside parking

Managing the market of parking supply in a city has to cover both off-street and on-street parking – and in correlation with each other. If one of them – usually the former – is considerably more expensive, using the other will automatically gain popularity among the citizens. Favouring curbside parking leads to frequent double parking and even more congestion than usual, caused by the endlessly circling drivers looking for a parking spot.

The best solution is an on-street parking fee that results in an 85% occupancy rate – with just enough empty parking spots at all times to prevent an overcrowded street.[28] By evening out the cost of on-street and off-street parking, or just stop providing the former for free, a city can reach immediate results – and generate some revenue in the process. The success lies in the follow-up: rates should be adjusted according to the drivers' activity, carefully balancing between a street full of stationary cars and a ghost-town (since the measure can work both ways). Raising and managing on-street parking fees this way is good for business: in London, the average parking time shortened by 66%, increasing the turnover of visitors in the shopping district. Additionally, time spent hunting for a spot also dropped from 6.1 minutes to 62 seconds.[29]

To elevate this approach to a more sophisticated level, a city with the necessary resources can introduce an **occupancy rate-based parking fee system**, with a fully automated platform – like in San Francisco. By installing embedded car sensors, the utilization of the parking supply can be monitored real time and hourly adjustments become possible by zones or regions. Developing a smartphone app for support can aid the drivers by constantly updating them about the number of available parking spaces and the relevant fees. Building a system like this is quite expensive (it cost $20 million in the case of San Francisco), but it should earn back the invested money through increased parking revenues.

4.2.2.4 Developing the urban environment

Both the parking spaces and the money they generate through parking fees can be used to lessen the environmental effects of the ever increasing asphalt areas of a city. The first solution – the introduction of Park(ing) Spots or **Park(ing) Day**s – also addresses low occupancy rate in the case of parking areas. The main purpose of the event is reclaiming public space – often needlessly – devoted to automobiles, and therefore contributing to a vibrant street life – all this achieved by converting a parking spot into a small park-like area in a community-driven effort. The original idea is limited to one-day events and temporary measures, more of an awareness raising campaign shedding light on the sheer amount of space taken up by cars in the urban environment, but in the case of unwanted parking spaces, a city can make these 'parklets' permanent.[30]

The other solution is **earmarking** the money a city earns through parking fees: using these revenues to directly finance a certain budget item – such as investing in a greener city to mitigate the effects of climate change – and communicating this effort through raising awareness about the importance of the cause can help sway citizens with an uncertain or even negative attitude concerning the current or planned parking regulations in the city: if they know the benefits of the measures, they will cooperate without (or with less) opposition.[31]

[28] Donald Shoup (2011): The High Cost of Free Parking. Routledge, p. 299 (pdf)
[29] Jeff Speck (2012): Walkable City – How Downtown Can Save America, One Step at a Time. North Point Press, p. 87 (pdf)
[30] Mike Lydon et al. (2011): Tactical Urbanism – Short-term Action, Long-term Change. The Street Plans Collaborative, p. 4 (pdf)
[31] Friends of the Earth Germany (2015): Guideline – Sustainable Parking Management. Clean Air, p. 2

22 Reclaiming public space through Park(ing) Days

Source: La Comunidad Verde 2015 and Broken Arrow Chamber of Commerce 2017

4.2.3 Evaluation and comparison of practices

 low costs

 fast implementation

 smooth implementation

 quick results

 medium costs

 requires more time

 can incite some conflict

 needs more time to work

 high costs

 time-consuming

 significant opposition

 longer investment

Name of practice	Cost-effectiveness	Time required for the implementation	Potential for conflict	Timeframe of benefits
In-lieu payments				
Reducing the number of parking spaces				
Off-street parking places (multi-level) to replace on-street parking				
Parking cash-out				
Switching to biking facilities				
Occupancy rate-based parking fee system				
Park(ing) Day				
Earmarking				

4.3 Improving public transport

4.3.1 Identification of challenges and solutions

Functional, good quality public transport is a crucial ingredient of any sustainable urban transport system, and an important condition of walkability. As we already know, people only walk if certain conditions are in place. Even so, however, there is a limit of the distance most people are ready to walk, and once the distance is deemed too long, people choose to use other transport modes – **"pedestrian accelerators"**. The most important possible pedestrian accelerators include personal motorized vehicles (passenger cars or motorbikes), bicycles, public transport, taxis and more recently in larger cities, car-sharing services. These are all viable options and have a place in an urban mobility system, but public transport is especially important, as it potentially offers benefits for both the community and the individual users, including:

- similar to cars, it could be a fairly quick way to reach our destination, while being protected against the elements;
- it requires significantly less space per user than cars;
- it is cheaper to use than a car; and
- the emission per user is significantly lower than in the case of cars.

Some experts even go as far as claiming that the first step of making a city truly walkable is to put a well-functioning public transport system in place. It is clear that even in small and medium-sized cities, good public transport needs to be part of the mobility mix but developing and running a good public transport system is not easy; in fact, most cities struggle to properly manage theirs. The related challenges city administrations and public transport companies face are multiple.

The most important challenge is of a **financial nature**: constantly developing infrastructure and operating a high-quality public transport service is **a costly exercise**. The most important sources of financing are fares (ticket sales), public funding (in most cases provided by the local government) and – to a smaller extent – other revenues (for example, advertising). From a financial perspective, every participant is frustrated: the public transport operator feels that the tickets are too cheap, and the public contribution is too low to cover the costs. The local government is frustrated due to the continuously increasing financing needs, especially in light of the quality of the service, while the users feel they pay too much for the service they receive. Proper budgeting, transparent finances, offering high quality service and constant development in return for the public contribution, a creative approach to increase revenues from other services and increasing operational efficiency can be all parts of the solution to this challenge.

In many towns – especially in Central-Eastern Europe – there is also a **"motivational" problem** from the part of the transport operators. As the major source of revenue is the public contribution, they are more interested and motivated in negotiating for even smaller increases in funding or in cutting costs than in increasing ridership, which only has a very modest effect on their revenues. Setting clear goals, aligning the interests of involved parties (establishing open, honest communication), having well-thought-through service level agreements between the public authority and the transport operator are all parts of the solution to this challenge.

Public transport also has an **image or perception problem**: people (and often the public transport operators themselves, as well as the local authority) consider it **a cheap, poor quality option for those who cannot afford other, much better alternatives** (meaning: owning and using a car). This negative perception is quite harmful in that it drives away potential users who otherwise would be ready to use public transport. There is no easy and quick solution, but the first step in changing this situation is to have a different attitude towards public transport within the local authority and in the transport company: public transport should not be considered as an expensive, low-quality mobility option for poor people, but as an integral part of the sustainable urban mobility system, a pedestrian accelerator offering a competitive service. Once this changed attitude is in place, user experience across all aspects of public transport need to be improved, awareness raising, and marketing campaigns need to be used to change user perception.

Public transport also faces strong – and increasing – **competition** from various other mobility alternatives. The most obvious competitors are **motorized personal vehicles, especially cars**, which – from a user's perspective – offer various benefits, including full autonomy and flexibility (I can use it whenever I want to get to almost any destination), no need to mix with other people (often with much lower status), perceived safety against crimes, speed, full protection against the elements (heating and climate control) entirely tailored to individual needs, large cargo capacity (cars can be used to carry heavy objects) and even status and wealth (supported by the marketing machinery of car manufacturers). While car ownership is much more expensive than using public transport, people tend to forget about the upfront (purchase), fixed (taxes, insurance, having a garage, etc.), or even service costs, and only calculate with the costs of fuel, thus making the cost-comparison unrealistic. In addition to personally owned cars, services like **UBER** (at least in cities they are allowed to operate) also present a strong competition for public transport. They offer many of the advantages of a personal car over public transport, while eliminating some of its disadvantages (like, for instance, high fixed costs, hunting/paying for expensive parking spaces, etc.). Surprising as it sounds, **bicycles** are also competitors of public transport – so much so that some towns, after significantly improving their network of bicycle routes, experienced that while the proportion of bicycle users has indeed increased, the public transport users were the ones who switched to riding a bike instead of car users – the latter was the original intention. Last but not least, we cannot ignore an up-and-coming potential – but very dangerous – competitor: **autonomous cars**. Though the technology is not yet fully ready, their mass proliferation is only a couple of years away according to some analysts. If cities and transport operators are not prepared, autonomous cars will attract users from public transport, and instead of easing mobility problems, they will exacerbate them, making cities even more congested. Here, finding the optimal answer is even more difficult; however, thorough and forward-looking transport planning, policies and measures to make car use in urban cores less convenient and more expensive, constant development of service quality, communication and awareness raising all need to be parts of the solution.

Public transport is a huge and complex issue in itself, so we do not even attempt to give a comprehensive set of solutions to the related challenges – there are many dedicated initiatives trying to do that. All we can offer is a collection of ideas that may help towns committed to become more walkable to understand and maybe slightly improve public transport.

Main challenges	Potential solutions
Financial problem	Improve fair collection – payment experience Use flexible pricing
"Motivational" problem	Integrating public transport and land use planning Learn from others, experiment, evaluate and adjust
Image or perception problem	Redesign the public transport network Improve "spaces" linked to public transport
Competition from other mobility alternatives	Give public transport priority Make it easy for users of other transport modes to change to public transport Improve user information

4.3.2 Detailed description of adaptable practices

4.3.2.1 Add the key ingredients of an appealing public transport

As Jeff Speck, walkability expert and evangelist puts: *"When your commute takes two transfers and ninety minutes, you find a way to get a car if you can."*[32] In the same book he identifies 4 crucial ingredients of an appealing public transport experience that can provide a good starting point to developing public transport.

- **Urbanity** means that public transport needs to offer access to the benefits of urban life. This means that public transport stops have to be located close to places people want to go to – like workplaces, shops, cafés, restaurants, cultural institutions, sports facilities, etc.
- **Clarity** of the public transport routes is also indispensable: a complicated, difficult to understand network means discomfort and annoyance, people prefer easy-to-understand straight lines. Clarity is also important when it comes to public transport information – smart-phone applications, timetables, information posters – as well as to payment.
- **Frequency** is another important aspect of user-friendly public transport: people hate to study timetables (especially complicated ones that are impossible to understand). Especially in denser areas, they rather go to a stop knowing that they only need to wait maximum ten minutes (preferably less) before the next bus or tram arrives. Therefore, public transport operators should use smaller vehicles instead of reducing frequency significantly.
- **Pleasure**: the use of public transport should be a positive user experience every step of the way. Bus stops need to be places where people like to hang around, the interior of vehicles has to be not just functional but also attractive, nicely designed with much light, comfortable and clean.

When developing public transport, **at first focus on the basics**: convenience is king – and people only use public transport if it is frequent enough, fast enough and affordable; sure, onboard wi-fi or a smart travel planner application are nice to have, but not until buses are infrequent, unreliable or the service is prohibitively expensive. From a financial standpoint, using revenues from car-related taxes to subsidize public transport is a smart idea.

4.3.2.2 Introduce better integration of spatial planning and planning public transport

Public transport planning needs to be an integral part of urban and land use planning – this is so obvious that it should not even be mentioned, and still, in many cities we see that the two do not go hand-in-hand. Whenever certain functions are planned in a town, they have to be assessed as traffic attractors and generators. This is done in the case of public buildings (sports facilities, cultural centres), or in the case of commercial developments like shopping malls, but often is forgotten when new residential areas – especially in the more suburban parts of the city – are planned. New mobility demand is induced, but it is assumed that people will use their own cars – and they will, as the other options are not up to their expectations. In order to make planning more integrated, it is also useful to have a shared map of zones, land use and public transport networks

[32] Jeff Speck (2018): Walkable City Rules – 101 Steps to Making Better Places, ISLANDPRESS, Washington

(not only road networks) – and all departments involved in either aspect should use this **shared map** instead of the ones focusing only on their own respective areas.

From time to time, it is necessary to **redesign the public transport network** completely – and still, towns rarely do it. Instead, the public transport network develops "organically" as the city grows, adding new routes or expanding existing ones. While these small individual changes may have made sense in isolation, as many small changes add up, they may not work together well. But regular redesign – or at least a careful review – is important not only because the city is changing quickly but also because our knowledge of best practices has increased significantly, just like technology and people's expectations changed drastically. So, even if you do not think so, the public transport system of your town probably also needs a redesign. And not just redesign – also implement the changes!

4.3.2.3 Improve the user experience

If we want to lure people into using public transport, we need to drastically improve the user experience, using the approach behind design thinking. So, it is not just about better network, more modern and cleaner vehicles but about offering a seamless user experience at every step of the user's journey. Identify every important element, understand the most important problem points and design solutions to eliminate them. (You may not be able to implement all of them at once, some of them at all, but have a plan to introduce the most important ones gradually.) Below we list some important elements of the user experience.

Improve user information. Better user information drastically improves user satisfaction, especially in case of time-sensitive services like public transport. Provide high-quality, reliable, up-to-date network and timetable information through various channels (printed, website, in-vehicle, smartphone application, etc.). Also, if you have the possibility, share real-time vehicle arrival information – on the vehicle, in the stops and also (if there is one) in the smartphone application. People hate uncertainty.

Improve fair collection – payment experience. Having a smooth and quick payment experience means that people feel less frustrated when they have to pay for the service, even if they consider ticket prices high. Making payment quick and easy reflects that the transport company respects their time. Do not eliminate traditional payment techniques (ticket office, in-vehicle ticket sales) – not just yet – but offer quicker and easier payment solutions (prepaid travel cards, mobile payment, online payment, etc.) – people will gradually gravitate towards these solutions. Making payment easy and painless will make users happy, while reducing waiting times and human capacity needs: it is a win-win situation in the long run.

Improve "spaces" linked to public transport. In having a positive user experience, the physical spaces we use during the travel process (bus stops and vehicle interiors) play an important role. To improve them sometimes requires massive investments – like replacing multiple vehicles at once in a large fleet – which are not always possible. As a bare minimum, though, keep these places clean and tidy. Involving users and local businesses in the process is also possible – bus stops can be designed using a participative process –; asking their opinion regarding expectations or design options, or even the contribution of businesses in return to a dedicated advertising surface. As bus stops are public spaces, design them accordingly – make them inviting, safe, well-lit and preferably

somewhat protected. Use standard – if possible, interesting, playful, unique – design (or variations of it) in the entire town and place the same type of easy-to-read information at the same places in the stops. When procuring new vehicles or renewing existing ones, look beyond functionality and try to make them as attractive as possible, with friendly, nice interiors accessible for all.

4.3.2.4 Other possible practices

Give public transport priority: public transport is part of the local mobility system – it needs to work in cooperation with other transport modes. Given that it is more sustainable, claims much less space per person transported and its operation costs society significantly less than that of personally owned vehicles, it is natural to give public transport priority over cars. Provide a dedicated lane for buses where there is enough space, use traffic lights to prioritize the moving of buses, making them quicker than cars in rush hours.

Make it easy for users of other transport modes to change to public transport: establish P+R facilities where car users can park their car and switch to public transport. You can even combine parking fee and bus fare: for the price of parking, car-owners can also use public transport. Though often it is not easy – especially in rush hours when buses are full – but create spaces on public transport vehicles where occasionally (for instance, in off-peak hours) bicycles can be carried. In smaller towns, it would be wise to experiment with light car-sharing and other community-based solutions (e.g. small buses carrying people from feeder lines to the main network).

Use flexible pricing: on the one hand, make public transport cheaper for those who are in need (students, elderly, but also other disadvantaged groups of the society); on the other hand, use pricing to encourage the use of service in less busy periods. (It is important to note here, that some cities even experiment with free public transport for their residents – Tallinn, Estonia being one of the better known such cities. While it is an interesting practice, without going into details we can conclude that results are controversial, so it is advisable to progress slowly and with care before such a big decision is taken.)

Learn from others, experiment, evaluate and adjust: there is no magic pill in public transport development. However, whenever a change is planned, it is useful to look at the experiences, similar practices of other towns, learn from their successes – and mistakes. If possible, start with small steps, evaluate the results and progress when the solution has proven to work. It always has a risk, but the biggest risk of all is not to develop because "that is the way how we always did it".

4.3.3 Evaluation and comparison of practices

 low costs

 fast implementation

 smooth implementation

 quick results

 medium costs

 requires more time

 can incite some conflict

 needs more time to work

 high costs

 time-consuming

 significant opposition

 longer investment

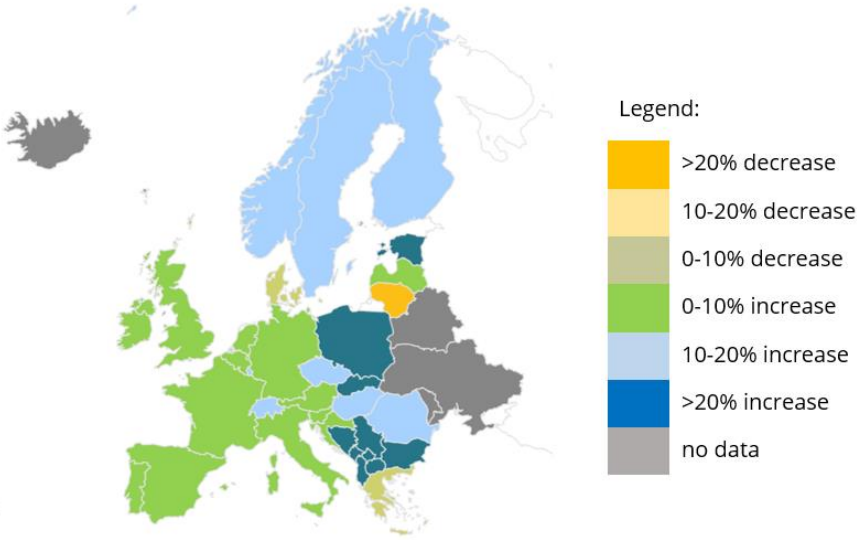
Name of practice	Cost-effectiveness	Time required for the implementation	Potential for conflict	Timeframe of benefits
Integrating public transport and land use planning				
Redesign the public transport network				
Improve user information				
Improve fair collection – payment experience				
Improve "spaces" linked to public transport				
Give public transport priority				
Make it easy for users of other transport modes to change to public transport				
Use flexible pricing				
Learn from others, experiment, evaluate and adjust				

4.4 Using economic motivators to reduce car use

4.4.1 Identification of challenges and solutions

The number of passenger cars in cities is significant – in Europe, it was increased by 8.6% between 2010 and 2016[33], resulting in 22.5 million new cars on the road. During this seven-year period, the highest growth was observed in Estonia (27.2%), followed by Slovakia (27.1%) and Poland (25.7%). Only three Member States recorded a decline: 1.1% in Greece and 4.4% in Denmark – in Lithuania, the number of registered passenger cars declined by 23.2% but mainly due to a change in the registering procedure in 2014, consequently, the Lithuanian data from 2014 onwards cannot be compared directly with data from the previous years.

23 Increase in the number of passenger cars between 2010 and 2016



Source: **Eurostat** (2016)

The increase in the number of cars is also supported by the fact that while between 1990 and 1999, 39.2 million and between 2000 and 2014, 54.9 million cars were sold annually on average, **this number grew** to 77.6 million between 2015 and 2018 worldwide. In 2015, 1 billion cars were used. **Based on recent trends**, the number of passenger cars will continue to rise globally, and it is expected to be 1.5 billion by 2025 and 2 billion in 2040.

Besides the overall increase in the number of cars, their concentration has also grown – the urbanization process leads to people and their vehicles moving from rural areas to cities. In our cities, the so-called **automobile-dependency** is a major problem, which can be defined as a high level of passenger car use, automobile-oriented land use and a lack of alternative traffic opportunities. At the same time, there is considerable debate about the economic, social and

[33] The period under review was between 2008 and 2016 in the case of Denmark and between 2010 and 2015 in the case of Romania.

environmental costs of automobile-dependency, and whether the benefits of cars outweigh these costs. Although the basic level of car use may have economic benefits, there is evidence that the excessive use of cars actually has a negative economic impact. Therefore, the most sustainable transport development programmes aim to reduce this car dependency, change the modal share to shift its proportions from car traffic to other alternative, sustainable modes of transport.[34]

Car usage is mostly driven by convenience – it has several advantages to the user as opposed to the alternative ways of walking, cycling, taking a bus and catching a train: door-to-door travel, flexibility, a relatively low travel time, a low marginal cost, comfort, etc. In addition, owning a car is also a way to express social status.[35] Nevertheless, automotive transport places significant economic, environmental and social burdens on cities:

- Though in the past decades, cars are operating with much lower emissions – their fuel efficiency has practically doubled, and their tailpipe emissions have dropped by more than 95% –, due to their large number, our cities are struggling with smog and **air pollution**. Even though a significant increase in the number of electric cars may cause a positive change in this area, it will not be able to solve every problem.
- The infrastructure that satisfies motorized traffic requires a significant amount of **valuable urban land**: European cities allocate almost 25% of their surface area to roads and supporting infrastructure, which can be as high as 40-50% in many US cities.
- At the same time, according to the World Health Organization's recommendation, cities should assign at least 9 m^2 of **green space** per resident to provide a liveable environment – unfortunately, in many cases only around 2 m^2 are available, as most urban areas are occupied by buildings and the transport infrastructure.
- As a vicious circle, the same enormous transport infrastructure **generates an even greater traffic on roads**. To express this phenomenon, Jeff Speck uses the term 'induced demand' in several studies: *"Induced demand is the name for what happens when increasing the supply of roadways lowers the time cost of driving, causing more people to drive and obliterating any reductions in congestion."*.[36] Consequently, the average commuter in the European Union wastes almost **28.25 hours** in **road congestions** annually.

In other words, managing urban mobility challenges can only be achieved by **reducing the number of cars in circulation**, and in parallel with the **support of alternative modes of transport**. Several cities have already introduced interventions for this purpose. In general, car-use reduction initiatives can be characterized as structural or psychological:

- **Structural interventions** include the modifications of the physical and/or legislative systems that help to reduce the attractiveness and opportunities of car travel and/or offer incentives for the use of other transport modes. In most cases, structural interventions can

[34] Litman, T.; Burwell, D. (2016): Issues in sustainable transportation. International Journal of Global Environmental Issues, Vol. 6, No. 4, pp. 331-347
[35] **Mackett**, et al. (2013): Reducing Car Use in Urban Areas. In Sustainable Transport for Chinese Cities. Edited by Mackett, et al.; Emerald, Bingley; Yorkshire, Great Britain; pp. 211-230
[36] Speck (2012): Walkable City – How Downtown Can Save America, One Step At A Time. North Point Press, New York, p. 55

be regulatory/command-and-control approaches that set specific standards, or market-based policies/economic incentives which rely on market forces to correct producer and consumer behaviour. For example, road pricing which provides financial incentives for car-use reduction, road closures which disrupt routinised driving patterns, and bus priority lanes which seek to make public transport more efficient.

- Driving a car is often the result of a decision-making process driven by habits, so the purpose of psychological interventions is to change perceptions, beliefs and attitudes, thus, encourage a voluntary change in transportation choices. **Psychological strategies** are less expensive and may be more acceptable publicly, but their impact can only be realized in the long run. These include education programmes or applications providing tailored information to passengers based on their travel patterns in order to increase awareness of their transport use and equip them with the knowledge and skills required to utilise existing non-car transport infrastructures.

While related to the previous point, it is important to emphasize that one important driver to influence the decision of using a car is financial in nature. Generally, people do not take into account all the expenses related to owning and using a car. The actual cost of a car is much more than a simple monthly payment, considering it involves the price of purchasing a car or a loan, a sales tax, a registration fee, insurance and maintenance. Presenting of and **education about the real costs of owning and using a car** could also influence the reduction in car ownership.

Both structural and psychological interventions can reduce car use, and the complementary application of both approaches may optimise effectiveness.[37] In this subchapter, we intend to present economic incentives directly or indirectly contributing to this goal.

In the context of mobility, economic incentives provide a continuous motivation to encourage users to reduce car use and modify their transport habits by offering them other modes of transport. Consequently, the use of economic incentives can only be effective if the alternative modes of transport meet the needs of passengers as well as privately-owned and -driven cars. Economic incentives can be positive or negative:

- **Positive economic incentives** (subsidies) reward people financially for making certain choices and behaving in a certain way. In most cases, supporting alternative modes of transport can be implemented in the form of (local) government subsidies – these can include incentives promoting **shared mobility** and **fare-free public transport**.
- **Negative economic incentives** (charges and fees) punish people financially for making certain choices and behaving in a certain way. Charges and fees often lack public approval, especially if they charge for something that was previously free. To change public opinion, the revenues generated through these charges have to return to the transport sector.[38] Charges and fees include **congestion charges** and **fuel pricing**.

[37] Graham-Rowe, et al. (2011): Can we reduce car use and, if so, how? A review of available evidence. Transportation Research – Part A – 45, pp. 401–418

[38] Santos (2017): Incentives to encourage shared mobility. Centre on Regulation in Europe (CERRE)

Main challenges	Potential solutions
Reduce the number of cars in circulation/traffic congestion	Road pricing, congestion charges Education about the real costs of owning and using a car Fuel pricing
Increase the use of public transport	Fare-free/subsidized public transport
Improve alternative modes of transport	Incentives to promote shared mobility

4.4.2 Detailed description of adaptable practices

4.4.2.1 Charges and fees

In most cities, everybody experiences congestion most days, but these are not only a personal annoyance – they have a serious economic impact as well. According to a 2005 study by Oxford Economic Forecasting, the quantifiable economic cost of transport delays to Central London employees and businesses is estimated to be £1.19 million a year.[39]

Studies show that one of the most effective ways of reducing car congestion is **road pricing**, however, due to public opposition, the introduction of initiatives based on limiting the freedom of choice can be challenging. Road pricing are direct charges for the use of roads, including road tolls, distance or time-based fees, congestion charges and fees designed to reduce the use of certain categories of vehicles, fuel sources or more polluting vehicles. Road or congestion charges have proved to be able to reduce the use of cars in cities and their implementation has other benefits, too, derived from the reduction of air pollution and road casualties. Nevertheless, the implementation of congestion charges on their own, without supporting alternative modes of transport, has a low possibility of generating significant benefits.[40]

Congestion charges on urban roads are currently limited to a few cities, like Gothenburg, London, Milan, Singapore and Stockholm. They can be classified into four different categories[41]:

- a cordon area around a city centre, with fees for passing through the line;
- area-wide congestion pricing, with fees for being inside an area;
- a city centre toll ring, with fee collection surrounding the city; and
- a corridor or single facility congestion pricing, where the access to a lane or facility is priced.

One of the best examples of a successful implementation of congestion charges is **London**. It has been 15 years since London's congestion charge was introduced. The London Congestion Charge

[39] Oxford Economic Forecasting (2005): Time is Money – The Economic Effects of Transport Delays in Central London. GLA Economics and Transport for London

[40] Shergold, Bartle (2016): The Economic Benefits of Sustainable Urban Mobility Measures – Independent Review of Evidence, Summaries. University of the West of England, Bristol

[41] Small, Gomez-Ibañez (1998): Road Pricing for Congestion Management – The Transition from Theory to Policy. University of California Transportation Center, p. 214

Zone covers a 21 km² area in the city. The system is quite simple: when you enter the zone between 7am and 6pm, you pay a flat daily rate (except on weekends, public holidays and between Christmas Day and New Year's Day). The amount has risen from £5 to £11.5 over time. Residents inside the zone receive a 90% discount and registered people with disabilities can travel for free. Emergency services, motorcycles, taxis and minicabs are exempt from paying.[42] Relevant indicators show that the application of the charge was successful. The Transport for London (2008) reported that it reduced traffic significantly:

- the number of vehicles entering the zone decreased by 16% and the number of cars, minicabs and lorries fell by 29%;
- the number of buses entering London increased by 33% and the number of people using them during morning peak hours rose by 30% between 2002 and 2007.

This effect is continuing today. The volume of traffic in the zone is nearly one quarter lower than a decade ago, enabling the city centre to be used by pedestrians and cyclists instead of cars.

The other type of charges and fees is taxes on car use and ownership. **Fuel pricing** is a politically sensitive area, although there is a clear link between fuel price increases and lower car usage. According to Hanly, a 10% increase in fuel prices caused a 1.5% reduction in traffic volume in the first year, building up to about 3% over a 5-10-year period.[43] Working out the impact of fuel prices on car use has many difficulties because of (among other things) the influence of the nature of travel, driving styles and types of vehicles. Sensitivity against increasing fuel prices has somewhat reduced as cars became more efficient and the number of electric and hybrid vehicles increased. Overall, there are many controversies surrounding the use of fuel pricing, since increasing them excludes social groups with low income from car use, increasing social inequality.[44]

4.4.2.2 Subsidies

For urban trips, the main alternatives to cars are walking, cycling, taking a bus and other forms of public transport, therefore, improving the environment of these alternative modes of urban mobility is essential to reduce car use. However, reducing the number of cars in circulation can also be achieved by encouraging the better utilization of cars by shared mobility.

Car sharing (also known as carpooling or ridesharing) is the process of two or more people sharing a car and travelling together and share the effort of driving and/or the cost of travel. The implementation of car sharing systems is supported by a strong political interest and, on the other hand, market demand. The political motivation may be the aim of reducing one-person car use, thereby congestion and harmful emissions. Economic incentives, such as exemptions from parking fees and road pricing, can contribute to promote shared mobility initiatives. Properly integrated public transport and car sharing systems can synergistically strengthen each other. However, the pricing of car sharing systems should take into account public transport charges in order to not

[42] Tochtermann (2008): Congestion Charging – A tool to tackle congestion in UK cities? Centre for Cities
[43] Hanly, et al. (2002): Review of Income and Price Elasticities in the Demand for Road Traffic – FINAL REPORT. Centre for Transport Studies, University College, London
[44] Wang, Chen (2014): Impact of fuel price on vehicle miles travelled (VMT) – Do the poor respond in the same way as the rich? Transportation, 41, pp. 91–105

reduce the modal share of public transport. Prior to the introduction of a car sharing system, assessing the number of potential users is essential, as a larger group of members increases the likelihood that an individual user will find a suitable match for their journey. For this reason, marketing and public awareness raising campaigns are important factors to successfully implement car sharing systems in cities.

An important alternative to using cars and other personal motorized vehicles is public transportation. **Fare-free** (zero fare) **or partly free public transport** can encourage the use of it, reducing car use. The benefits of free public transport include the following:

- the system is more accessible and fairer to low-income residents, which can be beneficial to social inclusion, businesses and job seekers;
- fewer cars in circulation means less traffic and congestion, faster average travel speeds, fewer traffic accidents and easier parking; and
- the decreased air and noise pollution from road traffic have positive environmental and public health effects.

Adelaide and Tallinn are good examples of how cities can promote the use of public transport: while Adelaide provides free public transport along certain lines, the whole system is fare-free in the Estonian capital. **Adelaide** (South Australia) has some free bus and tram services in the main central business district and free travel at out-of-peak times for Senior Card holders. **Tallinn** started providing free public transport to its residents in 2013. With this step, the city contributes to social equity and the measure became a significant incentive for many car drivers to use public transport instead. Indirectly, this results in a reduction in air pollution and noise in the city, and – in the long run – an improvement in the local living standards.

4.4.3 Evaluation and comparison of practices


low costs


fast implementation


smooth implementation


quick results


medium costs


requires more time


can incite some conflict


needs more time to work


high costs


time-consuming


significant opposition


longer investment

Name of practice	Cost-effectiveness	Time required for the implementation	Potential for conflict	Timeframe of benefits
Road pricing, congestion charges				
Education about the real costs of owning and using a car				
Fuel pricing				
Fare-free/subsidized public transport				
Incentives to promote shared mobility				

5 Encouraging walking – communication and awareness raising

5.1 Target groups

Since walking is a universal activity everyone is involved in from time to time, communication and awareness raising related to it should cover the whole population. This means that it is important to **formulate messages and use channels to reach as many people as possible** with the benefits of walking and the concept of a pedestrian-friendly city. Of course, we have to keep it in mind that there are **specific target groups** having more interest or stakes in certain aspects of walkability – reaching and involving them may require extra effort. The term 'pedestrian' itself covers a wide range of people with different backgrounds and walking habits (see the figure below):

- people travelling **on foot** (children, young students, adults, aged pedestrians – maybe with a cane, disabled people – e.g. with a guide dog – and runners/joggers);
- people travelling **on small wheels** (in-line or roller skates, skateboards, kick scooters and also parents with a stroller); and
- people with a **mobility impairment** (using mobility scooters, manual/electric wheelchairs, a walking frame, etc.).

24 Pedestrian subgroups

However, it can be seen from this list that beside the method of walking, there are other characteristics that can be used to delineate specific target groups:

1. **Age**
   Different pedestrian **age groups** have different needs and abilities. During their lifetime, young children without depth perception and requiring constant parental supervision first become young adults with more independence but also a sense of invulnerability, making spur of the moment – and thus dangerous – decisions (like darting through traffic despite a red light). Finishing their education, they transform into responsible citizens, active members of the urban transport flow, but as aging takes its course, they slowly lose their reflexes and some of their sensory abilities (vision, hearing, etc.). Traffic safety is important in every stage

of life, but the message can be different when talking to a rash high schooler or an older – and maybe slower – member of society.

2. **Marital status**
   Here, the decisive thing is not if someone is single or married – simply put, people perceive and judge urban mobility differently when they have children and when they do not. **Families** form a separate category within the general population: whether parents allow their children to go to school on foot (or on a bicycle), or rather take them by car in spite of the small distance, can determine both the morning and afternoon traffic burden on a city – and making this decision highly depends on several factors an awareness raising campaign can influence.
3. **Physical abilities**
   Young children, older adults and **people with disabilities** have different needs as pedestrians. They also walk a lot, but depending on their age, type of disability and level of impairment they need carefully designed facilities that eliminate barriers – their awareness of the risks and the help available to them, and others' awareness of them are all important elements of a walkable urban environment: cities need to provide walkability for all.

We also have to consider the fact that – as important parts of any local traffic – **drivers and cyclists** should be targets of certain kind of communication activities, too. In the case of the former, they pose a significant risk to pedestrians and must be urged to be considerate of them, but they can also be persuaded to cut back on their use of motorized vehicles in favour of cycling or walking, for example. At the same time, the peaceful and safe coexistence of pedestrians and cyclists – who sometimes even use shared spaces – requires the latter to become another target group on the list that should be addressed.

Last but not least, it would not be smart to forget that every intervention and adaptable practice discussed in Chapter 4 can only become a reality if the local **decision-makers** are convinced that they will make the city more liveable and benefit society (and the economy) in several ways. Therefore, reaching and including them first and foremost is a crucial step to acquire a foothold for the 'pedestrian-friendly city' concept among the given city's leadership. If their commitment is secured, they can actually help convince and inspire the general population and the specific target groups, resulting in a society that values the active and environmentally friendly modes of transport and also strives to accommodate them in the urban mobility system.

5.2 Key messages

The previously identified target groups determine the message we want to disseminate. We can distinguish between two major categories:

1. General population
   The main goal of this communication area is **raising awareness about the benefits of walking, encouraging people to travel safely and be more tolerant toward others**, etc. (some of these will be discussed in detail in the next paragraphs).
2. City officials, decision-makers, urban planners

The objective to reach in this case is their approval and acceptance of walkability as a key element of sustainable urban mobility. To achieve it, **they have to be informed and convinced of the – macroeconomic – benefits of a walkable city** discussed in **Chapter 2.4.2** (economy, health, environment and society).

Within the first category, key messages can be grouped based on the key requirements of walkability (useful, safe, comfortable and interesting).

Useful walk – Dense, mixed-use neighbourhoods combine residential, commercial, cultural, institutional and industrial functions, allowing people to **live, work, play and shop in one place**. When we question why residents in a city are not walking, however, the answer is often that it takes too much time. Empirical research from recent years points out that when people try to estimate physical distances in time, they often come up with false results – a time requirement of a 500-meter or 1.5-kilometer walk is overestimated which discourages them from walking. One way to correct this misconception is to communicate clearly and remind people that **they are not too far from the places they go to almost every day**.

Safe walk – Efficient and safe urban transport and the effective coexistence of different transport modes requires a high level of tolerance and empathy from the participants, but also accurate knowledge about the local rules of traffic. The key messages in this topic are concerning **traffic safety and what can the given target group do about it**, for example:

- *"Look up from your phone when you cross a road, even if you use a pedestrian crossing."* (for high school students);
- *"Be aware of your surroundings – children and families frequent this area."* (for drivers, near schools/playgrounds);
- *"Stand out – wear bright-coloured clothes or reflective gear."* (for everyone out after dark); etc.

Comfortable walk – Beside a carefully maintained pedestrian infrastructure, the existence and efficient operation of 'pedestrian accelerators' – mostly biking and public transport facilities – provides a basis for uninterrupted and smooth traffic flows. Driving a car suggests a certain status in society – taking a bus or riding a bike should be elevated to the same level through similar opinion-forming methods, raising awareness about the importance of intermodality. The key messages here can be that:

- **public transport is an efficient and comfortable way of reaching any destination in a city** – every edge it has over car use (like the lack of congestions due to separate bus lanes) should be emphasized; and
- **biking is both health- and eco-friendly** – it offers time for exercise during the necessary day-to-day activities to those who cannot find the time otherwise and reduces an individual's environmental footprint.

Interesting walk – Another way to attract people to the street is providing entertainment and a visually pleasing scenery. Regular events and a rich street life are guaranteed to fill previously empty corners of the city. **Developing engaging neighbourhoods** should be promoted to the citizens as **a community-driven project** – creating street art, public gardening and other joint activities can send the message that **the city is every residents', and everyone should do their part in making it attractive**.

As mentioned at the beginning of the chapter, the benefits – both the individual and macroeconomic – of walkability were detailed in a previous section of the document. Overall, the important takeaway is that **investing in walkability for cities and devoting time to walk for citizens have useful externalities economically, physiologically, environmentally and socially**.

It is important to note that sometimes the message is about a specific development plan. Even if a walkability intervention has several benefits, the lack of information makes people reluctant to accept the changes, and also more prone to disagree and complain. To prevent this, there are two important questions that must be answered in every case:

- **What are the benefits of the project?** (i.e. more free parks in the city, wider sidewalks, new businesses opening on a pedestrian-only street, a safer city and a healthier environment); and
- **What will the temporary inconveniences be?** (e.g. different traffic regulations near the location, noise during the construction period).

5.3 Communication channels

Communication channels are the delivery vehicles for the key messages – these can include both traditional and new media (we indicated the ones that are the most useful in the topic of walkability with bold letters):

- **publications**
- radio and television
- **billboards**
- telephones
- direct mail
- **face to face meetings**
- **websites/blogs**
- **social media**
- **e-mail**
- video-conferencing
- **mobile**
- search engine optimization

25 Traditional Media vs. New Media channels

Source: Techfunnel (2018)

We can group these channels into three different categories based on the approach we want to take when addressing the respective target audience:

1. **Interpersonal**
   If we want to **reach as many people as possible** with the same message – not to personalize it, make direct contact or get immediate feedback, just disseminate it –, **publications** (i.e. opinion papers on the importance of walking in a local newspaper, books about the benefits of walkability), **billboards** (i.e. traffic signs indicating the walking distances of important destinations nearby) and **websites/blogs** (i.e. providing news about the city's current development plans) can be used effectively.
2. **Personal**
   If we want to take a more personal approach, there are several direct means of communication available which enable regular contact between the sender and the receiver. The key requirement here is the **segmentation of a wider target group based on individual interests** which can be gathered by online questionnaires and other data mining methods. Some of the possible channels are **e-mail**s (i.e. personalized newsletters) and **mobile**s (i.e. a smartphone app that can be used to set walking goals and give personalized messages based on the user's walking habits).
3. **Interactive**

If we can only choose one approach, this is the one to take – to truly engage the residents of a city, discover what will generate their interest and create powerful content, interactive communication channels must be used. Beside the fact that **they have more impact on people's behaviour and make them relate more to the given topic**, **community-driven development** – an important and powerful tool of walkability investments – is only possible by utilizing them fully and efficiently, thus *"strengthening the local community groups, facilitating their access to information and promoting an enabling environment"*.[45] The channels most often mentioned as interactive are **social media** (i.e. Facebook groups, Twitter facts about the benefits of walkability, YouTube videos about a city's lesser known but nevertheless interesting destinations) and – of course – **face to face meetings** (i.e. community events, street actions, walkshops).

Regardless of the chosen channel(s), there are a few important general facts that anyone with a plan to deliver an awareness raising campaign focusing on walkability have to keep in mind:

- It is not a smart idea to organize a campaign based on only one communication channel. To reach an ideal saturation level among the population, **the message has to be disseminated by at least three different ways**: in the case of a community event (a face to face meeting), it would be prudent to start a Facebook site, too, to promote the event and publish a news article with pictures/videos in a newspaper in printed form and/or in a blog afterward. It is also important to **mix traditional and digital channels**.
- **The target group** we want to reach **determines the communication channels** we will use – we have to analyse our audience's everyday habits to identify the channels most likely to succeed in catching their attention.
- A communication campaign always has at least three phases – the planning phase, where the previously detailed decisions (analysing the target group, drawing up the message, choosing the channel, etc.) take place; the implementation phase, where the dissemination itself happens; and a third phase people often forget about – **evaluation**. For every chosen channel, we must assign **measurable indicators**, so we can appraise the success of our campaign with quantifiable means. These indicators can be independent from us (e.g. the number of likes on Facebook), or dedicated methods (e.g. a satisfaction survey after a walkability intervention).

5.4 Practices and tools

Communication strategies consist of the types of actions we do to get our message in front of our target group using the most appropriate channel. Based on the Good Practice Catalogue and the previous chapters of this document, the following practices and tools can be distinguished. (We have to note that this is a non-exhaustive list.)

[45] Matous, Petr (2013): The making and unmaking of community-based water supplies in Manila. Development in Practice, Volume 23, Issue 2, pp. 217-231

Walkshops – Walkability walkshops (their methodology was developed during WP3 of the CityWalk project) bring together people from a specific neighbourhood to jointly look at the level of walkability and the obstacles preventing people from walking more. The suggested programme (introduced in the Walkability Planning Guide) starts with a short interactive presentation about walkability, answering the "what's in it for me" question. Then, the facilitator starts the walk and supports the group during the assessment process. The participants record their scores by each criterion (sidewalks, pedestrian crossings, street furniture, etc.), which the facilitator's assistants use to calculate the average value for each of them. In a quick feedback session, the most important problems and possible solutions are discussed in groups, focusing on the question "What should be done to improve walkability in the neighbourhood?". Overall, walkshops contribute to:

- **information collection** – the organizers will get to know the current opinion of the local residents about their neighbourhood's walkability;
- **awareness raising** – the event presents a chance to promote the active modes of transport, especially walking, and to plant the importance of a walkable city in the participants' minds; and
- **engaging the local community** – discussing the city's traffic problems and finding solutions jointly with the citizens contributes to community-driven and participative planning.

Walkability events – In **Chapter 4.2.2.4**, the possibility of Park(ing) Days – when citizens, artists and activists collaborate to temporarily transform metered parking spaces into public places (parks) – came up as a way to highlight the burden of parking cars in urban areas. Similar events, localized to a specific area of the city, can also emphasize the importance of walking, cycling and reducing car use. **Closing off a small area or popular street from motorized traffic and making it accessible only to pedestrians** for a day or the duration of a public event can attract people from all over the city and presents an opportunity to teach them about the concept and benefits of walkability while also entertaining them with various programmes – or just leave them to their own devices and give them a place for **creative community-based activities**, organized by the citizens themselves (like in the case of the Freedom Bridge in Budapest, Hungary, open only for pedestrians during four weekends of the summer).

26 Freedom Bridge (Budapest, Hungary), closed from motorized traffic

Source: **Ádám Leéb**

Walking days – There are numerous annual events dedicated to various causes (Earth Day on 22 April, International Day of Forests on 21 March, World Water Day on 22 March, etc.) – why not **assign one day in a year locally to walking**: some parts of the city can become pedestrian-only zones for a day, but a series of programmes can also be held in several locations to demonstrate support for the active and environmentally friendly modes of transport. If choosing a specific day proves to be difficult, the events can be organized not just once in a year, but **any day the city's leaders point to** – the important factor is their **regularity**.

Campaigns based on billboards/signs – A less interactive method – but still effective – can be an awareness raising campaign utilizing posters, brochures, billboards, traffic signs or even some unconventional materials (e.g. messages printed on chocolate or gum wrapping paper). The key characteristics of this practice are:

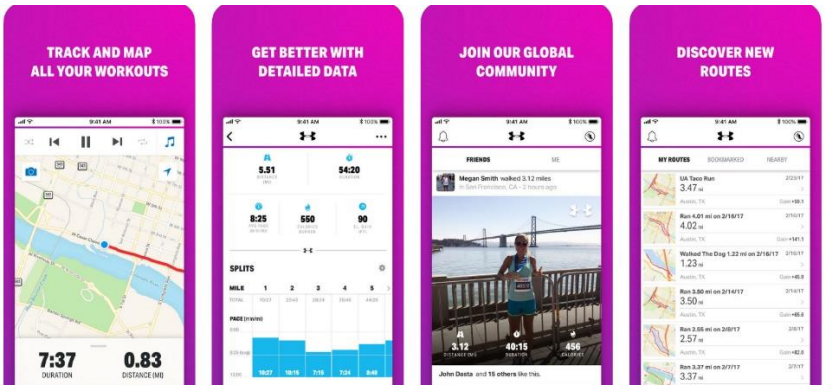
- a **short message**, which therefore has to be creative, funny and attention-grabbing enough to reach the target audience before they walk away, turn their head or throw it away;
- a **fast implementation period** – an initiative like this should not take too long: its main advantage is its refreshing, original nature and 'cool' factor which a dragged-out campaign only negates; and
- a **hardly quantifiable outcome** – by definition, this method cannot be used as a solitary way to promote walkability, otherwise, its outcome will come into question: it is best to use it in collaboration with other, more interactive and easily evaluated practices.

27 Traffic signs that can catch people's attention and interest

Source: AFP; Viumbe, LLC; A² Be Safe; Walk [Your City] Inc

Gamification – *"Gamification is the application of game-design elements and game principles in non-game contexts."*[46] The most popular and useful application of this method in the field of walkability is **exergaming** (or gamercising): the technology tracks the movements of an individual and promotes an active lifestyle using various ways. Mobile phone apps such as Zombies, Run! – where the players go through missions during which they run, collect items and listen to audio narrations – and Pokémon GO are AR (augmented reality) exergames. But we do not have to only think in complicated and expensive-to-produce video games – **an easy-to-make (and use) local fitness app** can be just as effective: it can gather readings about the route, distance and time of a walk (and the calories burned), and also include a social component to create maps, share them with friends and send messages. The city may even organize **contests** based on the length of walking, honouring the most dedicated residents.

28 Map My Walk app by Under Armour



Source: **Under Armour, Inc.**

[46] Huotari, K.; Hamari, J. (2012): Defining Gamification – A Service Marketing Perspective. 16th International Academic MindTrek Conference, Tampere, Finland