CityWalk

Baseline Study

June 2017

Final version

Table of Contents

1 Introduction

1.1 The CityWalk project

1. Figure 1: The CityWalk project (Source: own elaboration)

Sustainable urban mobility is an issue of increasing importance in cities around the world. With a steadily growing urban population intra-urban mobility needs are on the rise, resulting in a continuous increase in the number of cars moving around in city streets. Our still very much car-oriented cities struggle to cope with this mobility pressure – and its various negative consequences. Car-oriented urban transport systems lead to various negative environmental impacts, health problems, and scarcity of quality public spaces in cities.

Recognizing this problem cities around the world look for solutions enabling efficient and sustainable urban mobility.

17 partners from 9 countries - Slovenia, Hungary, Slovakia, Croatia, Romania, Bulgaria, Czech Republic, Austria, and Serbia - started working on the CityWalk project – "Towards energy responsible places: Establishing walkable cities in the Danube Region". Their project – aimed at establishing walkable cities in the Danube Region - has been granted over 2,2 million € in the frame of the Interreg Danube Transnational Programme. CityWalk project helps cities in the Danube Region to reduce emissions, noise and to become safer, better places to live, by increasing the role of more sustainable forms of mobility in the urban transport mix, especially active transport forms – like walking and biking. To achieve that, the focus of the project is to improve key conditions of walkability.

The CityWalk consortium covers an extensive part of the Danube area. The cooperation of 17 partners from 9 countries enables the creation of common practices and methodologies in the field of sustainable urban mobility and transport. Project CityWalk relies on a balanced group of local, regional and national partners (public and academic) – including medium-sized cities, development agencies, research organizations as well as a chamber of commerce and industry.

Besides the essential accompanying project management activities (Work Package – WP – 1) and communication activities (WP2), the project is structured into 3 walkability-related work packages.

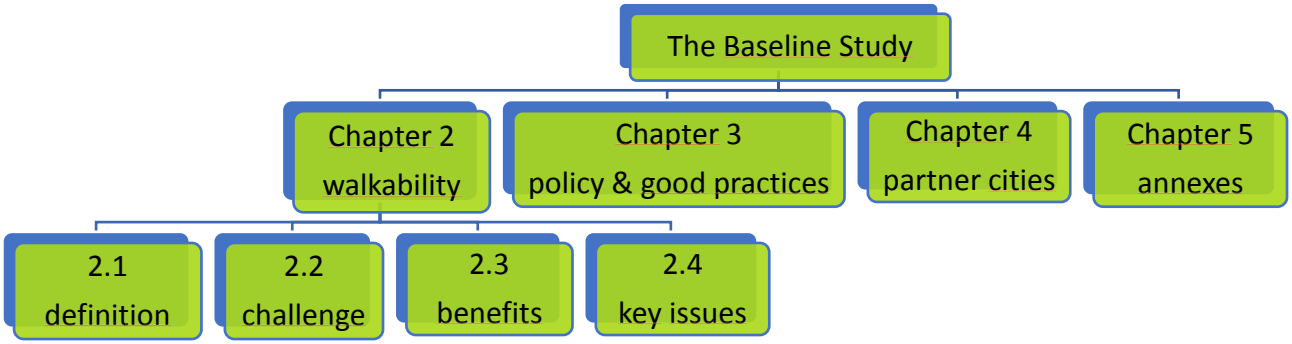
- WP3 (Walkability Planning) – is aimed at establishing the professional context of the project activities and delivers tools that enable partner cities to prepare their walkability plans. The main deliverables under this WP include a Baseline Study (this document), supported by a set of infographics and a presentation material; a Practical Guide on Walkability Planning accompanied by a 2-day training course; finally, using the methodology presented in the Guide, the partner cities will prepare their pilot walkability plans.
- WP4 (Walkability Toolkit) delivers a useful toolkit that partner cities (and other cities within - and outside - the Danube Region) can use to quickly and efficiently improve the key conditions of walkability. The tools to be delivered will include a Walkability Guidebook, presenting specific measures that improve walkability, together with a walkability good-practice catalogue; a walkability index that enables the measuring the level of walkability in different urban neighbourhoods; and an online walkability assessment tool and a related mobile application.
- WP5 focuses on practical measures, that – relying on the methodological tools developed in WP1 and WP2 – will result in specific walkability improvements in partner cities, and in the medium term also in other cities of the region. Small scale pilot actions will be implemented in each partner city to improve the key conditions of walkability; the toolkit developed in WP4 will be "test-driven" in the partner cities and fine-tuned based on the test results; finally, local,

national and EU level policy proposals will be prepared to significantly improve walkability in cities.

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: 01. 12. 2016	**End date:** 31. 05. 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, Serbia (RS) • Nyíregyháza Industrial Park Ltd. (H)	

1. Table: Project at a glance

1.2 The Baseline Study



2. Figure: The Baseline study (Source: own elaboration)

This document is the Baseline Study – the first deliverable as part of Activity 3.1 ("Establishing State of the Art") under Work Package 3 ("Walkability Planning").

To improve walkability and to facilitate smart integration of sustainable transport modes in urban areas, it is crucial to have a clear view on the current state of the art regarding the issue, including results of related scientific research, definitions of key terms, activities being done by various cities in this field across Europe as well as outside Europe, documented best practices. In addition, it is also important to understand and present how the development of sustainable urban mobility integrates with other policy areas in urban development. Finally, we also need to clearly identify the current state of affairs - policies, priorities, plans - in the cities represented in our partnership.

The Baseline Study plays a crucial role in this process. Its main purpose is to create a common understanding and level playing field among all the partners regarding the context and key issues related to walkability. Being one of the first deliverables, the Baseline Study will bring all partners involved in the project to the same level of initial knowledge and information at an early stage of project implementation. It also sets the scene for future readers not involved in the project.

In addition to the Baseline Study document, the key findings, conclusions will also be presented in other formats, more specifically, a presentation and a set of infographics. These tools then can be used for multiple purposes: partners can use them to present the findings to local stakeholders, and the partnership can also use these tools to support the dissemination process (presentations in conferences, blog articles), as well as to establish a solid foundation for presenting the policy proposals.

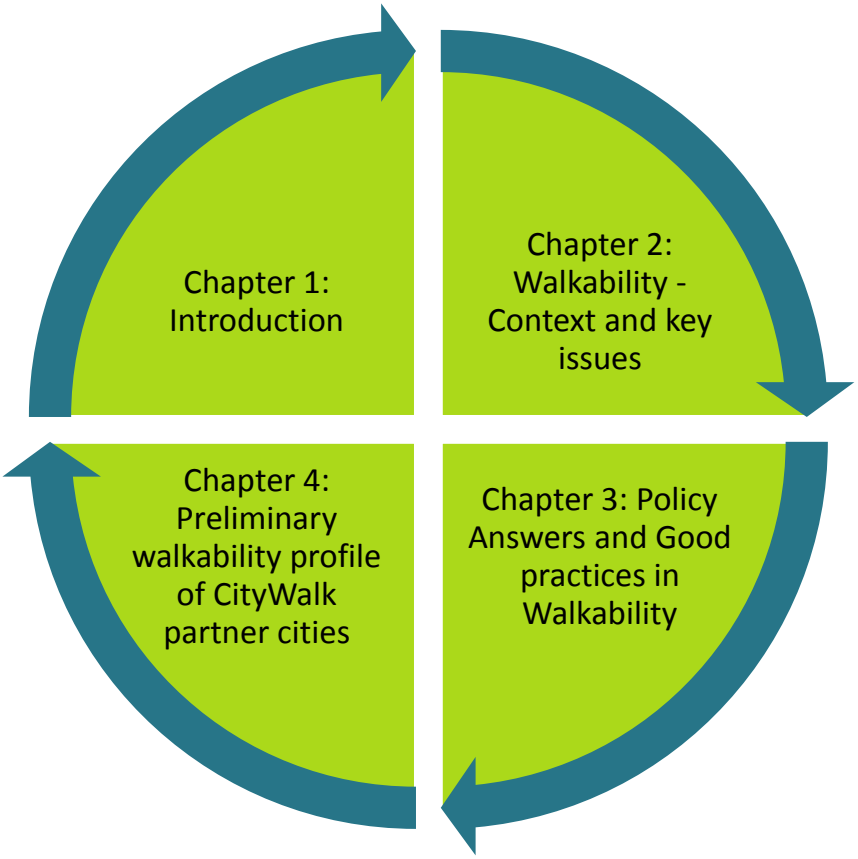
By reading the Baseline Study carefully, partners will:

- have a good understanding of the concept of walkability;
- learn the most important negative consequences of dominantly car-oriented urban transport systems;

- understand the most important benefits of better walkability in our cities;
- know about the key issues, challenges related to developing walkability in urban areas;
- have an initial overview of the types of interventions that can contribute to improving walkability;
- learn basic facts about each-others' cities and their walkability challenges, goals and plans.

The Baseline Study has been designed to be concise, easy to navigate and easy to understand for the partners, as well as for future readers. Below we provide a summary overview of the structure and the main chapters of the document.

The Baseline Study consists of 4 main chapters, supported by various annexes.



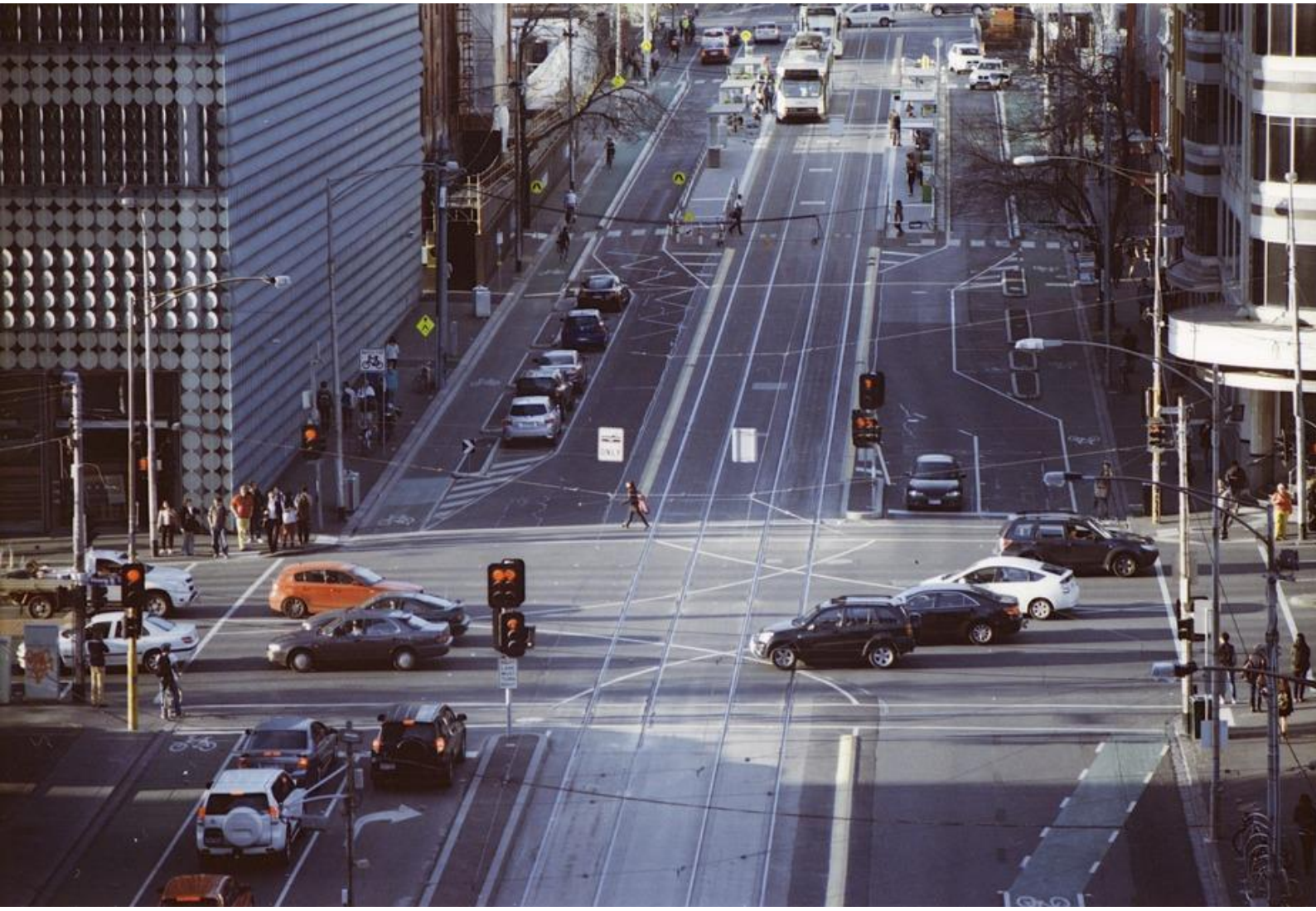
3. Figure: The main parts of the Baseline study (Source: own elaboration)

- **Chapter 2** is the core part of the Baseline Study – it presents a thorough **overview of the topic of walkability and its context**, with a focus on the following elements:
    - **Chapter 2.1 defines walkability** and presents its importance in sustainable urban mobility.
    - **Chapter 2.2 describes the challenge** - what is the reason why cities (in the Danube Region but also elsewhere) need to think about walkability – and in sustainable urban mobility? What are the negative consequences of car-oriented developments? What if we do not act NOW?

- **Chapter 2.3 presents the most important benefits** of walkability. It explains what makes walkability (and active transport) the optimal strategic choice when it comes to the future of urban mobility. It also introduces specific and tangible benefits of walkability – supported by figures and research results where possible.
- **Chapter 2.4** highlights the key issues related to walkability. Important topics like measuring walkability, analysing its costs and benefits, planning for walkability, land use and street design, establishing the optimal transport mix in cities, raising awareness and motivating modal change, dealing with counter-interests are all covered. At the end of this chapter the most important conclusions are summarised and the choice of CityWalk's focus areas will also be justified.

- **Chapter 3** provides a quick **glance at existing good practices** in walkability. CityWalk project will produce various tools and methodologies that can provide practical help to any city in the Danube Region that decide to improve walkability. One of these tools will be a detailed and structured good practice catalogue. The project will also result in a set of national and transnational policy proposals. Nevertheless, we deem important to present an initial list of good practices from the countries represented by the partners.
- **Chapter 4** presents the preliminary **walkability profile of CityWalk partner cities.** To help partners to get to know each other (and other cities to better understand the partnership) a short profile of all cities represented in the partnership – but already from a walkability / active transport perspective – is included.
- **The Annex** includes a short introduction on non-city members of the partnership and the bibliography used in preparing the Baseline Study.

2 Walkability – Context and Key Issues



2.1 What is walkability?

Walkability IS	Walkability IS NOT
• a new word – it has been invented in the 20th century when cars completely took over our cities	• about creating entirely car-free cities
• about enabling and encouraging walking	• entirely about pedestrian infrastructure
• the promotion of active, environment-friendly and sustainable forms of transport over motorized transport	• an idealistic concept but a practical answer to urban challenges

2. Table: Walkability – what it is and what it is not (Source: own elaboration)

To discuss issues related to walkability, it is important to have a common understanding of what we mean by walkability. In this chapter, we present a possible definition of walkability.

Walkability in English is a relatively new word – for a long time walking in urban environments was natural, cities were "walkable" places, and walking was the most basic form of moving from one place to the other. From the beginning of the 20th century, however, cars gradually took over our cities and demanded more and more space, until cities became totally car-oriented places where people – pedestrians – became "secondary citizens". Cities were increasingly built for cars and not for people. Despite all these changes, every city travel still starts and ends with walking, even today.

Walking – together with cycling – is an active form of transport – mobility that comes from muscle power.

Walkability is the extent to which an urban area enables and encourages the movement of its citizens by walking. The concept of walkability also implies the provision of "competitive advantage" to walking over using motorised vehicles.

Walking in city environments goes hand in hand with cycling – another active form of transport, and with public transport – which in walkability context often referred to as "pedestrian accelerator". As a totally environment-friendly from of transport, walking is the most basic and most important ingredient of sustainable urban transport systems.

In his book "Street Smart – The Rise of Cities and the Fall of Cars" Samuel I. Swartz identifies 4 main aspects of sustainable urban transport systems:

1. **Density** and connectivity – to make active forms of transport – walking and cycling – an obvious and practical choice for city dwellers.
2. **Access** to multiple methods of transportation – and a variety of points where the different modes intersect.
3. **Intelligent** transport systems that take advantage of advanced ICT solutions.
4. Transport networks and services that are **accessible everywhere, all time and by everyone**.

This definition clearly puts walking (together with cycling) in number one position when it comes to sustainable urban mobility.

When defining walkability, it is essential to highlight a couple of key issues:

- While walkability advocates (like ourselves, CityWalk partners) clearly aim at reducing car traffic in congested urban areas and increasing the role of active forms of transport (together with public transport), **improving walkability is NOT about creating a totally car-free future of cities**. It would be neither desirable, nor practical; cars (though probably more and more electric and self-driving cars) will long have an important role in the urban mobility mix.
- **Walkability is much more than** just fabulous, (expensive) nicely maintained **pedestrian infrastructure** – if that were the case, developing walkability would be a simple affair: provide the perfect infrastructure and people will walk. This is important to stress, as infrastructure developers tend to hijack any fancy urban development concept and use it as an argument for spending money again on building something. While infrastructure is certainly important, there are other aspects: like for instance the city fabric – the everyday collection of streets, blocks and buildings -, the already mentioned density, the attitude of people, and many other things.
- Finally, various urban developers still believe that walkability is just another idealistic urban development concept, but they are wrong. **Improving walkability** is a fairly simple and **very practical answer to a multitude of urban challenges**.

2.2 The challenge

4. Figure: The challenge (Source: own elaboration)

2.2.1 Urban mobility at a turning point

Mobility - and urban transport systems enabling mobility – is an essential ingredient of city life. Good urban transport systems need to ensure that people (labour force and consumers) and goods move between different locations within the city. Urban economy, productivity, social life – basically the entire life of cities - depend on how efficiently and effectively urban transport systems operate. And, as more than 50% of the global population (steadily growing) lives in cities even today, this is a truly global issue.

Even today, over 1 billion people use some form of urban transport daily – this means that urban transport is by far the most used transport form.

Urban transport systems are at a tipping point: they struggle to cope with the demand even today (especially in bigger cities, but increasingly in small and medium sized cities), and, considering the expected growth of urban population, their challenges will further exacerbate already in the near future.

While the increasing challenges of malfunctioning urban transport systems can be traced back to various causes – the core problem is the strong dominance of the automobile in our cities. The transport systems in most of the cities heavily rely on car use. In the 20th century cities have been built (and rebuilt) to create ideal conditions for cars – cars simply took over our cities. No surprise – as car use has various clear advantages, including total autonomy (on-demand mobility), comfort and convenience, speed, as well as less tangible factors like status and pleasure. While some of these advantages can be provided by other forms of transport, only cars give us the total package. So, when given the choice, most individuals still have a preference for using the automobile rather than other forms of transport. That is why car ownership is still on the rise globally, and mainly in urban areas. And while this may be good news from a short-term economic development perspective, it is very bad news for urban transport systems – and urban life as a whole.

Beyond the unquestionable advantages of car use listed above, there are various other factors contributing to the increasing demand for cars; two major factors need to be mentioned here.

1. **Underpricing.** Car owners all over the world tend to complain about the high costs (price of the automobile, fuel prices, insurance, taxes, etc.) of owning a car. And while car ownership is truly expensive, in reality, people still not bear the total costs of car use. Most road infrastructure in cities are considered public service – thus they are subsidized, drivers are not required to pay for road use. This is a classic case of the "Tragedy of the Commons" - when a community resource is free to use, it tends to be overused.
2. **Faulty planning and regulatory practices.** Traffic engineers in cities constantly fight against congestion on city roads. For a long time, they did this (and some time they still do today) through spending public money on building more lanes, more roads, and more parking facilities. At the same time, given the scarcity of public money, they ignored other transportation alternatives. Also, local building regulations in many cities impose minimum standards regarding roads and the provision of parking services. Thus, city planners, regulators and traffic engineers work closely (hopefully unknowingly) to maintain car dependency of our cities.

Car dependency of cities is not just an abstract notion – its level can actually be measured quite well. Key indicators to measure car dependency include the level of vehicle ownership, per capita motor vehicle mileage and the proportion of total commuting trips made by car. A city can be considered highly car dependent when more than three quarters of all commuting trips are done by using car.

As presented, most urban transport systems struggle to deliver their main function in a (financially and environmentally) sustainable manner. In the following chapters, we highlight the most important challenges facing urban transport systems. These challenges are mostly interrelated, still they need to be discussed as separate issues.

2.2.2 Traffic congestions and parking problems

The first things that come to the mind of city dwellers when discussing urban mobility problems are traffic congestions and difficulties to park. Especially in bigger cities, people spend more and more time sitting in traffic jams, and finding a good parking place near their destination is also increasingly difficult. The core of the problem is, that the rapid motorization, the diffusion of cars has increased the demand for related infrastructure – roads and parking places - within cities. However, the supply of

necessary infrastructure has had difficulties to keep up with the steadily growing demand for more and better infrastructure. The reasons have been manifold:

- Infrastructure development cannot be done from one day to the other, while the proliferation of automobiles has been a rapid process – thus the **supply of infrastructure has always been lagging behind**;
- **Funding problems**: creating quality infrastructure for cars is expensive – and as the provision of roads is considered a public service, cities often have not had the necessary means to develop the roads and parking facilities as quickly as it would have been desirable – even though road development normally enjoys preference over improving the conditions for other forms of transport.
- **Ignorance of "induced demand**". Traffic engineers have sophisticated algorithms to calculate the necessary extent of road development to cope with the increased (and precisely quantified) traffic demand. These algorithms, however, do not consider the additional demand induced by the road development itself. Whenever travelling becomes easier, quicker, congestions are eliminated, more people decide to use cars and the demand increases as a direct consequence of the development itself. As a since forgotten traffic engineer brilliantly put in the seventies: "*Curing congestion by adding more lanes is like curing obesity by buying bigger pants*." However crazy it may sound, **roads cause traffic**.
- **Physical limitations**. Unless a city is not built from scratch – which is very rarely the case nowadays, space available is very limited. New roads, wider roads or parking places can mostly be created at the expense of other functions: pedestrian areas, public spaces, parks, green areas or spaces potentially available for buildings. In many urban areas there is simply no more space available. (Parking spaces occupy 24 % of the area of US cities, and in some cities there are 3 or even more parking spaces per car![1])

Congestions and parking problems are closely interrelated. People drive around, looking for parking places (referred to as cruising), which creates unnecessary additional traffic, contributing to congestions. This is an argument motorists often use to push for more (and preferably free) parking spaces. The problem is that ample (especially free) parking encourages people to use their cars, which again contributes to congestion.

[1] Marsanic, Robert – Krpan Ljudevit: Contemporary issues of Urban Mobility; December, 2015.

3 Longer commuting

One of the biggest generator of city traffic is commuting – people travelling between their home and their workplace or school at the beginning and at the end of the work / school-day. Zoning, suburbanization, housing affordability issues are all factors that result in increasing travel demand. Growing distance between the residence and the workplace of people increases travel time and creates more congestions, which in turn further increases travel time. People spend more time travelling – sitting in their cars or using public transport.

Longer commuting can be associated with various negative consequences. Commuting – especially commuting by car in rush hour traffic every day – is something most of the people despise. While most people love driving, they hate commuting. According to Princeton psychologist, Daniel Kahneman's research commuting ranks as people's least favourite regular activity. One study even found that "a 23-minute commute has the same effect on happiness as a 19 per cent reduction in income".

Longer commuting also means that people have less free time for physical activities, thus has negative health consequences. In fact, commuting and spending time in congestion is stressful; studies concluded that after commuting subjects had higher blood pressure, higher heart rates and lower frustration tolerance.

Also, as commuting time cuts into people's free time, those who spend longer time commuting are less likely to participate in community activities.

4 Public transport failures

Public transport is an essential ingredient of any urban transport system. A good public transport system can move people more efficiently, with much lower per capita emissions, and takes away significantly less space from other city functions than automobiles. Still, despite all these benefits we can see very few truly well-functioning public transport systems in car dependent cities. Most such systems are overused in peak hours, while massively underused – even empty – in off-peak hours. They can run efficiently in and around the city centre – dense areas of the city – but are not efficient at all farther away from the centre, in less dense suburban areas.

Low number of users in off-peak hours and in less dense urban areas make the service financially unsustainable, and most public transport companies cannot cover the operating and capital costs from their incomes. In response, companies provide less regular services and spend less to develop their fleet and other aspects of the service they provide. Lower quality of services and less regularity then drive away those users who have other alternatives, and this results in a downward spiral, further deteriorating the positions of public transport.

Despite all these issues public transport still has an important place in sustainable urban transport systems, but its business model, financing, service quality and integration with other forms of urban transport need to be drastically reimagined.

4.1.1 Ignorance of non-motorized transport

Non-motorized or active forms of transport – walking and cycling – are the most basic forms of moving around in cities, using only muscle power. They are environmentally friendly and healthy ways of mobility, that requires only basic and (as compared to cars) inexpensive infrastructure. However, for a long time, traffic engineers have only designed local systems that provide ideal conditions for car transport, almost completely ignoring the needs of pedestrians and bicycles. Besides, as cars demanded more and more space in our cities, this increasing demand was met by taking away space from pedestrians – reducing sidewalks, public places and parks to give mores space to cars.

In addition to space and infrastructure problems, intense car traffic has drastically limited the flow of pedestrian and bicycle traffic and increased the risks of accidents.

In recent years the number of cities applying more sustainable practices in developing their urban transport systems has constantly expanded: more and more cities take steps to drastically reduce the number of cars and increase the role of active transport and public transport. To achieve that, these cities increasingly invest in high quality pedestrian and bicycle infrastructure, and spend less on infrastructure enabling car transport

This is a welcome change that needs to take place in every city that intends to establish a sustainable urban transport system – and our project provides arguments and practical advice on how to increase the proportion of active transport – primarily walking – at the expense of car traffic in cities.

4.1.2 Losing valuable public space (and activities)

Urban streets had served for centuries as public spaces used by citizens not only for mobility, but as important meeting points where people can spend time together and socialize. Markets, street

vendors, parades were important parts of everyday street life, but as cars demanded more space, these activities gradually disappeared from streets, simply because there wasn't enough space any more – sidewalks became ever narrower until there was hardly enough space even for pedestrians to move around unimpeded. In addition, cars demand space not only when they move, but also when they stand still – and they are stationary quite often: it is estimated, that an average car spends 95% of the time idle. Increased car traffic resulted in increased need for parking spaces, and parking places were often created at the expense of public places, parks and squares – valuable city space. In fact, Donald Shoup, UCLA urban planning researcher claims that "The cost of all parking spaces in the United States exceeds the value of all cars and may even exceed the value of all roads,"[2]

Favourable conditions for cars encouraged even more people to drive – which reduced pedestrian traffic and the opportunities for street encounters, social interactions.

4.1.3 High maintenance costs

To properly serve the increasing car traffic in urban areas cities had to build more, wider and better roads. With more extensive road network, however, they face significantly higher maintenance costs just to keep the existing level. Roads are expensive to build – and expensive to maintain. In addition to the repair and maintenance costs there's also an increasing (and continuous) pressure to upgrade to more modern infrastructure.

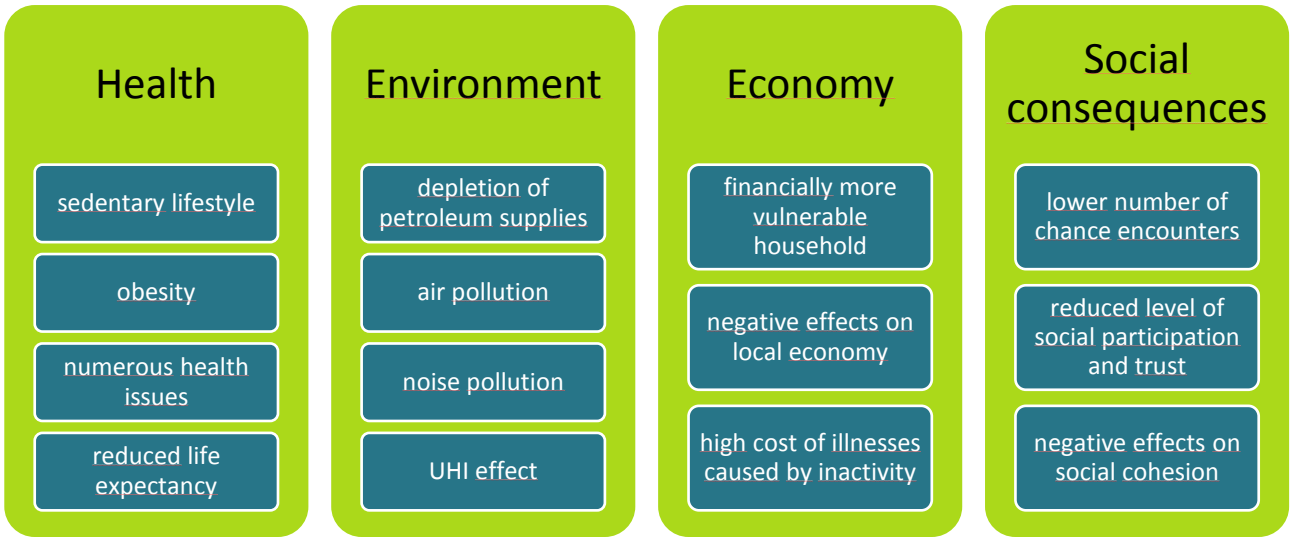
Drivers take quality roads for granted, although they do not pay for the use of the infrastructure. This means that the entire community – not just car owners but also those who walk or use public transport - contribute to the costs of road development and maintenance equally.

Road development, repair and maintenance costs became so high in some cities that often they decide to delay maintenance activities – but this simply leads to significantly higher future costs while also increases the risk of failure.

Thus, most cities struggle even to meet the development and maintenance need of the existing road network, let alone spending on other – increasingly important - elements of the local transport system, like pedestrian and cycling infrastructure or public transport.

[2] Shoup, D. 1999, abstracted from Journal) *Instead of Free Parking:* http://shoup.bol.ucla.edu/InsteadOfFreeParking.pdf

4.2 The negative consequences of malfunctioning urban transport systems



5. Figure: The negative consequences of malfunctioning urban transport systems (Source: own elaboration)

There are various negative effects of not properly functioning, unsustainable urban transport systems on the health of citizens, on the environment, on the local economy as well as on social life in the city. In this chapter, we summarize the most important negative consequences.

4.2.1 Health

Living in cities per se is not unhealthy. Living in car oriented cities, however, has a surprising amount of direct negative effects on the health of citizens. Many of the health-risks are the consequence of sedentary lifestyles: people spend most of their time sitting, and physical inactivity has serious negative consequences. Simply put: people drive, use a car, even when they could easily walk or use a bike to reach their destination within the city. Being sedentary and not meeting the physical activity guidelines[3] of 150 minute per week moderate physical activity (or 420(!) minutes for youth) make people gain unnecessary weight. As one study[4] demonstrates, "each hour spent in a car per day is associated with a 6% increase in the likelihood of obesity".

Overweight and obesity increase the risk of various health problems – chronic diseases (some of which are among the leading causes of death), including:

- High blood pressure (Hypertension)
- High LDL cholesterol, low HDL cholesterol, or high levels of triglycerides
- Type 2 diabetes
- Coronary heart disease
- Stroke
- Gallbladder disease

[3] WHO - Global Recommendations on Physical Activity for Health - 2011
[4] Frank LD, Andresen MA, Schmid TL.: Obesity relationships with community design, physical activity, and time spent in cars. 2004. American Journal of Preventive Medicine 27(2):87-96

- Osteoarthritis (a breakdown of cartilage and bone within a joint)
- Sleep apnea and breathing problems
- Some cancers (endometrial, breast, colon, kidney, gallbladder, and liver)
- Mental illnesses such as clinical depression, anxiety, and other mental disorders

In addition, obesity is also associated with significantly lower quality of life, and reduces life expectancy by an average of 3 years.

Obesity is unfortunately an increasing global epidemic, which is prominently present also in Europe, where – according to the WHO's research – 50% of people are either overweight or obese, whereas more than 20 % of people are obese. What's even more frightening is the fact that in the WHO European Region 1 in 3 11 year olds is overweight or obese![5]

And if we consider that „each additional kilometre walked per day was associated with a 4.8% reduction in the likelihood of obesity"[6], it is easy to see why improving walkability is probably our best possible strategy for "curing" obesity – and thus improving health.

4.2.2 Environment

Malfunctioning urban transport systems and high level of car dependency also have various negative environmental impacts.

Traditional internal combustion engine vehicles use fossil fuel and contribute to the gradual depletion of finite petroleum supply – all the while they only use 15 % of the fuel for creating kinetic energy – the rest escapes as waste heat. Not very efficient, indeed.

In addition, cars are major contributors to air pollution in our cities: one quarter of the EU's total transport emissions originate in urban areas. Globally more than 1 Billion people are subjected to air pollution every year, most of which is caused by vehicle emissions. Air pollution has numerous negative health effects: it contributes to aggravated cardiovascular and respiratory illness, added stress to heart and lungs (which must work harder to supply the body with oxygen), and can also damage cells in the respiratory system. Air pollution is especially dangerous for pregnant women, older individuals and children under age 14.

The estimated costs of negative health consequences of air pollution amount to about 2% of GDP in developed countries and to about 5% of GDP (!) in developing countries, where over 90% of air pollution in cities is caused by vehicle emissions.

Cars are also major sources of noise pollution in cities which is detrimental to nature and discourage human activities.

Last, but not least, motorised vehicles – combined with the thermal and radiative properties of asphalt paved roads promoting high heat release - also increase the Urban Heat Island (UHI) effect. (Urban Heat Island effect: dense urban areas are measurably warmer than the surrounding areas. On average, the difference could be 1-3°C, but in the evenings the variance can go as high as 12 °C). Such differences

[5] www.euro.who.int/obesity
[6] Frank LD, Andresen MA, Schmid TL.: Obesity relationships with community design, physical activity, and time spent in cars. 2004. American Journal of Preventive Medicine 27(2):87-96

have negative effects of human health, adversely influence quality of life and leads to increased energy usage due to the need for cooling buildings.

4.2.3 Economy

The negative economic consequences also need to be taken into account.

Car usage is a major cost factor in household budget. In the United States, low income car dependent households can easily spend up to 50% of their budget on transportation, which is the second largest household expense. Households in the EU has a slightly better position: fuel and maintenance of personal transport vehicles is the fourth largest expense in the EU.

This has various implications. On the one hand, car dependent communities have few ways to significantly reduce their transportation costs in response to unexpected events like a serious illness or losing a job.

Another important factor to consider is that, people spending on fuel or on buying their vehicles is not good for the local economy, either. As in most cases the cars are manufactured elsewhere and the gasoline, too, is coming from other countries, almost all the money spent on personal transport leaves the city and contributes to better living standards and quality of life in other cities, countries and even continents.

Not to mention the cost implications of illnesses deriving from physical inactivity. Only in the UK, the cost of illnesses resulting from physical inactivity has been estimated at $14.2bn per annum.

Overall, car-dependent urban transport systems have various negative economic consequences – so breaking car dependency and shifting urban transport systems into more sustainable directions also makes economic sense.

4.2.4 Social consequences

The challenges related to urban transport systems also contribute to social difficulties in cities.

As presented in the previous chapter, even though people don't cover the full costs of car use, it is still very costly, and lower income families often can't afford having a car. Unfortunately, these very families mostly live in peripheral, more remote areas of the cities, because they can't afford housing in the city centre or in affluent, better serviced districts. In these peripheral areas transportation is highly dependent on motor vehicle travel and thus car-dependency contributes to inequality and lack of social mix, resulting in in a steady increase of social and class segregation.

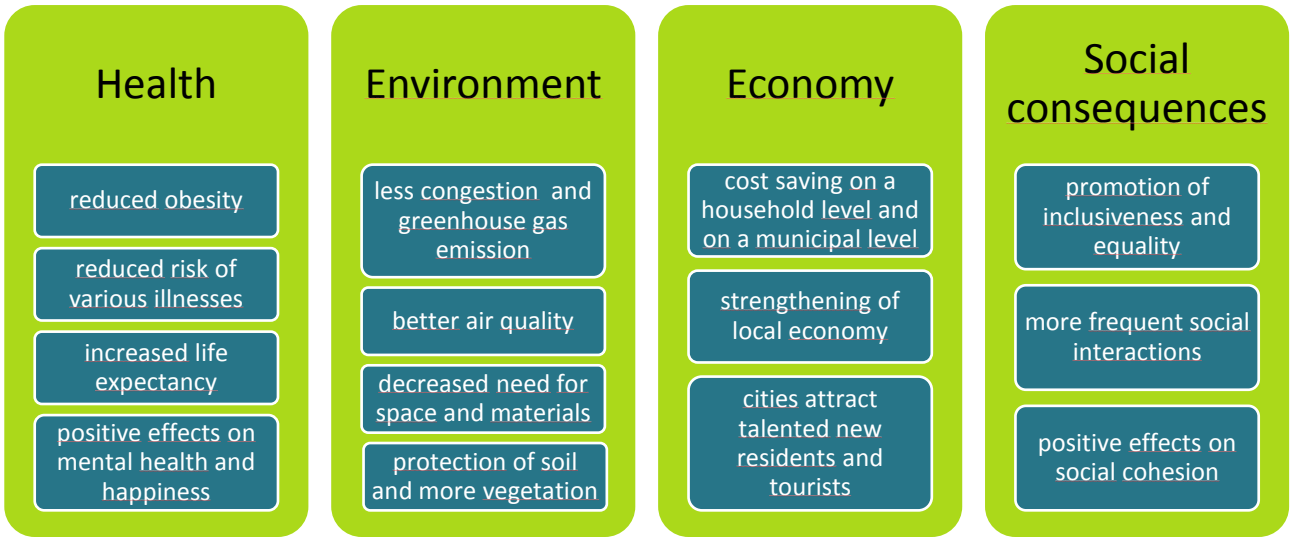
In addition to contributing to social segregation, car dependency may also lower social participation. Walking and cycling promotes chance encounters – when someone meets an acquaintance, he or she may stop to say hello and have a few words. These chance encounters strengthen the social capital and can lead to new ideas and co-operations. However, such encounters are not possible where people pass by each other in cars. A survey conducted by Swedish researchers between 2004 and 2008 confirms this: "Commuting by car was significantly associated with a higher prevalence of low social

participation and low general trust compared with active commuting, and the association increased with the duration of commuting time."[7]

In conclusion, car dependency, surprisingly, has negative impacts on local social cohesion as well.

[7] Mattisson, Kristoffer, Hakansson, Carita and Jakobsson, Kristina: Relationships Between Commuting and Social Capital Among Men and Women in Southern Sweden. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4509867/

4.3 Key benefits of walkability



6. Figure: Key benefits of walkability (Source: own elaboration)

4.3.1 Health benefits

Walking more is healthy – so improved walkability, the increase in the number of citizens walking regularly instead of using automobile is good for the overall health status of the city. In fact, improved walkability probably has a more direct and more immediate positive effect on the health of city dwellers than many public health initiatives trying to encourage people to exercise more. In highly walkable neighbourhoods or cities people mostly walk to reach their destination – and while doing so they exercise without even noticing.

Doctors suggest at least 30 minutes of physical activity every day, five days a week, as a tool for longevity - and 30 minutes of walk is easy to accomplish if people walk between places in the city. Studies even show that walking reduces the risk of all-cause mortality by up to 20%.[8]

As presented above, obesity is a continuously expanding global epidemic, the number of obese people is on the rise, and obesity is the leading cause of various chronic diseases. Walking, however, increases energy expenditure – depending on bodyweight, walking at an average speed burns approximately 4 calories per minute – translating into more than 100 calories during a 30-minute walk[9]. So, if caloric intake is not increased, walking can improve body composition and contribute to reducing obesity. **Walkability is a secret weapon against obesity**- and this is not just a theory! Research shows that countries where walking and cycling are more widespread as opposed to car use, have the lowest

[8] Hallal, Pedro C. - Azevedo, Mario R. - Reichert, Felipe F. - Siqueira, Fernando V. - Araújo, Cora L. - Victoria, Cesar G.: Who, when, and how much? Epidemiology of walking in a middle-income country. 2005. American Journal Of Preventive Medicine. http://www.ncbi.nlm.nih.gov/pubmed/15710270

[9] Cities Alive – Towards A Walking World. ARUP. 2016. p. 36. http://publications.arup.com/publications/c/cities_alive_towards_a_walking_world

obesity rates; on the other hand, countries with the highest rates of car use for travel have the highest obesity rates.[10]

According to Transport for London, the likelihood for individual obesity decreases 4.8% every km of walk per day![11]

Walking also reduces the risk of various diseases, including coronary heart disease, stroke, colon cancer; it also lowers the level of cholesterol, blood pressure. In addition, walking contributes to stronger bones, helps to strengthen bones, reduces the risk of injuries from falls, increases muscle flexibility and joint movement.[12]

And that's not all! In addition to significantly reducing the risks of various diseases (and contributing to longevity), walking positively affects mental health and happiness. Simply 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". Walking regularly also improves self-esteem, mood, contributes to positive mindset and reduces stress.

Considering all these benefits regular walking really has super drug qualities – **doctors should prescribe regular walking as a medication to everyone**. Also, improving walkability should be on the top of the list when it comes to city level public health policy.

4.3.2 Environmental benefits

When talking about reducing automobile use in cities, probably the environmental benefits are the first that come to mind to most people. No surprise there, as driving less has a wide variety of positive effects on city environment.

First and foremost, shifting from driving to walking reduces congestions - walking more means less cars are on city streets. Simply replacing the shortest drives with walking could have a major effect: according to the latest National Travel Survey in England, as much as 18% of all trips made in 2013 were less than one mile in length – so each of those drives could be easily replaced with a pleasant 20-minute walk.[13] The only thing we need to do is to walk whenever our destination is less than one mile away.

Having less cars in city streets also results in reduced greenhouse gas emissions: simply reducing the number of driving days per week just by one could easily eliminate 3,8 Million tons of greenhouse gas emissions per year globally. And before anybody would think that changed travel behaviour of one single person does not have any effect at all, the figures tell otherwise: through walking or cycling to

[10] Steps To A Walkable Community - A Guide for Citizens, Planners and Engineers. p.1.
Sam Schwartz Engineering and America Walks. 2012. https://www.scribd.com/document/261463434/Steps-to-a-Walkable-Community
[11] Frank LD, Andresen MA, Schmidt TL: Obesity relationships with community design, physical activity and time spent in cars. 2004. American Journal of Preventive Medicine 27(2):87-96
[12] Warburton, Darren E.R. - Nicol, Crystal Whitney - Bredin, Shannon S.D.: Health benefits of physical activity. 2006. Canadian Medical Association Journal. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1402378/
[13] National Travel Survey: England 2013, by Department for Transport. 2013.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342160/nts2013-01.pdf

work or to school one could save our cities (and the earth) from at least 17 kg of emissions per person per year. Lower emissions equal better air quality, which also has its own health benefits.

Less cars also require less space – walking infrastructure and spaces for pedestrians are much more compact than spaces necessary for cars moving at a relatively high speed (or, standing still, for that matter). What's more, constructing pedestrian infrastructure requires less materials – so the negative impacts of construction to the environment are more modest.

Soil is essential to nurture plants and animals – and it is not a renewable resource. Still, we continue covering soil with solid surface – concrete, stone and asphalt – just to serve the needs of the increasing car fleet in cities. Less cars means we can save more soil in our cities. Less surface area covered also means better permeability – which is crucial for draining rainwater – especially when extreme amount of rain falls in a short period of time (which happens more often due to climate change)

And not just that – we can have more vegetation, green spaces in our cities, which have a variety of positive effects on our city environment: they are not only more pleasant to look at, but they improve air quality (by absorbing CO2, 1 single tree can offset approximately 2500 km driving annually), reduce noise, and contribute to improving the overall mood of pedestrians. Besides, more extensive vegetation in cities can significantly improve urban microclimate and reduce the urban heat island (UHI) effect.

4.3.3 Economic benefits

Improved walkability would be worth pursuing for its extensive health- and environmental benefits alone. As indicated above, however, improving walkability also makes economic sense. Paul Shaker urban professional goes as far as stating: *"Walkable environments should be viewed as economic infrastructure that attract employment and should be invested in accordingly."*[14]

The economic benefits of improved walkability derive from various factors.

One such factor is the major cost savings[15] that can be achieved due to walkability. Cars require extensive and pricey facilities – roads and parking places, while building pedestrian (and cycling) infrastructure is significantly cheaper. In addition to the one-time costs of building the infrastructure, a road network is a system that requires constant maintenance for safety and efficiency, while pedestrian infrastructure is much cheaper to maintain, too. So, the per user combined cost of infrastructure and maintenance over the long term is much lower.

Congestions in cities also cost money. Congestions have both a direct and indirect economic impact on car commuting households. „Direct costs relate to the value of fuel and the time wasted rather than being productive at work, and indirect costs relate to higher freighting and business fees from company vehicles idling in traffic, which are passed on as additional costs to household bills."[16] According to the joint report of INRIX and Cebr the congestion costs in the UK amounted to £13.1 billion in 2013, and

[14] Paul Shaker, "Walkability and Economic Development", in Plan Canada, Fall 2012
[15] We deal with walkability-related cost-benefit analysis in more details in chapter 2.6.2
[16] Centre for Economics and Business Research (Cebr): The future economic and environmental costs of gridlock in 2030 (Report for INRIX, July 2014)

this figure is estimated to increase to £21.4 billion in 2030 (which, by the way, is more than the entire UK transport budget was in 2014).

As walking and cycling facilities may move five to ten times more people than driving over the width of a single traffic lane, if more people walk (cycle and use public transport) in walkable neighbourhoods – with a same amount of space available – congestions – and the related costs can drastically decrease.

Additionally, significant cost savings occur from reduced mortality and lower healthcare costs associated with more walking.

Better walkability also contributes to increased land and property values. Walkable neighbourhoods are safer, more attractive and thus more desirable for people – which significantly increases property value. In the United States, walkability is measured by Walk Score[17], an index calculated based on the presence of and access to various amenities and services within walking distance in a given area. On average, one point increase of Walk Score (on a scale of 100) directly translates into an increase in home values of between USD 700 and USD 3000. So, the sales value (and rents) of residential (as well as commercial) real estate are significantly higher in neighbourhoods with high quality pedestrian infrastructure. Therefore, investing in pedestrian infrastructure may be considered a profitable investment.

Walkability is also good for local businesses and economy. In the US, people spend more than USD 8.000 on their cars every year on average. Less than 20% of this money (money spent on licences, insurance, repairs and maintenance) remains in the local economy. If the amount of money currently spent on cars could be spent in other ways – on local products and services – that would be clearly beneficial to the city.

The biggest complaint of local shopkeeper against turning streets into pedestrian-only areas that by prohibiting access of cars they will lose their customers. Retailers, however, significantly overestimate the number of people shopping by car. In fact, an analysis prepared by Transport for London shows, that pedestrians usually spend 70% more than drivers.[18]

It also seems that pedestrian friendly, walkable neighbourhoods - in addition to being much healthier - are also wealthier: "…research has shown positive correlations between improved walkability, raised local retail spend, enhanced value of local services and goods and the creation of more job opportunities".[19]

Another important factor is the attractiveness for investors. Businesses – especially the most dynamic and innovative businesses - increasingly go after the talent – the so-called creative class. More precisely, businesses increasingly choose locations that are attractive for talented people. No surprise, as migration patterns have drastically changed: economic migration (moving to a place because of a job opportunity) is increasingly replaced by lifestyle migration – when people move to a place to achieve better quality of life. This means that people choose city before job – and young, talented

[17] In chapter 2.6.1 we present more information on measuring walkability, and CityWalk project will develop its own walkability index.
[18] Town Centres Study 2013 – Transport for London, June 2013.
[19] Cities Alive – Towards A Walking World. ARUP. 2016. p. 55.
http://publications.arup.com/publications/c/cities_alive_towards_a_walking_world

people – the creative class – prefers to live in vibrant, walkable neighbourhoods. So, if a city wants to attract and retain businesses, improving walkability is a must.

Finally, walkability also plays an important role in attracting tourists: visitors prefer walkable places – they like to spend time (and money) in interesting, vivid, walkable cities.

4.3.4 Social benefits

Walking is the most democratic mode of transport: it is completely free and it ensures total independence and autonomy also for those who do not wish, are unable or cannot afford driving a car. Walkable cities are socially more inclusive, providing equal opportunities for all.

Walkable cities also promote more frequent social interactions: if acquaintances drive by each other in cars, most likely they don't even notice. If, however, they pass by each other on foot or by bike, they can (and do) easily stop, say hello and have a quick chat. Such chance encounters enhance relations and social capital, can lead to new ideas, cooperation possibilities, joint projects – and ultimately a much stronger, helpful and resilient local community – one where the citizens also have a much stronger attachment to the place.

And the stronger social interactions and social capital in walkable neighbourhoods is not just an assumption: an interesting Irish study has shown that residents of a street with 2,000 vehicles per day traffic have three times (!) as many friends as those living in a street with a traffic of 16,000 vehicles per day.[20] Another study has demonstrated that "residents of highly 'walkable', mixed use neighbourhoods exhibited at least 80% greater levels of four indicators of social capital (knowing neighbours, sociability, trust and political participation) than those in car-dependent neighbourhoods."[21]

[20] Appleyard, Donald - Gerson, M. Sue - Lintell, Mark: Livable Streets. 1981. University of California Press. Berkeley. 1981. https://books.google.co.uk/books?id=pfreUQKD_4QC&redir_esc=y

[21] Leyden, K.M. 2003. Social capital and the built environment: the importance of walkable neighbourhoods. American Journal of Public Health 93(9): 1546-1551. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448008/

4.4 The most important “ingredients” of a walkable city at a glance

Walking should be:	Prerequisites
• useful	• dense neighbourhoods • mixed-use neighbourhoods
• safe	• traffic safety • low level of crimes
• comfortable	• efficiency • convenience
• interesting	• varied street scenes • green areas • facilities for social encounters

3. Table: The ingredients of walking (Source: own elaboration)

While the project will deal with the various attributes of walkable cities in more details, it is important to provide a quick overview of the essential ingredients of a walkable city – or a walkable neighbourhood.

Before looking at the key conditions of walkability, it is important to highlight a distinction between two different types of walking: destinational walking and recreational walking. Destinational walking is walking to reach a specific destination, while recreational walking is walking to exercise. Both are important. However, to improve the urban transport system in a city we need to encourage destinational walking, so when looking at improving walkability, we mainly have destinational walkers in mind. (Still, most of the expectations of recreational walkers are very similar to those of destinational walkers – so if a neighbourhood is attractive for destinational walkers, recreational walkers will probably also use it.)

People will only walk (and abandon their car), if walking is useful, safe, comfortable and interesting – so these are the four most important attributes of a walkable neighbourhood.

7. Figure: The ingredients of walking (Source: own elaboration)

People in a city regularly move between different parts of the city – so usually they want to reach a specific destination. Walking with a destination in mind means that the walk is **useful**. People only choose walking regularly as their preferred "mode of transport", though, if a wide range of functions, services are accessible within walking distance. So, people walk to the workplace, to the school, to the grocery store, to the café or to a concert hall - if these facilities are easy to reach by walking.

This can be best done in dense, mixed use neighbourhoods – i.e. neighbourhoods that mix residential, commercial, cultural, institutional and certain types of industrial functions. Such a structure allows people to live, work, play and shop in one place. If these functions are located in entirely different parts of the city, people are forced to move around in ways other than walking.

Most downtown areas – even in smaller cities - are dense places where various functions are present – what is often lacking is a strong residential function. So, to improve walkability in city centres one possible action is to bring (back) houses with residential use.

People may choose walking if they can reach various services easily, but we can only convince them to walk **if the walk is safe – AND feels safe** (perceptions are important – and changing them is often more difficult). Or, to put it negatively: people don't walk if they don't feel safe. Walking safety has two main aspects: traffic safety and low level of crimes.

Traffic safety is important for every participant of city traffic, but especially for pedestrians: as the soft human body is much weaker than the hard metal of cars, pedestrians need to be protected in any way possible. First and foremost, this requires a combination of different types of pedestrian infrastructures: pedestrian-only zones, shared streets with strict speed limits for automobiles and proper sidewalks along all city roads designed primarily for car traffic. In addition, safe crossing of streets needs to be ensured through proper crosswalk placement and marking.

Another important factor in pedestrian safety is the speed of cars: only 5 percent of collisions involving pedestrians at 30 km/h result in death, whereas 85% at 60 km/h! You want to make a difference in traffic safety in a city? **Start by reducing the speed of automobiles.** Easy, one may think: just put up speed limit signage in city streets and the problem is solved. While this is an important step, it is not enough: if traffic engineers keep designing city streets for unimpeded traffic, cars will not slow down just because of a couple of speed limit signs. Reducing the speed of cars requires the use of physical obstacles – like speed bumps - where necessary, or reducing the width of lanes, as narrower lanes mean people drive more carefully – and slowly. Reducing the width of lanes (in some cases also the number of lanes) – often referred to as road diet – has the added benefit of gaining some extra space for functions other than the flow of cars. These functions may include parallel parking (which is a good protective zone between the fast-moving cars and the pedestrians), or additional space on the sidewalk; it could even facilitate the installation of a dedicated bike lane. Planting trees is also a good idea: trees make people drive slower, protect the pedestrians, provide shade in the summertime and have various environmental benefits.

As people walk not only in daylight, street lighting also plays an important role in both traffic and crime safety. Better visibility benefits everyone: the drivers, the pedestrians – especially the older ones with impaired eyesight - and the cyclists.

The single most important factor in reducing the risk of street crime – and making the street FEEL safer is to **“put” people in the street**. In vivid streets, full of people, much less violent crimes are committed than in empty, abandoned streets. So, the more people walk, the safer the street becomes. Certainly, there are other ways to improve safety: have “eyes on the street” – police presence, safety cameras, windows of offices and residential buildings overlooking the street, voluntary community organizations. There are also principles of good design for safety like locating buildings, placing lighting at otherwise dark entrances of buildings, proper positioning and height of plants, bushes – that could be followed.

Having streets that enable useful walking, are and feel safe is half success; however, we can’t quite persuade many people to walk in the walking is not **comfortable**. Walking requires muscle power, and pedestrians love efficiency – as well as hate losing time and energy. In terms of urban form, grid-like street structure, small-to-medium block size means quicker routes and wider selection of possible options to bypass obstacles.

Pedestrians hate when their free flow of movement is broken – if they need to repeatedly wait long time to cross (unsafe) roads, they rather decide to choose other mobility options (assuming they can). Sometimes pedestrians – especially older ones and small children - like to have a short rest – so sitting opportunities – street benches – along the way is also useful.

Finally, efficiency and convenience also imply easy access to “pedestrian accelerators” – public transport facilities (and increasingly bicycle infrastructure – even bike sharing) – when the distance to cover so requires.

The last piece of the walkability puzzle is making the walk interesting. If facades of the buildings alongside the streets are huge blocks of concrete, bricks or non-transparent glass, if there is no street life to speak of, if the shop windows are ugly, unkempt, if there are no outdoor cafés, the walk is not interesting. Even if walking is useful, safe and comfortable – if it is not interesting, people will choose other forms of transport.

The quality of the edge – where the street (the sidewalk) meets the buildings – plays an essential role in making the street interesting (the edge has to be active, open and lively, if possible), so architecture is important in creating a walkable city. Unfortunately, though, designing buildings that contribute to street life is very low on the priority lists of architects. The more varied the street scene (including the buildings), the more people will consider walking.

Green areas are also important to make a neighbourhood interesting – people want easy and quick access to nature. City parks, pocket parks or parklets, trees, playgrounds for children and adults – accessible to everyone – also make the walk interesting. Planners have to make the scaling of green areas right, though: oversized green areas can deter people from walking: frequent small green areas are much better than huge green areas from a walkability perspective.

In the end, what makes walking truly interesting is other people – people like to go where other people are. So, frequent sitting possibilities, outdoor cafés, restaurants, bier gardens, gyms are all facilities that need to be encouraged, as they attract people – and people attract other people.

4.5 Key walkability issues

This Chapter explains the most important issues to consider when a city decides to improve sustainable urban mobility built around active transport / walkability.

The key topics covered in the following subchapters:

8. Figure: Key walkability issues (Source: own elaboration)

4.5.1 Measuring walkability

4.5.1.1 What is the issue? Why is it important?

Studying walkability from a practical aspect can raise the question: how can we define and describe the level of walkability of a given neighbourhood or city? To be able to identify the necessary improvements in pedestrian areas, assessment of the existing pedestrian system is essential. Quantifying / measuring walkability is also a must, if we would like to understand whether we have made real progress in improving the level of walkability in neighbourhoods and cities. Measuring walkability also facilitates comparing the level of walkability of different neighbourhoods in the same city, or between cities.

4.5.1.2 How to measure walkability?

There exist different systems and approaches to quantify and measure walkability.

Probably one of the most popular methods for quantifying walkability is the patented system of Walk Score, which has been developed and is run by a private company (named Walk Score). This method is widely accepted and used in the USA, Canada and Australia, mainly because the existing database of the company assigns a numerical walkability score to any address in these countries. In addition, walk score value can be assigned to neighbourhoods or cities, not just to individual addresses.

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. In assigning the Walk Score value, hundreds of walking routes to nearby amenities are analysed, and the algorithm awards points based on the distance to the nearest amenity in each category. If the amenity is only 5 minutes far by walking, the maximum point is given. The number of points declines as the distance increases; if the amenity is further than 30 minutes of walk, no point is awarded.

To measure pedestrian friendliness, population density and road metrics are also analysed, such as block length and intersection density. The given points are the basis for the classification of addresses into categories. There are some rankings available of the most walkable neighbourhoods and cities of the USA, Canada and Australia. The Walk Score evaluation of the neighbourhoods does have an effect on real estate prices.

Walk score	Description	Examples
90-100	Walker's Paradise *Daily errands do not require a car.*	Downtown of Boston
70-89	Very Walkable *Most errands can be accomplished on foot.*	New York, San Francisco

50-69	Somewhat walkable *Some errands can be accomplished on foot.*	Ottawa, Sydney
25-49	Car-Dependent *Most errands require a car.*	Gold Coast
0-24	Car-Dependent *Almost all errands require a car.*	Suburbs of Sydney

4. Table: Walk Score methodology (*Source*: on the basis of the https://www.walkscore.com/methodology.shtml, own construction)

While the method is widely used, it is not perfect, and it has received some criticism from urban professionals. Its limitations include the fact that the algorithm does not consider whether there is a sidewalk, or what is the crime rate in the area; it does not differentiate between the types of amenities, either – the proximity of a liquor shop deserves the same score as a supermarket.

Another essential method for measuring walkability is the Walkability Audit, which evaluates streets for their walkable character by assessing numerous criteria[22]. During the assessment, every street sections gets a quantitative score and a qualitative assessment, which serve to make recommendation to improve the quality of walking. In the qualitative part there are various sections and the specific criteria are ranked in each section on a scale from 1 (the worst) to 5 (the best). In case of commercial streets, the following factors are considered:

- sidewalks – their presence, condition, obstructions, overall connectivity and widths are evaluated,
- crosswalks – their safety, visibility, signage, wait time and crossing time at the intersections with traffic lights are evaluated,
- signage – it is the most important for tourists to help them find amenities, attractions, public restrooms, parking, information, restaurant, retail shops; not to mention the relevant road signs, such as speed limit and street signs,
- aesthetics and amenities – the appealing factors for walking can be the presence of trees, green areas, relevant amenities like benches or trash cans,
- safety – is one of the most important aspects of a walkable, pedestrian-friendly environment; the presence of other pedestrians, the traffic speed, the night-time lighting, the isolation from cars and litter are taken into consideration here.

In the course of the assessment, impediments to walking in specific areas are identified, helping to define the areas for improvement. The qualitative part looks at the presence (or lack) of bicycle amenities, public transit stops, type and number of people present in a segment, amount of parking available and the overall connectivity of streets. In case of residential streets, the audit is a bit different, since these streets have other characteristics. As part of the assessment process informal pedestrian interviews and formal stakeholder interviews can also be conducted to obtain the necessary data. The

[22] Eidmann, J., Long, A., Noomah, C., Ury, E. (2011): *A walkability study of North Adams, Massachusetts*.

evaluated segments and their data can be located on an aerial map with the help of a Geographic Information System (GIS).

As a third method, the Transport Walkability Index can be mentioned, with which we can also assess the walkability in neighbourhoods[23]. The Transport Walkability Index can measure the transport walkability (walking for transport – also called destinational walking - is walking to a specific destination – as opposed to recreational walking).

First, the areas need to be determined that are not applicable for walking for transport. Then three main datasets are required for the calculation, such as residential density, street connectivity and land use mix. After the calculation and harmonization of the data, the obtained information can be imported to an aerial map through a Geographic Information Systems (GIS) platform, in this case, too.

As it can be seen, several methods exist to quantify and measure the level of walkability – but there is no one single – widely accepted - approach in place.

4.5.1.3 Measuring walkability in CityWalk

When it comes to understanding and improving walkability, or comparing the level of walkability of different places, measurement is essential. This is reflected in the fact that CityWalk intends to develop its own methodology for measuring the level of walkability, to be applied initially in the partner cities. After testing and fine-tuning the methodology will be disseminated to other cities in the Danube Region and beyond.

Specifically, the following deliverables will be produced as part of the project:

- Developing an index and related methodology to measure the level of walkability (WP4)
- Developing an online tool using the measurement methodology to identify the level of walkability in various neighbourhoods (WP4)
- Developing a mobile application using the walkability index algorithm, enabling users to measure the level of walkability in their neighbourhood (WP4).

[23] Giles-Corti, B., Mavoa, S., Eagleson, S., Davern, M., Roberts, R., Badland, H. (2014): *Transport walkability index: Melbourne*. McCaughey VicHealth Centre for Community Wellbeing, The University of Melbourne, Melbourne.

4.5.2 Analysing costs and benefits

4.5.2.1 What is the issue? Why is it important?

To justify any urban development intervention – also investments aimed at improving walkability –, it is important to understand – and to show the decision-makers and citizens – its estimated costs and its expected benefits. Benefits of walkability (see Chapter 2.4) are not easy to measure or quantify and so tends to be underrepresented in urban planning and fiscal evaluation. Most of the travel researches underestimate or even completely ignore the analysis and significance of non-motorized travel. There is no doubt that better understanding the financial impacts of walkability could change development trends, land use and street design as well (see Chapter 2.6.4). This chapter deals briefly with this topic.

4.5.2.2 How to analyse costs and benefits of improving walkability?

Walkability can have monetary effects at personal level and it makes economic sense on a larger scale as well. Some of the benefits can be detected directly and/or in the short term, but most of them are noticeable only long after the walkability investments have been made. As a result:

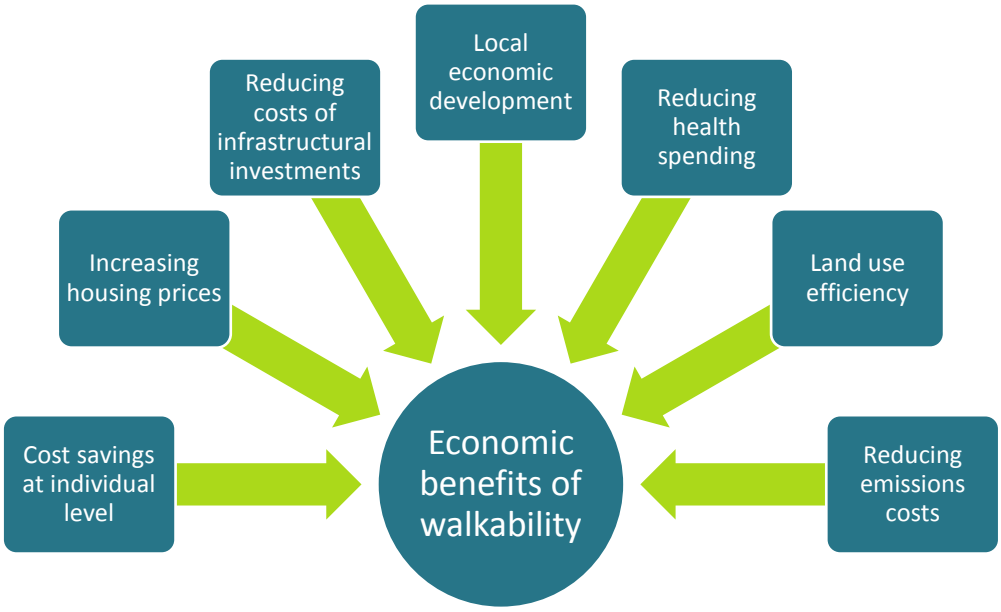
- resources shift from walking facilities to roads and parking,
- car-oriented land use is preferred to pedestrian-oriented land use,
- pedestrian safety investments and traffic management practices are undervalued.

Economic advantages of walkability can be identified mainly as positive externalities – a consequence of an activity (in this special case: improvement of the condition for walkability), which affects other parties without this being reflected in market prices.

Non-motorized transport tends to be more resource efficient and affordable than using a car. It does not mean that walking or cycling is the best solution in every case, but it emphasizes the potential resource and cost savings derived from it.

9. Figure: Comparison of non-motorized transport and car usage. (Source: Based on Littman, T. A. (2017): Economic Value of Walkability. Victoria Transport Policy Institute)

Many international researches intend to monetize benefits of walkability;[24] according to them at least the following 7 factors should be considered when evaluating walking and walkability investments. For most of them, useful data and standards are available as starting point or benchmark for the further examination.



10. Figure: Economic benefits of walkability. (Source: own elaboration)

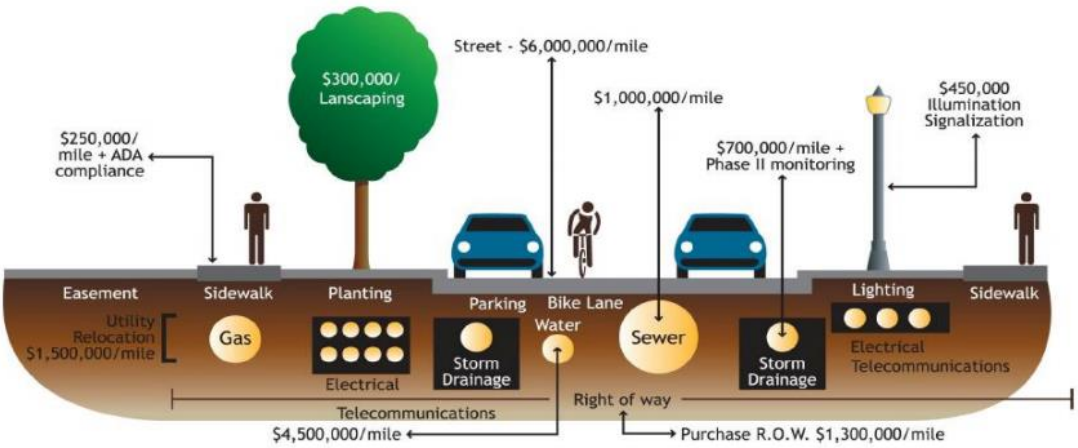
- **Cost savings at individual level:** using an own car – especially in urban environment – generates a lot of direct expenses (buying a vehicle, spending on fuel, using parking facilities, paying insurances and taxes, etc.), but also indirect spending (e.g. travel time[25] – mainly in congestions). The average American family spends approximately 19% of its income on transportation.[26] These costs can be cut significantly if people choose walking over driving. As a result, consumer savings can be spent on other goods or services that accelerates local economic growth (see below, by local economic development).
- **Increasing housing prices:** migration to the suburb has slowed recently. Properties located in walkable communities are more likely to hold their value, because buyers are paying more for houses in areas where they can get around without wheels[27]. In the USA, a Walk Score algorithm was developed, which measures the number of typical consumer destinations within walking distance of a house (from 1 to 100). Researchers used an economic method (hedonic

[24] The following studies introduce useful methods for quantifying economic impacts:
- ICLEI (2007): Active Transportation Quantification Tool, Cities for Climate Protection. International Council for Local Environmental Initiatives, http://att.ccp.iclei.org
- Littman, T. A. (2017): Economic Value of Walkability. Victoria Transport Policy Institute

[25] Travel time is difficult to monetized: it depends on who are travelling, for what reason, and how long is it take objectively and subjectively (perceived time).
[26] Florida, R. (2011): The Financial Benefits of Living in Transit-Friendly, Walkable Areas. In: The Atlantic Daily
[27] Cortright, J. (2009): Walking the Walk: How Walkability Raises Home Values in U.S. Cities. Impresa, Inc., CEOs for Cities

regression) for estimating the connection between the Walk Score and the housing prices. Results show, that on average, each point increases the value of property by USD 1,000 to USD 3,000 per square foot.[28] Revenues from property taxes, if any, can be used for implementing sustainable transport projects. In the long term, individuals can reduce their transport expenditures by preferring residential areas with flexible transportation choices, including public transport and services within walking distance.

- **Reducing costs of infrastructural investments:** public expenditures to build and maintain roadway facilities can be reduced considerably if non-motorized transport is placed in the foreground. According to the figure below investment costs of sidewalks are only a fraction of that of roads – mainly due to the different technical requirements (e.g. use of materials, load-bearing capacity). This can be interpreted as direct cost savings of public authority responsible for road development.



11. Figure: Typical cost of a complete street (per mile). Source: Nicholls, J. et al (2011)[29]

- **Local economic development:** interventions aimed at improving walkability contribute – among others – to increasing local business activity, expanding innovative and creative industries, enhancing attractiveness for investors and tourists. If driving can be efficiently substituted by walking, consumers spend more for other goods and services. Economic benefits can be measured using different methods, e.g. market surveys, changes in retail sales / incomes of enterprises operating in the given area / local tax revenues, etc. For example, a Canadian analysis concluded that after expanding sidewalks and adding bicycle and bus lanes 90% of customers walk, bike or travel by public transit to shops. Although car-users spend more per trip, other customers visit the shops more often and spend more per month on average.[30]
- **Reducing health spending:** health cost savings resulting from more frequent walking are tangible both at individual and at macro level. It is very important that walking has a positive

[28] Vanderpool, C (2009): Cost/Benefit Analysis of Walking? http://www.triplepundit.com/2009/08/costbenefit-analysis-of-walking/

[29] Nicholls, J. et al (2011): Washington's Complete Streets & Main Street Highways Program - Case Studies & Practice Resource. WSDOT Research Report, Research Project GCB 1037

[30] Sztabinski, F. (2009): Bike Lanes, On-Street Parking and Business A Study of Bloor Street in Toronto's Annex Neighbourhood, The Clean Air Partnership, www.cleanairpartnership.org/pdf/bike-lanes-parking.pdf

effect not only on physical, but also cognitive[31] and mental health. According to estimates, health expenditures can fall by USD 1 per "walked" mile.[32] A research team has developed a method for monetizing reduced mortality resulted from walkability investments – results are more than impressive: benefits per capita can exceed USD 12,000 within the period considered.[33] On the other hand, these amounts should compensate the negative external costs of pedestrian accidents.

- **Land use efficiency:** walkability investments reduce the size of areas required for transport facilities and result in more sustainable land use patterns. Cost savings can be well exemplified by changes in land use: if a "walk-friendly" public park is established instead of a road, potential external cost savings of this change can exceed EUR 64,200 per hectare on average.
- **Reducing emission costs:** a walkable city has many other social and environmental benefits that can reduce expenditures of public authorities. One of the most important effects of expanding non-motorized transport is the decrease in air and noise pollution costs. Three types of emissions can be analysed:
    - emissions from fuel consumption,
    - non-tailpipe particulates and evaporative emissions,
    - emissions from vehicle production and fuel production.[34]

  There are two basic methods to monetize these impacts: damage costs which reflect harms and risks, and mitigation costs which include the expenses of reducing emissions. According to a European study, air pollution costs of passenger cars using diesel fuel in urban transport reach 1.53 euro cent per vehicle-km. GHG emissions accelerate climate change – risk prevention and disaster management connected to this process also induce massive public expenditures that can be reduced in walkable cities. In 2050, external costs of GHG emissions may exceed EUR 180 per tonne.[35]

In a detailed study[36], the fix and variable costs of each transport mode were estimated. External cost savings are remarkable due to a shift from car travel to other modes: every mile biked reduces external costs at least by USD 0.39 per passenger-mile; in case of walking, it can reach USD 0.85. As a conclusion, it can be stated that motorized transport would decline significantly if related prices would reflect full costs. When designing walkability interventions and initiatives, it is important to consider that benefits are more significant in areas with a wide range of available services but poor pedestrian infrastructure.

[31] Baulkman, J. (2014): Easy-to-Walk Communities Can Blunt Cognitive Decline. In: University Herald
[32] LTNZ (2010), Economic Evaluation Manual (EEM) – Volumes 1 & 2, Land Transport New Zealand, www.landtransport.govt.nz/funding/manuals.html
[33] Boarnet, M. G. et al (2008), "Walking, Urban Design, and Health: Toward a Cost-Benefit Analysis Framework," Journal of Planning Education and Research, Vol. 27, No. 3, pp. 341-358, http://jpe.sagepub.com/cgi/content/abstract/27/3/341
[34] Littman. T. A. (2009): Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications. Victoria Transport Policy Institute
[35] Maibach, M. et al. (2008): Handbook on Estimation of External Cost in the Transport Sector, CE Delft, http://ec.europa.eu/transport/costs/handbook/doc/2008_01_15_handbook_external_cost_en.pdf
[36] Littman. T. A. (2009): Transportation Cost and Benefit Analysis: Techniques, Estimates and Implications. Victoria Transport Policy Institute

4.5.2.3 Cost-benefit analysis in CityWalk

Although developing a detailed methodology for cost-benefit analysis of walkability investments that may be used across Europe goes beyond the scope of CityWalk project, this topic will be tangentially discussed in the following document:

- In the Walkability Planning Guide in WP3,
- In the Walkability Guide and the Good Practice Catalogue to be developed in WP4.

4.5.3 Planning walkability

4.5.3.1 What is the issue? Why is it important?

Making cities more walkable – and what is even more important, making **people walk more** - is a complex challenge, requiring investments, changing local regulations, awareness raising, education and a variety of other interventions. Implementing standalone projects aimed at improving pedestrian infrastructure in random parts of a city is far from sufficient. Given the complexity of the challenge, if a city really commits itself to make more people walk, bike and use public transport (and less people drive), the first crucial step is to prepare a plan that sets out the objectives, the specific interventions needed and the roadmap for implementation.

Even though careful planning is essential, currently most medium-sized and small cities in the Danube region lack the experience and a proper, easy-to-understand methodology for walkability planning.

4.5.3.2 How to plan for walkability?

Various types of plans exist in cities that affect the issue of walkability in some form.

As mobility is a crucial part of city life, it is usually included in integrated urban development strategies, and is also the subject of dedicated plans. Local traffic plans, for instance, cover the developments needed to improve the urban transport system. Most of these plans, however, are exclusively prepared by traffic engineers and still focus too much on creating the best possible conditions for moving (or parking, for that matter) cars, while ignore the needs of pedestrians. Even if they don't, however, local traffic plans concentrate almost exclusively on improving infrastructure.

Fortunately, in more and more cities traditional local traffic plans are being replaced by, or complemented with sustainable urban mobility plans (SUMP). As the name suggests, these plans provide a strategic framework for creating sustainable urban transport systems and place an emphasis on active forms of transport as well as public transport. Usually SUMPs are not detailed enough, though, to design the specific, practical interventions needed to make a city more walkable.

Recognizing this problem some cities prepared so called "permeability plan"; permeability is the extent to which an urban area permits the movement of people by walking or cycling. Permeability plans focus on identifying and eliminating - mostly physical - barriers to permeability.

However, cities that take walkability seriously, usually deliver a dedicated walkability planning process. The process starts with the design of a local walkability strategic plan, aimed at increasing the number of walking trips, and propose specific interventions – including also soft measures – to achieve that. (Some local walkability strategies also include cycling to make a combined strategy.)

As most mayors and urban planners feel responsibility to the entire city, there is a desire to deliver walkability improvements everywhere. On the one hand, this is not a very efficient use of available resources, and usually means that the changes will not be significant enough to really improve the walking environment. On the other hand, walkability improvements are normally not relevant in every part of the city, either. Therefore, the local walkability strategy also needs to define the specific neighbourhoods where walkability improvements are needed and this way ensure the concentration of the interventions, or, as a bare minimum, prioritize the walkability improvement of the various neighbourhoods / districts.

One may ask where to concentrate first if there are more than one – seemingly equally relevant - options but limited resources? The answer to this question is surprisingly easy: downtown first. In any city, the downtown is the part that really belongs to every citizen, and usually the downtown is used by everyone. Besides, the reputation, the image of a city really depends on the qualities of its downtown: if the downtown is attractive, the city is attractive. So, always start with the downtown.

Key aspects of walkability planning

- The planning process needs to be genuinely **participative** – walkability directly affects the life of citizens, besides, improving conditions for pedestrians often create inconveniences for drivers (road diet projects, establishing lower speed limits, reducing the number of parking places in downtown areas, etc.). A good walkability plan results in significantly better environment for pedestrians – and slightly less convenient environment for drivers. This often creates conflicts which need to be managed during implementation, but the sooner (already in the planning phase) drivers are involved, the easier it will be to mitigate negative consequences. Involving all stakeholders as early in the process as possible is crucial.
- Walkability planning needs to rely on a thorough analysis – **a detailed walkability analysis**. This analysis uses information from a variety of sources:
    - Higher level statistical data (key demographic data, number of passenger cars per capita, etc.) that is available from official statistics and enables comparison with other urban areas;
    - Mobility related data available either on national level or locally (length of roads, bicycle routes, sidewalks, key attributes of local public transport, etc.) that are crucial to understand the local mobility situation and the essential challenges;
    - Most importantly though, walkability planning needs to rely on extensive survey collecting information on travel habits, barriers to walking, walking-related perceptions and feelings. Such surveys – done properly – can also serve as hidden promotion of the walkability concept and walking.
- Walkability planning needs to use an **integrated approach**: first and foremost, integration with local transport policies and all other local transport forms is of key importance, but not sufficient. Walkability plans need to be aligned with other urban development areas; as a bare minimum, possible "side effects" of walkability improvements on other policy areas (e.g. making a neighbourhood more walkable most probably increases property values, the increase of property value gradually drives away less affluent residents and results in gentrification. That brings about social challenges.). During the planning process, such side effects need to be considered, and measures need to be proposed to mitigate the negative consequences.
- The walkability planning process has two main levels:
    - The preparation of **city level local walkability strategic plan**, which covers the entire city and usually aims at increasing the proportion of active forms of mobility at the expense of automobile use. The local walkability strategic plan provides the strategic framework for walkability improvements in the city and identifies the neighbourhoods where investments need to be made.
    - **Community / neighbourhood level walkability audits and plans** to identify the very specific improvements necessary in a certain part of the city – these plans are specific and action-oriented.

- As already discussed above, better walkability is not just about improved pedestrian infrastructure: walkability plans need to address the walkability challenge in an integrated way. Therefore, walkability plans need to identify different types of interventions:
    - Investments in pedestrian infrastructure;
    - Soft interventions like actions to better harmonize the various transport modes, or initiatives to raise awareness of the importance of walkability, etc.
    - Policy proposals, proposals for changing local regulations (for instance parking regulation, building regulation).

  In addition to designing interventions and policy proposals, walkability plans should also recommend walkability principles and practices that need to be applied when any urban development project (like building a new road, or a public space is rehabilitated, etc.).

4.5.3.3 Walkability planning in CityWalk

Given the importance of walkability planning, it's also a priority area in CityWalk. The project intends to provide a methodology to the partners (and disseminate this guide also to other cities in the Danube region). To this end, the following outcomes will be produced:

- A "Walkability Planning Guide" will be developed (WP3);
- A 2-day interactive training course on walkability planning will be designed and delivered to the representatives of the partners (WP3);
- The city partners will develop their own pilot walkability plans "test-driving" the planning guide; based on their experiences the Guide will be fine-tuned and finalized (WP3);
- The (finalized) Guide will be disseminated to other cities outside the partnership.

4.5.4 Street design

4.5.4.1 What is the issue? Why is it important?

To move around in cities on foot, on a bike, on a bus or in car requires appropriate space. This function is served by city streets, which constitute the most important and most valuable public space in our cities – occupying approximately 20% of the total land area in a typical city. However, they not only provide mobility for citizens, but they are places for people to meet, have different forms of interactions, do business and be entertained. Good streets make cities liveable while also ensure high quality mobility. In addition, as Samuel I. Schwartz puts in his book: "Vehicles come and go. Buildings go up and come down. Roads last forever."[37]

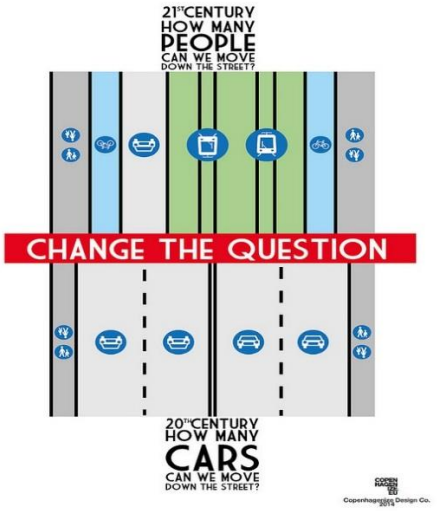
Streets have played this essential role in city life ever since towns and cities exist. With the dramatic expansion in the number of cars in city streets, however, the various forms of transport – walking, cycling, public transport and automobiles - increasingly had to compete for the limited space available. For a long time, cars have demanded and were granted more and more space for moving around (carriageways) and for being stationary (parking spaces), too. The space available for automobiles has continuously increased at the expense of other street functions.

Fortunately, more and more cities around the world have realized that the takeover of our streets by cars undermines the quality of life, and have taken measures (sometimes even drastic ones) to claim back city streets.

Good quality streets, appropriate street design are the most basic conditions of walkability.

4.5.4.2 How to design walkable streets?

As cities have recognized the risks of losing city streets to automobiles, they have increasingly started to focus on designing streets based on a pedestrian-first approach. The following figure developed by Copenhagenize Design Company demonstrates the difference between the 20th century's and the new approach.



12. Figure: Changing the question (Source: copenhagenize.eu)

[37] Samuel I. Schwartz with William Rosen: Street Smart – the rise of cities and the fall of cars.

Whenever a new city street is built, it is critical to apply pedestrian-friendly street design principles. Given the limited space available in already established cities – especially in developed countries, there are very few opportunities to design completely new streets. More often existing streets are redesigned to better provide for its multitude of essential functions. And while engineers, architects and developers love to argue otherwise, the redesign of existing streets to make them more walkable can also be done on a limited budget. As Janette Sadik-Khan, former Transport Commissioner of New York City has famously put: "Transforming a car-clogged street into inviting shared space doesn't always require heavy machinery, complicated reconstruction, or millions of dollars. Planners can reorder a street without destroying a single building, double-decking a street, or building a streetcar, light rail system, or highway interchange. It can be accomplished quickly by using the basic materials that every city has access to — in New York City's case more than six thousand miles of streets — and the basic stock that all city transportation agencies already have in their supply depots or available through existing contracts. Yes, I mean paint."[38]

Principles for street design

The "Better Streets, Better Cities" guide to street design identifies the following 7 criteria for responsible street design:

13. Figure: Principles for street design (Source: own elaboration)

[38] Janette Sadik-Khan – Seth Solomonov: Streetfight - Handbook for an Urban Revolution (2016)

- **Safety**: city streets need to be safe for all users; either there needs to be a separated slow zone where pedestrian have clear priority, or in smaller streets where the different types of users "share the street" the entire street needs to be a slow zone.
- **Mobility**: ensuring continuous mobility of users is one of the key functions of city streets. Wider streets allow for dedicated zones for motorized vehicles – private cars and public transport – and a segregated, protected zone for cyclists. If space is sufficient, dedicated bus lanes make public transport much quicker and more convenient.
- **Pedestrian accessibility**: streets need to be accessible and usable for different categories of pedestrians – including small children, young mothers with prams, elderly individuals and people with disabilities.
- **Liveability**: good street design contributes to liveability. Elements like trees providing shade for pedestrians and cyclists, green surfaces and parklets, sitting facilities – proper space for social interactions are important.
- **Sensitivity to local context**: proper street design incorporates elements that reflect street activities characteristic in the area - like space for street vendors, outdoor cafés - and patterns of pedestrian movements.
- **Creative and flexible use of street space**: limited space means street design needs to be flexible to accommodate various functions and also temporary activities from time-to-time, and to quickly adapt to changing needs (for instance if less parking places are needed).

The design of any street builds from a combination of various elements. Below we present the most important street design elements. Not all of them should necessarily be used in every street – when selecting the street design elements one needs to consider the space available, the required functions, the local context, the mobility demand and how to best meet the above listed design criteria[39].

- **Footpaths:** footpaths provide space for safe and comfortable pedestrian movement. Footpaths (together with other elements) are the primary public space of any city, and host many social interactions. From a walkability perspective, the existence and the quality of footpaths are essential conditions – we can only persuade people to walk more if they can do it safely, comfortably, and preferably in an inviting environment.

- **Cycle tracks:** cycle tracks are dedicated parts of street providing space for safe, preferably uninterrupted and direct movement of cyclists, physically separated from the speedier car traffic. Cycling is an important element in the urban mobility mix of any walkable city: it is low cost, environment-friendly, quick, but requires significantly less space (both when moving and when stationary) then driving.

- **Carriageways**: the carriageway is the part of the street that provides space for motorized vehicle mobility, separated from slower forms of mobility. If space allows, carriageway can also include dedicated space (bus lane) for public transport. In smaller streets where there is no space for dedicated parts for the different users (vehicles, cyclists, pedestrians) the solution is to apply the shared street principle where the different types of users co-exist – this typically means that vehicles move at significantly lower speeds.

[39] In presenting the general design criteria for the various street elements we rely on „Better streets, better cities" - A guide to street design in urban India (December 2011)

- **Pedestrian crossings**: pedestrian crossings are dedicated and clearly signalled parts of the street allowing pedestrians to safely and conveniently cross from one side of the street to the other. In a normal street pedestrian crossings are the parts where the vehicles and the pedestrians are using the same space. Pedestrian crossings provide unquestionable preference and protection for pedestrians.
- **Landscaping**: landscaping – trees and green surfaces – makes streets more attractive and liveable. It is not just aesthetic, though; it has an important function, too: trees provide shade for pedestrians, cyclists and street vendors, reducing temperature and making street life more pleasant even on hot summer days. Green surfaces also play a role on a city scale: reduces the urban heat island (UHI) effect and improves the rainwater draining qualities. In addition, trees and other plants capture dust and greenhouse gases. Overall, landscaping is an integral part of street design – something to consider from the very beginning rather than just an afterthought.
- **Bus stops**: good public transport is an essential attribute of walkable cities, serving as "pedestrian accelerator". Bus stops are important elements of street design, providing the interface between the street and the local public transport system. Their proper positioning can make the public transport system more usable. Bus stops need to provide a safe, comfortable and protected (from weather) waiting space for pedestrians, without obstructing pedestrian and bicycle movement. Waiting for a public transport vehicle is probably the less liked part of the journey – so the design, the user experience are crucial from both street design and public transport quality perspective.
- **Street furniture and amenities**: street furniture provide places for people to sit, rest and interact with each other. Functional elements providing services – trash cans, public toilets, facilities for street vending and signage are also considered street furniture. Just like furniture in a room, well positioned, user friendly and beautiful street furniture make the street a more liveable and pleasant place to be for all users (and from a walkability perspective also encourage walking). Street furniture need to be positioned where they are likely to be used – and if the various elements of street furniture has an attractive design that is unique to the place, they can even act as differentiating factors.
- **On street parking**: as pointed out several times, automobiles require space in our cities when they are on the move – and when they are stationary. And while promoting walkability is also aimed at reducing the number of car trips and cars in our cities, cars will long remain and demand space for themselves in our streets. On street parking needs to be designed in a way, that offer clearly designated and managed space for cars without obstructing the flow or reducing the safety of pedestrian and cycle traffic. Providing free parking means providing valuable city space to cars without any compensation – subsidising private vehicles. It is undesirable not only because car owners should not be subsidised, but also because such a practice encourages car use (which has a multitude of negative effects, as seen elsewhere in the Baseline Study). Street parking should be considered not as a right, but as a premium service, and therefore needs to be efficiently managed and charged.
- **Traffic calming**: Traffic calming elements play a crucial role in ensuring safety (primarily for pedestrians) by reducing the speed of vehicles. They are especially important in shared streets and in places where many children are present – like around schools, playgrounds, parks and

residential streets. Traffic calming elements – like speed bumps, raised pedestrian crossings, perceived or real narrowing of the street, using vivid colours, bollards and even roundabouts, etc. – provide physical obstacles forcing slower driving in city streets. While many of the traffic calming elements can be expensive to apply, they significantly improve traffic safety (and roundabouts even improve traffic flow).

- **Street lighting**: As we have presented earlier in the Baseline Study, people may choose to walk if walking is safe and feels safe. Visibility is a key condition of safety, and visibility after daylight can only be ensured if there is appropriate street lighting in place. Street lighting reduces the risk of traffic accidents, theft and other violent crimes during night time, as well as mitigate the sense of isolation of pedestrians. From traffic safety perspective street lighting is especially important in potential traffic conflict points like intersections, crossings, driveways and public transport stops. From personal safety and crime prevention perspective high quality lighting is crucial in isolated places like under and overpasses, as well as walkways next to and through parks.

In a city environment there are streets with various qualities, physical attributes and functions. To have a standard structure for different types of streets it is useful to design street templates, that – as their name suggests – provide a collection of easy-to-follow templates for street development, to be used in the entire city.

4.5.4.3 Street design in CityWalk

Street design is also an important element in designing walkable neighbourhoods. While there is no deliverable specifically dedicated to the topic of street design, it will be definitely covered to some extent:

- In the Walkability Planning Guide in WP3
- In the Walkability Guide and the Good Practice Catalogue to be developed in WP4.

4.5.5 Establishing an optimal mix of transport modes built around walking

4.5.5.1 What is the issue? Why is it important?

Walking doesn't exist in isolation. In most cities, walking simply cannot be the only transport mode, not even within the city. There are distances, weather conditions, time implications – so while walking should be the primary mode of transport – the beginning and the end of every journey – there is a need to mix up different modes of transport and provide "pedestrian accelerators" for people.

For a city to be walkable and to increase the proportion of walking trips (and significantly reduce car use) an efficient multimodal urban transport system need to be put in place, where various forms of mobility have their place:

- walking
- cycling
- public transport
- car transport (privately owned automobiles and various new forms of car use) -

(and in that order).

If there are no attractive transport forms to complement walking (good conditions for cycling, competitive public transport), people may walk to short distances but change back to car whenever they need to cover longer distances.

4.5.5.2 How to establish a modal mix that supports walkability?

A good multimodal walkable city is where people usually choose to walk for shorter trips, use bike or public transport when they need to cover longer distances and occasionally (for late night, very early morning trips, or when they have to transport heavier objects) use the automobile.

Cycling

Bikeability in a city makes driving less necessary. Biking is a compelling alternative to walking when a longer distance needs to be covered, as using the same amount of energy as walking, a bicycle takes one three times farther. In addition, bikes have minimal spatial demand compared to cars. What makes a city bike-friendly? To answer this questions with proper details goes well beyond the scope of this Baseline Study. Nevertheless, below we present the most important conditions.

- **Road infrastructure** is crucial – any new urban road investment (building and rehabilitation) that do not consider bikers are waste of money. In a bike-friendly city every address can be safely and conveniently reached by bike. This does not mean, though, that separated bike paths need to be built along every city road. On all busy streets, preferably separated bike paths, or at least dedicated bike lanes should serve bike riders. Elsewhere, in smaller, slower streets cyclists can mix with traffic. Take the example of Copenhagen, where there are 454 km paths dedicated to cyclists, often with two lanes; new developments include bicycle superhighways; traffic lights give preference to bikers, and on snowy days bike paths and lanes are the first to be cleaned.
- **Facilities and services.** There is more to bike friendliness than just good roads dedicated to cyclists – other facilities and services also need to be in place, otherwise people will not use their bikes. Most importantly, at all important public destinations within the city (railway

station, schools, hospitals, bus stops, cultural institutions, shops, restaurants, etc.) high quality and safe "parking facilities" – bike racks - are needed in appropriate number. People increasingly use expensive bikes – they will not use them for city rides unless they know they can leave them safely behind, without the risk of being stolen. Useful facilities include frequent bike service stations where smaller repairs can be quickly made, and internet-based solutions, dedicated local applications (making bike-riding safer, quicker, more fun) for bikers are also increasingly important to persuade people to cycle.

- In addition to roads and facilities, there are various **soft factors** that need to be in place. Such factors include awareness-raising, promotional and educational campaigns, strong local community of cyclists, local champions – opinion leaders in the city who are bicycle advocates. Leading by example by the municipality also helps: if municipality staff is encouraged to cycle and the mayor is often seen to ride a bike – such behaviour has a major positive effect on citizens.

Bicycle related innovations also help the proliferation of cycling. Manufacturers produce better, lighter, easier-to-use bikes, while electrification increases efficiency. A ten-mile commute by car takes 30 minutes from door-to-door, the same commute by bike requires 60 minutes, and by electric bike it takes 35 minutes, which is compelling enough to persuade people to use their bike instead of automobile. Bike-sharing systems are also important – especially in larger cities – to encourage cycling.

Public transport

People cannot always walk or bike in a city – and when they don't, they either drive a car – or consider using public transport, provided it has a competitive offer. Unfortunately, in many cities public transport is still considered an inferior transport mode what people only use when they have no other choice. This shouldn't be the case, though: a developed country is not where the poor have cars – it is where the rich use public transport.

What makes a good public transport system?

- **Usefulness:** using public transit people should be able to access all important destinations in the city. The important stops need to be located right at these destinations – and not a few blocks away. As Jeff Speck puts in his seminal work on walkable city: "Riders should be able to fall into the bus from a stool at a coffee shop."[40]
- **Clear structure**: people despise complicated line structures that require years just to understand, let alone learn. Good public transport systems have simple lines or loops with a small number of diversions – a structure riders can comprehend at a glance, and where they can easily find their way.
- **Frequency**: complicated line structure can be further exacerbated by infrequent rides. People hate studying schedules – they just want to go to the bus stop knowing that within 10 minutes the bus (tram or metro) will definitely arrive. Just like the structure: keep it simple. If a frequent enough ride cannot be ensured, many people will rather use their car.

[40] Jeff Speck: Walkable City – How Downtown Can Save America One Step at a Time (2012)

- **Pleasure**: public transport is supposed to compete with the automobiles – but it is a mission impossible if pleasure, the fun factor is not even considered when a public transport system is developed and run. As Darrin Nordahl states in his book on public transport: "The fun factor – inherent in automobile – is what missing in public transport."[41] Public transport stops are public spaces – just like public transport vehicles are mobile public spaces. How can they compete with modern cars if only function and not pleasure, design, user interface is considered when they are put in place? Why would anyone choose the bus over a car if the bus is dirty, crowded, smelly – not a nice place to be at all? The fun factor is the oft forgotten key ingredient of good public transport.

The main barrier to developing and running high quality public transport services in many cities is that – unlike many interventions helping walkability – developing and maintaining public transport is very expensive, and in most places publicly subsidised. Many cities around the world experiment with different business models to run public transport services. In Nottingham, UK, for instance, businesses providing free parking for their employees pay special tax – and revenues from this tax are used to develop the local public transport system. Or take the example of Tallin, Estonia, where public transport was made free for Tallin residents from 2013. Cities also try to digitize their public transport system and investigate models that enable on-demand mobility using public transport. Helsinki, Finland, has started a complex on-demand mobility programme with the objective of making personal cars unnecessary by 2025. These are experiments worth looking at and learn from their examples – but it is clear, that there is no one-size-fits-all solution – every city needs to deal with the challenge and find their localised response. Also, when it comes to public transport, it is important to consider the possible effects of new urban mobility services.

New mobility services

An intense innovation and development process is taking place in the mobility sector to offer new urban transportation alternatives. Venture capitalists also see a huge business opportunity in new mobility solutions: "In 2014, global venture-capital investments into mobility services amounted to more than $5 billion, up from less than $10 million in 2009."[42] One thing is certain: the urban mobility landscape is drastically changing, and new mobility services based on IT solutions, combined with the rapid advance of autonomous (self-driving) car technology has the potential power to disrupt current models of public transport very soon. As the development of public transport requires massive long-term investments, cities need to be aware of these developments when making decisions. The following table gives a quick overview the most important new mobility services:

	Traditional mobility solutions	New mobility services	
Individual-based mobility	Private car ownership	Car sharing peer-to-peer	A peer-to-peer platform where individuals can rent out their private vehicles when they are not in use

[41] Darrin Nordahl: Making Transit Fun (2012)
[42] McKinsey&Company: Urban Mobility at a Tipping Point (2015)

	Taxi	E-hailing	Process of ordering a car or taxi via on-demand app. App matches rider with driver and handles payment.
	Rental cars	Car sharing – fleet operator	On-demand short-term car rentals with the vehicle owned and managed by a fleet operator.
Group-based mobility	Car pooling	Shared e-hailing	Allows riders going in the same direction to share the car, thereby splitting the fare and lowering the cost.
	Public transport	On-demand private shuttles	App and technology enabled shuttle service. Cheaper than a taxi but more convenient than public transit.
		Private buses	Shared and Wi-Fi-enabled commuter buses available to the public or to employees of select companies. Used to free riders from driving to work.

5. Table: Modes of mobility. Source: McKinsey&Company: Urban Mobility at a Tipping Point (2015)

4.5.5.3 Mix of transport modes in CityWalk

The mix of transport modes - dealing with public transport and enabling new mobility services in cities is a huge topic, which goes well beyond the scope of CityWalk project. Certain aspects of the issue will certainly be covered, so that partner cities can deal with the challenge when preparing their pilot walkability plans. More specifically, this issue will be touched upon:

- In the Walkability Planning Guide in WP3
- In the Walkability Guide and the Good Practice Catalogue to be developed in WP4.

Given its importance and scope, however – and also the relative lack of information especially in small- and medium sized cities in Europe, we believe it is worth considering the implementation of a transnational project to collect, develop and disseminate knowledge regarding this major challenge.

4.5.6 Raising awareness, encourage walking (and discourage car use)

4.5.6.1 What is the issue? Why is it important?

Careful planning, high quality walking infrastructure, street design, integration of walking with other transport modes and measuring the level of walkability are all important ingredients of creating optimal conditions for better walkability and increase the proportion of walking trips at the expense of car use. However, walking, cycling and using public transport instead of driving requires major behavioural change – a behavioural change on community level. And behavioural change does not happen just because there's better infrastructure for walking and cycling (and better public transport service, for that matter) in place. People need to understand the importance of change, the benefits for the city, the community and the global climate – and, more importantly, they need to perceive that the (preferably measurable) benefits they enjoy because of the change far exceed the sacrifices they need to make. (Because there are always sacrifices.) And this is where a wide variety soft interventions come into play.

4.5.6.2 How to convince people to change behaviour?

As always, the specific interventions necessary to persuade people to leave their cars at home (or better, don't even buy a car in the first place) and use the combination of walking, cycling, public transport, and occasionally car sharing instead, are different from city to city. Factors influencing the choice of actions include city layout, level of development, local mobility habits, traditions, culture, etc. Nevertheless, it is possible to identify types of actions that can serve as a starting point, and are worth considering for adaptation or as inspiring new solutions.

1. **Commitment building, education and awareness raising**: people should understand why drastic change in the urban transport system is necessary – they need to see the *WHY of walkability*. Therefore, actions aimed at explaining the rationale (always adapted to the target group) are all important. Some examples:

    a) **Participatory planning**: it is essential to involve the local community already in the very early phase of walkability planning. Citizens need to be active part of identifying the barriers and challenges hindering walkability, and they should be part of designing the solutions, too. This strengthens their commitment, creates ownership of the plan and make them support the delivery process.

    b) **Educational programmes**: raising awareness needs to start at an early age, so children need to be part of the process. Educational programmes for schoolchildren to explain the importance of sustainable urban mobility, as well as specific actions targeted at children and promoting walking are both useful. One premier example of such actions is the organization of "walking buses" and "bike trains". Walking bus (or bike train) is essentially an organised group of children (accompanied by adults) following a specific route and timetable to walk (or bike) to school. It is good (and educational) for the children, convenient for the parents and even reduces rush hour traffic.

    c) **Awareness-raising campaigns** to show people the dangers of sedentary lifestyle and the individual and community level benefits of regular walking and/or cycling. The more active the campaigns are (meaning: actively involve people in the

promoted activity), the more effective they are. Examples include Ciclovía events (originated from Colombia, Bogota, blocking off certain city streets to cars for runners, walkers, skaters, bikers every week for a certain period of time), or "bike to work" days.

d) **Leading by example**: just like in promoting bicycle use, leading by example is important. The municipality staff, city leaders also should commit themselves to active transport and demonstrate this commitment – they have to "walk the walk", not just talk about it (although regularly talking about the importance of walking is also helpful). If a mayor or vice-mayor is often seen walking in city streets, actively participates in neighbourhood "walkshops" to identify barriers to walking and possible solutions, regularly shares her / his daily step count on social media channels, people will see that walkability is something the city leaders are really committed to.

e) **Gamification**: everyone – not just children – love to play. If there are playful ways to participate in the change process, people will more likely join. That is why gamification is such an important part of promoting walking. Challenges to walk a certain distance every day, competitions between companies, schools, granting awards to the best performing institutions or individuals are all possible ways to involve people. (And in the age of cheap activity trackers – or even smartphones counting steps and distance such campaigns are easy to implement). The more people the challenge can mobilise, the better it is. Like the example of Oklahoma, US: after it was named the fattest city in the US, the mayor (leading by example) announced the "The City on a Diet"[43] campaign, with the ultimate objective of losing a total of 1 Million pounds. They have not only met their objective and became one of the fittest city in the US, but as part of their journey they raised taxes with the full support of residents to fund USD 917 Million worth of public improvements aimed at advancing quality of life (including many walkability related investments).

2. **Local regulations**: in many cases simple local decisions, regulatory changes can have bigger long term impacts than massive investment projects. Certainly, the level of freedom of a local government to decide on regulatory issues changes from country to country. Nevertheless, it is worth exploiting the possibilities in this area, too.

a) **Parking**: as practically every car trip starts and ends in a parking space, it is easy to see why dealing with issues related to parking is so important. Every parking space requires at least 15m^2 of valuable (and increasingly scarce) urban public space, and an average driver uses 2 to 5 parking spaces every day. A survey in Graz, Austria shows that while only 47 % of daily trips is done by cars, 92 % of public space for stationary traffic is used for parking cars, while pedestrians (walking trips account for 19% of daily trips) used a mere 3 % (in the form of benches, street cafés, etc.)[44]. Nevertheless, the public debate about parking is still dominated by emotional

[43] http://www.thiscityisgoingonadiet.com
[44] Austrian Mobility Research 2011 and City of Graz 2013

judgement by citizens, preventing decision-makers to deal with parking in a rational manner. And poor parking management also contributes to congestion in the form of cruising for parking. Though drivers also dream of excessive and preferably free parking spaces, the policy of free parking only increases congestion in cities. Active parking management in the form of introducing paid parking, increasing parking fees, reducing or restraining parking supply (maximum parking standards instead of minimum standards, for instance), however, can gradually lead to a more sustainable urban transport system.

b) **Speed limits** and other simple traffic calming measures: one of the key conditions of better walkability is increased traffic safety – and there's a cheap way of significantly improving safety: reducing the speed of cars. Doing so requires the introduction of speed limits and the use of traffic calming infrastructure (like speed bumps, bollards, elements to narrow the street, etc.). And the results really worth it: while only 1 in 10 pedestrians survives being hit by a vehicle travelling at 60 km/h, 9 out of 10 survives if the vehicle travels at 30 km/h! Every city should start by reducing speed limits in small streets to 30 km/h – making these streets safer and even suitable for bicycle ride even without building dedicated cycle path or lane.

c) **Building regulations to promote density**: to make a neighbourhood more walkable accessibility is the top priority – and in dense mixed neighbourhoods access is guaranteed without major demand for mobility. Local building regulations, therefore, should orientate investors (provided they have the freedom to do so) towards dense developments with mixed use (residential, shops, businesses, schools, etc. in the same area).

d) **Road building regulations**: speed limits may reduce speed – narrower roads definitely do. If it is possible, local road building regulations should aim at narrower carriageways / lanes; such an approach – often referred to as road diet – has the added benefit of having more space for other functions like sidewalks, dedicated bike lanes, bus lanes and even outdoor cafés.

3. **Economic motivators**: while the various interventions presented so far (including investments in better infrastructure) can all contribute to more sustainable public transport systems, economists tend to believe that the only thing that effectively and significantly drives people away from using their cars is pricing. As a recent article in The New York Times argues: "…This is because the average person prefers the privacy and convenience of riding in a car. Only when the drive is far enough or the traffic is bad enough — or a taxi costs enough — will more people choose to bike, car-pool, hop on a train or postpone a trip."[45] But how can we economically motivate people to change travel modes? There are various – albeit not very popular - options available.

   a) **Making car use expensive**: the simplest way to dissuade people from using their car is by making car use sufficiently expensive. Many big cities experiment with

[45] Conor Dougherty: Self-Driving Cars Can't Cure Traffic, but Economics Can (The New York Times, March 8, 2017)

congestion pricing, and despite certain difficulties London for instance managed to reduce inner city traffic. The already mentioned active parking management measures which – among others – make parking more expensive, also contributes to making driving more expensive (and thus, less attractive). (See also the Nottingham example in 4.5.5.2)

b) **Making public transport cheaper:** if people are to be persuaded to give up car use, the municipality needs to offer alternatives (walking is obvious, and biking if appropriate facilities are in place) – most importantly attractive, high-quality public transport offer – at a decent price. Both quality and pricing are crucial here – if the price of public transport usage is not significantly cheaper, people will rather stick to their cars. We have already discussed various attributes of good public transport in Chapter 4.5.5.2. Cities around the world experiment with different ways to keep public transport inexpensive (or even free, as in Tallin, Estonia, for instance). Solutions can include deeply discounted monthly, quarterly or annual tickets, special combined city cards that offer free ride plus discounts in local shops, restaurants and cultural institutions, motivations for companies to pay for the public transport usage of their employees, offering free public transport only for special target groups and only for certain periods (like for instance in Graz, Austria, where public transport is free for schoolchildren during the summer holiday).

c) Convenience, time: time is money, and saving time means saving money. If people realize that driving to work every day means spending significant time in congestion, and using (high quality) public transport (for instance buses in dedicated bus lanes), or even bicycle cuts their daily travel time in half, many would be tempted to leave the car at home.

Making car use more expensive is by no means a popular measure, and those affected – the car users – constitute a large and vocal group. It is not a surprise, then, that politicians find any excuse not to apply these measures until they do have other choice. True, applying these economic motivators (and demotivators) is a balancing act: requires thorough preparation (including consultation with those affected), and can only be done gradually (in Copenhagen, for instance from the seventies the municipality has reduced the number of inner city parking places by a mere 2% annually). In addition, the city needs to be able to demonstrate that there are other good quality alternatives prior to making car use more expensive.

4.5.6.3 Raising awareness, encourage walking in CityWalk

Raising awareness, using soft measures and local regulations to encourage walking and discourage car use are all crucial issues to make cities more walkable. Certainly it is not possible to elaborate every aspect of the topics covered in this chapter, but more details will be provided during the project, more specifically:

- In the Walkability Guide in WP4
- In the Good Practice Catalogue to be developed in (also in WP4)

4.5.7 Conclusions and the focus of CityWalk

In this chapter, we identify the most important implications of the issues identified for the delivery of CityWalk project.

CityWalk has been designed to accomplish several things, most importantly:

- To raise awareness of local governments of the importance of walkability - and its role in making urban transport more sustainable and, more generally, in improving the quality of life in cities.
- To provide clear arguments to local governments as to why walkability is beneficial to the city and its residents – arguments they can use to engage the various stakeholders;
- To enable municipalities to design and implement complex programmes to improve walkability – and to measure the level of improvement.

When it comes to target groups, our primary "customers" are the partner cities; however, dissemination of arguments, methods and tools on a much wider scale is an important mission of the project.

One of the key functions of this Baseline Study is to establish a common understanding regarding the state of the art and the key issues of sustainable urban mobility and walkability within the partnership. In addition, it also contributes to fine-tuning the design of the various deliverables to be produced in the course of project implementation.

Below we present the key implications for the various deliverables, based on the analysis of the key issues.

Work Package	Deliverable	Implication
WP3	D3.1.1 Baseline Study	-
	D3.1.2 Detailed presentation material	• Information enabling city leaders and officials to argue for the importance and the benefits of walkability is crucial; • While the Baseline Study is important source of such information, it needs to be presented also in a more visual, easy-to-digest format; • Both the presentation material (slide deck) and the infographics need to be flexible and easily adaptable to different uses; • The use of a modular design is proposed both in the case of the slide deck and the set of infographics
	D3.1.3 Infographics highlighting main findings	
	D3.2.1 Practical Guide on Walkability Planning	• Improving walkability is a complex task that needs to be carefully planned; • As there is limited practical experience in place methodological support is crucial; • In general, the Planning Guide needs to be hands-on, practical and specific; it has to serve the planning process as a blueprint, that includes information like:

		○ The key data to be used to analyse the situation and its sources; ○ Description of specific methodological tools (e.g. workshop methods, survey methods) to be applied during the planning process; ○ Templates necessary to deliver the various elements of the planning process (for instance a sample questionnaire) ○ Clear description of the overall planning process
	D3.2.2 Interactive 2-day training course on Walkability Planning D3.2.3 Training course delivered to min 10 participants	• The training course needs to guide the participants through the planning process, highlighting key issues, possible challenges, roadblocks and their solutions. • The delivery of the course needs to be highly interactive, allowing participants ample time to discuss and have their questions answered; • The use of the less known methodologies, tools needs to be demonstrated, not only explained.
	D3.3.1 Local walkability plans in partner cities prepared	• Cities will need regular possibilities to consult with experts during the preparation of their pilot plans; • The project needs to provide a platform where those involved in the planning process in the partner cities can share their experiences, good and bad practices, successes and mistakes to help each other.
	D3.3.2 - Training course to raise awareness of the wider audience designed and delivered D3.3.3 - Interactive workshop to engage professional audience designed and delivered	• The training course and the workshop need to serve as vehicles to recruit allies on local level, who will support the municipality in implementing the walkability plan.
WP4	D4.1.1 Practical Walkability Guidebook D4.1.2 - Sustainable urban transport and walkability good practice catalogue (online)	• The key function of the Walkability Guidebook and the Good Practice Catalogue is to present methodologies, solutions as well as inspiring, adaptable practices to address walkability challenges in cities. • The Baseline Study clearly demonstrates that the Guide and the Good Practice Catalogue definitely need to cover the following aspects of walkability in details: ○ Street design

		○ Issues related to establishing the proper transport mix ○ Active parking management to reduce car use ○ Awareness raising and gamification ○ Encouraging active transport using economic motivators;
	D4.2.1 - Detailed Methodology of Measuring, calculating and Using Walkability Index	"What's get measured, gets improved" Peter Drucker The Baseline Study also confirmed the importance using a quantifiable indicator to measure the level of walkability. On the one hand, such an indicator helps to monitor the progress, on the other hand, it can also serve as a "communication tool" to make residents understand why walkability is important for them. Combining the methodology with advanced internet-based solutions makes it easy to use, and helps to win over younger generations.
	D4.3.1 - Online Walkability Assessment Tool	
	D4.3.2 - Android and iOS mobile walkability assessment application	
WP5	D5.1.1 - Pilot Walkability Improvement Actions implemented	• Case studies, success stories are always effective tools to share knowledge and experience. The partners involved in the pilot actions need to properly cover and document the delivery of pilot actions – using descriptions, testimonies, pictures, videos – to provide inputs to the dissemination process.
	D5.2.1 - Walkability Guide test delivered and documented in partner cities	
	D5.2.2 - Walkability index measured for 5 neighbourhoods / streets in each partner city	-
	D5.2.3 - Online Walkability Assessment Tool tested by a group of citizens in each city	
	D5.3.1 - Local policy proposals to improve sustainable urban mobility and walkability	-
	D5.3.2 - National policy proposals to improve sustainable urban mobility and walkability	
	D5.3.3 - EU level policy proposals to improve	

	sustainable urban mobility and walkability	
	D5.3.4 - Final interactive workshops to engage local community opinion leaders	-

6. Table: Conclusions based on the issues (Source: own elaboration)

5 Examples of good practices in walkability from the partners

As part of WP4 an extensive good-practice catalogue will be prepared. Nevertheless, we already present here some typical policy answers / good practices provided by the partners.

Name of the good practice	City/ Country	Preliminary categorization						
		Measuring walkability	Walkability analysis / survey / planning	Land use and street design	Transport mode mix	Awareness raising and motivation	Regulation	Other
Well-connected city parts, good layout of city centre	Szeged/ HU			■	■			
Pedestrian Guidance System	Budapest /HU					■		
Reconstruction of the Town square in Ptuj	Ptuj/ SI			■				
Complex reconstruction of the Slovenska street	Ljubljana/ SI	■	■	■	■	■	■	
Pedibus and Biketrain	Ljubljana/ SI					■		
Cycle Belgrade	Belgrade/ RS		■	■	■	■		
Extension of the pedestrian zone of Knez Mihailova Street	Belgrade/ RS		■	■		■		
Extension of the „BULVÁR" pedestrian zone	Žilina/SK			■				
Urban Mobility Management	Žilina/SK				■			
Shared Space/encounter Zone for the university roundabout	Graz/AT						■	
Transport and public safety development of city centre in Varaždin	Varaždin/ HR			■	■			■
Development of cyclotourism in and around Varaždin	Varaždin/ HR			■	■	■		
Integrated urban transport project implementation	Varna/BG				■			
Modernization of the railway node Pilsen - new pedestrian	Pilsen/CZ				■			■

Name of the good practice	City/ Country	Preliminary categorization						
		Measuring walkability	Walkability analysis / survey / planning	Land use and street design	Transport mode mix	Awareness raising and motivation	Regulation	Other
underpass and adjusted pedestrian routes					■			■
Design pedestrian traffic solutions	Pilsen/CZ		■	■				
Rehabilitation of Unirii Square	Oradea/ RO			■	■	■		
Cycle path between Berettyóújfalu and Oradea	Oradea/ RO			■	■	■		
Implementierung Büro für Umwelt und Mobilität	Weiz/AT	■	■	■	■	■	■	■

Name of the good practice	Well-connected city parts, good layout of city centre					
Country of origin	Hungary					
City of origin	Szeged					
Population of the city of origin	162,621					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	**Land use and street design**	**Transport mode mix**	Awareness raising and motivation	Regulation	Other
The problem the good practice addresses	The city of Szeged is the 8th largest city of the country (281 km²). Taking into account its population – 162,621 – it is the third biggest city. Many people live relatively far from the city centre and they need to get to their workplaces, to schools or to other service providing institutions, which are usually more likely to be located in central areas. Since there is a limited number of parking places in the city centre and there are evident – high – costs of maintaining cars, not everyone can afford to use the car as a primary mode of transportation in everyday life. Additionally, there are negative side-effects of individual car transport, such as congestion, that are inevitable. Therefore, the city needs to provide other, sustainable modes of transportation for locals to satisfy their daily needs. Taking a different aspect into account, the citizens of Szeged, as people from developed areas of the world in general, are usually quite lazy, like comfort and don't want to do more physical activity than necessary. This phenomenon is not favourable from the point of view of population, since it leads to obesity and other health related issues. So we need to motivate people to do more exercises, from which the simplest, cheapest and most obvious is walking, that can be incorporated into anyone's life easily.					
Short description of the interventions implemented	To address the previously mentioned issues of the city, several interventions have been done and are being done putting emphasis on sustainable urban transport development, i.e. working out a Sustainable Urban Mobility Plan. To handle the issue of distances between city parts and to provide alternative transportation opportunities for citizens, plenty of public transport facilities are available. Szeged is one of the 3 Hungarian cities where trolley buses are present and here we can find 6 lines of them. Furthermore, the city is also one of the four Hungarian cities where there are tramways; here 5 lines of them exist. Moreover, there are also 33 bus lines in the city. The fares of public transport are also quite reasonable, a one-way ticket					

	bought in advance costs just one euro. It is also worth mentioning that several low-floor vehicles circulate in the city, which means a huge help for the disabled and the elderly. Lately, in the past 5 years numerous monitors – in 107 public transport stops – have been installed for the passengers' information. The city layout definitely attracts people to walk in the city centre. In fact, it is more advisable to choose walking as a transportation mode rather than driving or using public transport in the downtown of Szeged, since it is the most practical option. Thanks to the fact that the city centre has a nice layout with pedestrian areas, benches, parks, plants, good lighting, numerous restaurants, cafes, confectioneries and regular social events, such as fairs and festivals, it welcomes everyone for walking.
Benefits of the interventions	All the interventions mentioned above are in favour of the sustainable urban transport. The wide network of public transport with several types of vehicles, acceptable prices, plenty of public transport stops all around the city and frequent schedules encourage people to use public transport. In this way, if the individual motorized transport of cars is fewer, the amount of congestion, contamination, air- and noise-pollution, CO2 emission are also significantly reduced. Moreover, if people walk on a regular basis thanks to the welcoming environment and practical city layout, the health issues connected to the lack of physical activity, such as heart disease, diabetes, obesity and high blood pressure can also decrease. Additionally, if people walk in front of retail shops, restaurants, cafes and confectioneries, they are more likely to consume or purchase something there, so it contributes to the local economy, too.
Source of information	https://www.szegedvaros.hu/ http://szegedkozlekedes.hu/ http://szkt.hu/ Szeged Megyei Jogú Város Gazdasági Programja 2015-2019

Name of the good practice	Pedestrian Guidance System
Country of origin	Hungary
City of origin	Budapest
Population of the city of origin	1,759,000

Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	Transport mode mix	**Awareness raising and motivation**	Regulation	Other

The problem the good practice addresses	The infrastructural and tourist features of Budapest would make higher rates of pedestrian traffic possible, but mobility as a pedestrian is difficult both for residents and for tourists in the city, actually. The main underpasses and nodes are overcrowded, necessary information is not properly available at any requested languages, pedestrians can be lost in the "urban jungle" without clear guidance. Because of these facts, walking in Budapest not comfortable and attractive enough: relatively a small ratio of people approach their destination on foot.
Short description of the interventions implemented	One important tool of the development is "FUTÁR" (COURIER) online route planner application that makes searching simpler and more accurate. The operability of the "FUTÁR" is based on GIS development. Other main – tactile – element of the system is the network of information totems with unified maps, arrows and intelligent screens. The totems are located in crossings/underpasses with high traffic level and near the most visited tourist sites of the inner city as well as in the main public transport nodes of the outside districts – usually every 300-500 meters. The aim is the full coverage of the inner city by the totems. Between the information totems, sign poles with arrows help the orientation. Totems include static and digital information – the latter can be varied optionally according to the relevant information (e.g. in case of bigger cultural or sport programs). Main information of the totems: - yellow roof with pedestrian pictogram, - name of the given district/public space, - directions to the main near destinations, - digital screen (with the application "FUTÁR") or two maps showing an area walkable in 5 and 15 minutes, - list of tourist sites, streets, legends, logos, contacts, QR-codes.

	The system is designed modularly: it can be supplemented with wi-fi, meteorological sensors and surveillance cameras.  The system includes 6 intelligent totems, 59 static totems and 43 sign poles. The total cost of the intervention including the development of necessary infrastructure and GIS background is HUF 220,000,000 (cc. EUR 710,000). According to preliminary calculations, it can be implemented within 6 months.
Benefits of the interventions	Pedestrian can gain clear, specific and up-to-date information on the direction and distance of the near tourist attractions. Due to the comprehensive information, willingness and motivation of inhabitants and tourists to walk increases. Reach of destinations and tourist sites is easier, overcrowding can be reduced.
Source of information	www.bkk.hu

Name of the good practice	Reconstruction of the Town square in Ptuj					
Country of origin	Slovenia					
City of origin	Ptuj					
Population of the city of origin	23,137					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	**Land use and street design**	Transport mode mix	Awareness raising and motivation	Regulation	Other
The problem the good practice addresses	Before the reconstruction walking in the city centre was unsafe and unattractive because of poor condition of pedestrian infrastructure and relatively high rate of motorization. 1st problem: high risk of accident - worn out paving stones (the paving stones were subsided and partially fixed with the layers of asphalt), - elevated sidewalk (curbs), 2nd problem: discrimination – non-barrier-free pedestrian traffic - poor access for physically disabled citizens (different levels between streets and sidewalks, cracked walking zones…) - no easy access to City Hall's stairway for physically disabled persons 3rd problem: low utilisation rate of public spaces because of uncomfortable and uninteresting urban environment - lack of urban equipment (trash bins, benches, etc.) - no attractive green areas around the streets and central town square - inappropriately positioned planters					
Short description of the interventions implemented	With reconstruction project – outdoor renovation of town square, City Municipality Ptuj managed to create a completely new arrangement of central square in old town area, which represents the historical and cultural heritage: new paving stones around the market place (2.455 m²), well arranged square in front of City Hall and Café Florijan, horticultural plantings, a public lighting and rainwater draining system were built, streets in the proximity of central square were renovated. They also placed a new well, which represents a Roman fountain and improves liveability for all the residents and visitors.					

	 The project was implemented in 2014 and partially funded by the European Regional Development Fund (total budget: EUR 958.501,22).
Benefits of the interventions	- More attractive urban environment resulting from the renovation of protected central town square, - Improved urban environment and public wellbeing, - Enhanced attractiveness, competitiveness and efficiency of central area in terms of space usage, - New conditions for commercial and business opportunities, - Maintaining and creating jobs, - Improved conditions for physically disabled persons (improved accessibility to public buildings, cafés, shops, etc.). Renovated city centre ensures better environment for recreation, cultural activities, sightseeing, entertainment and events. The city can offer a wide range of cultural, commercial and F&B services. The renewed urban environment is more suitable for walking and more attractive to pedestrians. Indirectly, the project had positive impacts on preserving and creating jobs.
Source of information	City Municipality Ptuj, http://www.ptuj.si

Name of the good practice	Complex reconstruction of the Slovenska street					
Country of origin	Slovenia					
City of origin	Ljubljana					
Population of the city of origin	288,179					
Preliminary categorization						
Measuring walkability	**Walkability analysis / survey / planning**	**Land use and street design**	**Transport mode mix**	**Awareness raising and motivation**	**Regulation**	Other
The problem the good practice addresses	Ljubljana as a middle-sized Central European capital had to face several transport problems and challenges: - limited cycle track (cyclists must avoid bus stops, South-North direction used to be one-way type), - narrow walking zone, - air and noise pollution due to dense traffic, - low accessibility for physically disabled citizens (sidewalks were not barrier-free), - traffic jam (Slovenska street was the most loaded street in central area of Ljubljana), - lack of green areas (no space for green plantations due to narrow sidewalks), - inappropriate areas for urban community life, - unappealing area for business and commercial activities.					
Short description of the interventions implemented	Sustainable transport system of Ljubljana includes a combination of different innovative tools: urban electric trains, a public bike-sharing system ('BicikeLJ'), designation of an ecological zone, optimized bus routes, installation at bus stops of modern real-time displays, introduction of a contactless smart card ('Urbana'), P+R system at a very competitive price. The main interventions towards walkability of the Slovenska street were as follows: - reconstruction and reorganization of the common traffic zone for public and sustainable transport (walking zone and common traffic zone for public transport and cycles), - extension of walking zone, - accessibility for physically disabled citizens (barrier-free sidewalks, better positions of the bus stops), - sustainable transport establishment, - ensuring safe and security for all traffic participants (equal traffic rules for all participants),					

	- arranging comfortable public places (comfortable benches, trees), - construction of central public area.  
Benefits of the interventions	Transportation in Ljubljana has changed dramatically over the past decade. From a city which was rapidly becoming dominated by the car, the focus has now shifted to ecofriendly alternatives. In 2013, Ljubljana modified the traffic flow within the city to limit motorized traffic and give priority to pedestrians, cyclists and public transport. Cycling is also increasing, with over 3.5 million journeys using the 'BicikeLJ' bike-sharing system since 2011. Future transportation plans are promising in Ljubljana. In 2012, the city adopted goals that will see public transport, non-motorised traffic and private vehicles account for equal one-third shares of all transport by 2020. Main results of the new urban traffic system: - Reducing emissions caused by transport - Increased usage of public and sustainable transport, - Decreasing rate of personal motorized transport - More intensive community life in the central area,

	- Increase of business and commercial activities due to accessible and appealing area.
Source of information	www.ljubljana.si http://www.greenljubljana.com Press release of the European Commission (Brussels, 24 June 2014) Environment: Ljubljana European Green Capital 2016, http://ec.europa.eu/environment/europeangreencapital/wp-content/uploads/2014/04/EGCA-winning-city-2016-Ljubljana-F01.pdf

Name of the good practice	Pedibus and Biketrain					
Country of origin	Slovenia					
City of origin	Ljubljana					
Population of the city of origin	288,179					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	Transport mode mix	**Awareness raising and motivation**	Regulation	Other
The problem the good practice addresses	Educating people on mobility examples is very important in determining which mode of travel the young generation will choose upon gaining their independence. At a time when the level of motorisation in Slovenia is higher than it has ever been, transportation of youth is also focused more on motoring. Children who are driven by car (even over short distances, such as to school or kindergarten), have lower mobility, are less healthy, have lower physical stamina, are less skilled in autonomous conduct on the road, while their spatial orientation in their home district is also bad. Another important fact is the way someone arrives to school can be an important social event and contributes to social inclusion of young people. The described example of good practice addresses the problems of motorised arrival to school of many children, as well as the mobility habits in school, the social responsibility of schools, and congestion and road safety around schools.						
Short description of the interventions implemented	Pešbus and Bicivlak (Pedibus and Biketrain) are organised forms of transporting children to school, chaperoned by adults. The aim is to encourage children, parents and schools to use non-motorised mobility on the way to school and home throughout the year. To process of going to school by bike or on foot begins every morning before classes, children from one district come to school together by bike (bicivlak) or walking (Pešbus). Children travel to school along a predetermined route, and according to a pre-defined schedule to transport children to school, but the group is always accompanied by a certain number of adults. In Slovenia, the project is coordinated by the Institute for Spatial Policies (IPOP), supported by the Ministry of Health. The target group for Pešbus are first and second grade primary school students, while Bicivlak is intended for children between the ages of 6 and 11.						
Benefits of the interventions	The project has shown school children that travelling to school can be an important part of socialising. At the same time, it also contributed to gaining greater independence and punctuality (whoever missed Bicivlak or Pešbus had to go to school alone). In						

	addition to children forming better social ties amongst themselves, parents also got to know each other better. Children gained significant experience of active social behaviour and participation in traffic. Since the project was carried out in all types of weather, they also experienced a rainy walk to school. Parents were also satisfied with the project's implementation, and have, together with the school, shown that cooperation can contribute to better environmental education and social responsibility. Travelling to school was safer because it was organised with chaperoning adults, and there was less traffic congestion in the vicinity of schools, as fewer children arrived by car. Thus children were more physically active. Additionally, they also learnt a valuable lesson of how they can contribute to reducing traffic pollution and greenhouse gas emissions.
Source of information	http://zdravsolar.si/ Prinčič, P., Peterlin, M., 2016. Pešbus and Bicivlak: Sustainable mobility in practice. Compendium of good practice. Ljubljana. IPOP. 56 p. Healthy schoolboys and schoolgirls go to school by pešbus and bicivlak – even in the rain, material on the Bicivlak and Pešbus project, forwarded by Marko Petrlin, IPOP

Name of the good practice	Cycle Belgrade
Country of origin	Serbia
City of origin	Belgrade
Population of the city of origin	1,659,440

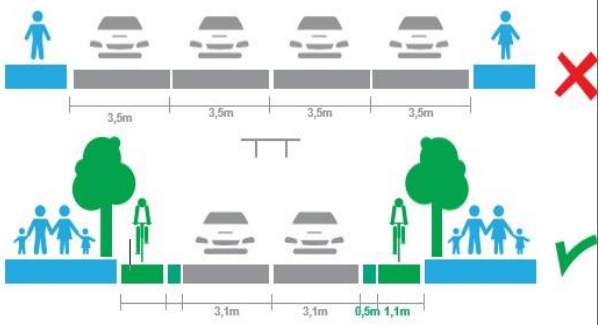
Preliminary categorization						
Measuring walkability	**Walkability analysis / survey / planning**	**Land use and street design**	**Transport mode mix**	**Awareness raising and motivation**	Regulation	Other

The problem the good practice addresses	Today, cycling in Belgrade is seen as recreation. The goal of this project is that the bicycle becomes a mode of transportation and that it is used for going to work, college, for going out, procurement and conducting all other daily activities. In the current state of transport system of Belgrade, the bicycle's modal share is close to zero, much less than any capital in the European Union. Reducing the number of daily trips by car would prevent the growth of traffic congestion and reduce pollution and noise levels. As the number of cars on the street increases, the city becomes less humane and the quality of life is reducing. Until now, Belgrade has built its transport and traffic infrastructure according to the needs of motor vehicles. But this is no longer sustainable, as the population and car ownership increases. Constraints on space mean that central areas of the city can no longer meet the needs of motor traffic, especially private cars. Therefore, Belgrade must develop infrastructure for non-motorized traffic. Planning and applying a new traffic regime will raise and share of non-motorized transport in the distribution of daily trips. Cycling needs the right conditions to grow. These include the development of a safe and attractive cycling network, parking for bicycles and other accompanying services. The CYCLE BELGRADE project will transform the traffic system of the city, with significant expansion of the existing bicycle network.
Short description of the interventions implemented	CYCLE BELGRADE is a key part of the city's sustainable urban mobility strategy. The aim is to redefine the hierarchy of traffic, so that pedestrians and cyclists have priority. It will also raise awareness of environmental protection, through the development of green modes of transport. The main outputs of CYCLE BELGRADE are the following: - 120km of new cycle network, - 150 public bicycle-sharing stations, - 200 bicycle parking locations,

- education and campaigns

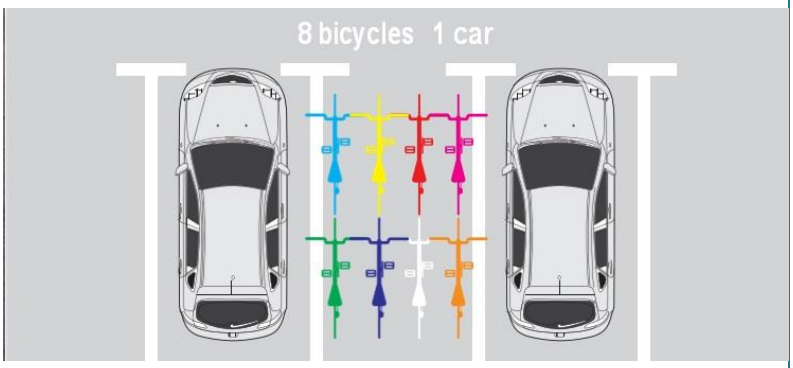
We need to build proper cycling infrastructure to develop bicycle traffic as a mode of transport in urban areas. This means constructing and reconstructing streets, as well as thoroughly changing the existing regime of traffic.
Infrastructure is just one part of the story. To increase bicycle use, we need to introduce a bike-sharing system as an alternative to motorised traffic and provide secure places for people to park their bikes. With education and campaigns aim to raise awareness of safe and sustainable urban traffic.

EXPANSION OF THE BICYCLE NETWORK
Belgrade's existing bike network has only 83 km. The project will add 120 km of new cycle lanes to the existing infrastructure. Around 90 km of these will use the existing street network and green areas. The remaining part of the planned expansion of the bicycle network of 30 km will be implemented through the reconstruction and construction of streets.



An example of the street's profile transformation

BICYCLE PARKING
The City of Belgrade has identified 200 bicycle parking locations, mainly in front of public institutions, universities and the edges of the pedestrian zone - as well as other centres of attraction. As cycling increases, so will the demand for bicycle parking, thus further installations will follow.



CYCLING CULTURE

Together with good infrastructure, creating a culture of cycling represents the beginning of a change that leads to a culture of sustainable mobility. An important part of the culture of cycling is respect and coexistence of all traffic participants. The development of bicycle traffic is no longer an option, but a necessity.

Benefits of the interventions

Walking and cycling are the healthiest and most environmental-friendly forms of transport. Besides, it offers a great number of advantages compared to other modes of transport.

Changing the hierarchy of traffic which gives priority to cyclists and pedestrians significantly raises the quality of life, thus contributing to a healthier neighbourhood, the health of citizens and reducing the need for investing infrastructure for motor vehicles.

The main objective of the project CYCLE BELGRADE is increasing the share of bicycle traffic from the current 0.7% to 5% in two years, and to 10% in the next 10 years.

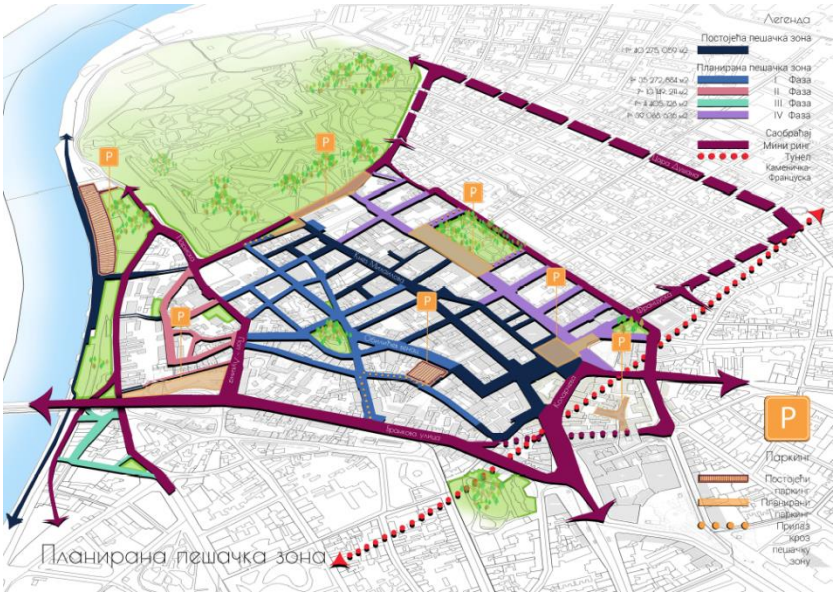
EDUCATION AND CAMPAIGNS

In the attempt to increase bicycle traffic in the long run, citizens should be informed about benefits of cycling. Also, future generations need to learn about cycling early and be brought up

	in a cycling culture. Therefore, the promotion of cycling among children and adolescents is one of the main priorities of the CYCLE BELGRADE project. The City of Belgrade plans to organise a series of activities and events in cooperation with cycling associations, including: - panel discussions and lectures on bicycle safety, - Mobility Week, - promotion of cycling in socially responsible companies, - construction of polygons for training of children in traffic, - educational workshops for the maintenance of bicycles. COOPERATION WITH CITIZENS Cooperation between the city administration and the population is a key part of the promotion of a bicycle culture in Belgrade. This gives a clear signal to the whole population about the readiness of Belgrade to be included in the family of European cities that care about sustainable development and urban mobility. So far, through cooperation with cycling associations and opinion polls of cyclists, 30 locations have been selected for parking bicycles and a certain number of the routes planned for the bicycle network.
Source of information	City of Belgrade www.beograd.rs

Name of the good practice	Extension of the pedestrian zone of Knez Mihailova Street					
Country of origin	Serbia					
City of origin	Belgrade					
Population of the city of origin	1,659,440					
Preliminary categorization						
Measuring walkability	**Walkability analysis / survey / planning**	**Land use and street design**	Transport mode mix	**Awareness raising and motivation**	Regulation	Other
The problem the good practice addresses	Belgrade is the Capital of Serbia and one of the leading cities in Western Balkans Region. Following its strategic goal to became smart city[46], Belgrade is faced by different challenges that are related with increasing urban traffic and congestion. They also have negative impacts on quality of life. Due to the above, Belgrade strives to shift towards approaches and policies for creating sustainable mobility. By analysing the overview of urban characteristics, open public spaces and quality of life of citizens and bearing in mind the current world trends in the field of urban planning and design, transport, protection and enhancement of natural and environmental surroundings and social development, the City of Belgrade initiated the project Identity_Mobility_Ecology (IME)[47] which comprises 20 sub-projects. The fourth project titled as "extension of the pedestrian zone of Knez Mihailova street" includes "the implementation of multiple projects in order to further develop the pedestrian zone in the heart of Belgrade, which started in 1980" (Folic and Vukmirovic, 2015)					
Short description of the interventions implemented	Extension of the pedestrian zone of Knez Mihailova Street includes implementation of multiple projects in order to further develop the pedestrian zone in the centre of the city. In this way, the City will develop "a green network" of pedestrian spaces in the city centre, which would interconnect the existing public spaces and spatial units of a broader significance for the urban identity all with the aim to reduce the use of private cars for transport and to create greener, healthier and more pleasant living space. The project will be realised in four phases that are temporarily and spatially defined (see Fig. 1). First phase of the project covers public spaces with the total area of 35,272 m^2 (see Fig. 1, blue). Part of this area is now in the phase of realisation (started in July 2015) and it will be reconstructed on the basis of the initial project for the pedestrian zone of Knez Mihailova street design by arch. Branislav Jovin during the eighties. Other parts of this area need to be designed and implemented until the end of 2018. Second phase includes the area of 10,149 m^2 located on a territory, which is under cultural heritage protection (see Fig. 1, rose). Third phase of the project includes street network in the Savamala					

[46] The City of Belgrade Development Strategy 2021 (Draft Version from January 2017)
[47] Adopted by the City Council on April 9, 2015

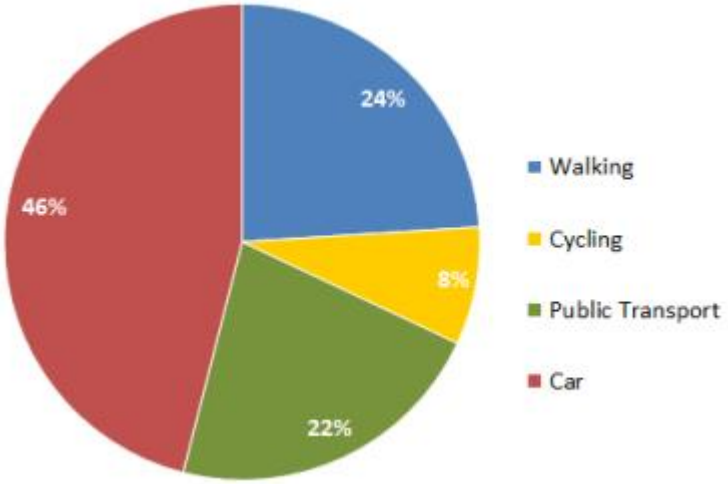
	district (see Fig. 1, green) with the total area of 4,405m^2. Finally, the fourth phase envisages the reconstruction of streets and public spaces along Vasina and Uzun Mirkova streets with the total area of 39,088m^2 (see Fig. 1, purple). This area needs to be designed and implemented until the end of 2019. Mentioned phases and areas have their own characteristic and function (zone of hospitality, zone of history, zone of culture and trade zone.  Figure 14: Project of the Extension of the pedestrina zone of Knez Mihailova Street. Source: Delipara, A. 2015
Benefits of the interventions	For the purposes of verification and further elaboration of this project, the city authorities conducted two documents - Spatial-ecological valorisation of the future pedestrian zone of Belgrade (Glumac at al. 2015) and Feasibility study of enlargement of pedestrian zone Knez Mihailova Street (CEP 2016). According to the valorisation, the extension of the pedestrian zone Knez Mihailova Street is the "most effective way of achieving environmental protection from the consequences of intense traffic, primarily for protection against noise and air pollution with the aim to reduce its level of the central zone of the city". On the other hand, the study (CEP 2016) provided different dimensions and variants of the project implementation. The study set several goals related to general conditions of bicycle transport in the centre of the city, logistic inside the area of pedestrian zone, smart functioning of the garbage disposal system, organisation of the public events, development of the GIS database, functioning of the taxis and functioning of the touristic transport. In this way, both documents reflect a general positive attitude regarding this project and initiative.
Source of information	- CEP 2016. *Studija izvodljivosti proširenja postojeće pešačke zone Knez Mihailove ulice*. Studija izvodljivosti, CEP, Beograd (CEP. 2016. *Feasibility study of enlargement of pedestrian zone Knez Mihailova street*, Feasibility study, CEP, Belgrade)

- Glumac S.; Sterđević, B and Košpić S. 2015. *Prostorno-ekološka studija buduće pešačke zone Beograda*. Prostorno ekološka valorizacija, Beograd: Grad Beograd – Sekretarijat za zaštitu životne sredine (Glumac S.; Sterđević, B and Košpić S. 2015. *Spatial-ecological study of the future pedestrian zone of Belgrade*. Spatial ecological valorization, Belgrade: City of Belgrade - Secretariat for Environmental Protection)
- Folic, M.; Vukmirovic, M. 2015. *Projekat IME: Identitet_Mobilnost_Ekologija Grada Beograda.* Beograd: Grad Beograd - Sluzba za informisanje (Folic M.; Vukmirovic M. *Project IME: Identity_Mobility_Environment*. Belgrade: City of Belgrade – Department for Communication)
- Vukmirovic M. "Sustainable Transport Development Strategies. Case Study: Extension of the Pedestrian Zone in Central City Area" in Cokorilo O. (ed.) *Proceedings of the Second International Conference on Traffic and Transport Engineering - ICTTE Belgrade 2016.* Belgrade: International Journal of Transport and Traffic Engineering - IJTTE, 25-26 November 2016

Name of the good practice	Extension of the „BULVÁR" pedestrian zone					
Country of origin	Slovakia					
City of origin	Žilina					
Population of the city of origin	83,532					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and **street design**	Transport mode mix	Awareness raising and motivation	Regulation	Other
The problem the good practice addresses	"Bulvár" pedestrian zone was designed in the mid-20th century and realized between the residential areas "Hliny I" and "Hliny II". It was originally part of the axis which began in the historical centre and led throughout residential areas "Hliny I" to "Hliny IV". When the shopping centre Aupark was built, this axis was interrupted. Originally intended optical and functional links are broken. Current status: "Bulvár" pedestrian zone constitutes a significant communications (walkway) axis within the city in north-south direction. This zone is made up of a set of residential buildings and public facilities. The current arrangement of "Bulvár" pedestrian zone does not provide any significant reason to remain longer in this place. It serves only as a corridor to pass through this area.					
Short description of the interventions implemented	The planned extension of the „BULVÁR" pedestrian zone creates a need for architectural interventions. Various forms of scale and proportions will be used to create a diversity of spaces. Street design tools contribute to creating different residential areas and public places with unique character.  "Bulvár" is composed of three longitudinal axes. Central axis serves to dynamic movement - is designed for up to fifth basic level of load (1.5 persons/m^2). Lateral axes are designed for static movement - the location of public facilities (e.g. outdoor cafés). "Bulvár" is transversely divided into three different zones. The first zone has a					

	environmental function characterized by originally planted trees. These are supplemented by artificial water surface. This symbiosis creates a unique space for sitting in the shade near the water. The central zone is characterized by dynamism and two different functions. This space is complemented by a statue of A. Bernolák. The third zone can be identified as a green enclave. It creates a counterpart of the first zone and offers an intimate space suitable for relaxing. Pavilion is located at the centre of this zone and increases the use of public space. 
Benefits of the interventions	- Attractive street design of the pedestrian zone, extended walkways and areas for recreation (especially on the more crowded east side). - "Bulvár" is accessible to vehicles only for the purposes of supply and rescue service, only short term parking is allowed (expansion of underground parking is not recommended).
Source of information	www.archinfo.sk/sutaze

Name of the good practice	Urban Mobility Management					
Country of origin	Slovakia					
City of origin	Žilina					
Population of the city of origin	83,532					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	**Transport mode mix**	Awareness raising and motivation	Regulation	Other
The problem the good practice addresses	The current state of mobility in Žilina is characterized by ever-worsening traffic, safety and environmental conditions. Quality of services is deteriorating in some parts of the city; infrastructure for the transport of persons, goods and services are in bad conditions. This is reflected in congestions, which cause appreciable loss of time, air pollution, parking difficulties and other economic, social and environmental problems. There are various factors contributing to these problems and challenges: - non-system approach to solving transport problems, - lack of basic tools for urban mobility, - land-use planning is not responsible and thoughtful enough, - inadequate legislation and governance, - insufficient human resources and financial background.					
Short description of the interventions implemented	The project ADVANCE aimed at the Mobility Action Plan of Žilina in 2013, which became the basis of the urban mobility management system. Its outputs are pointing to a Regional Transport General Plan of Žilina 2015 and Sustainable Mobility Plan of Žilina 2016. In these documents, the current state of the city was analyzed – using transport survey methods, as well as new city transport service model was designed that provides a conceptual solution to address all modes of transport at the same time.					



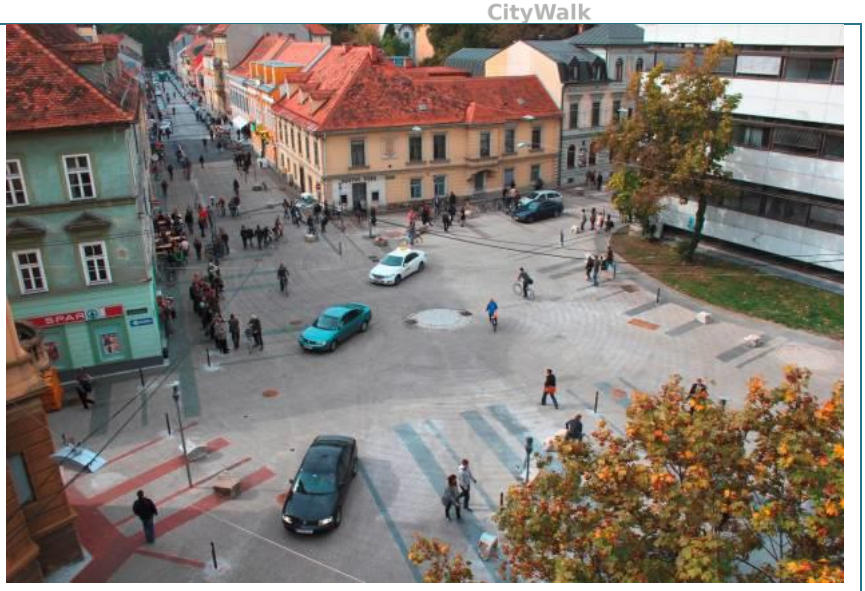
The aim of Sustainable Mobility Plan of Žilina is to increase the share of public transport and non-motorized transport.
In the frame of the project a common urban transport (mobility) policy was adopted that addresses the specific issues and problems facing Žilina.
Promotion and publicity of the planning process was innovative (e.g. campaign for using public transport, creative competition for children).

Benefits of the interventions	Ensuring the mobility in the urban transport system for local citizens and tourists: - increasing the attractiveness and vicibility of the city, - improving the quality of urban environment, - increasing the safety, - reducing air and noise pollution, - increasing the share of sustainable modes of transport.
Source of information	Sustainable Urban Mobillity Plan City Žilina (SUMP), in slovak, Celko, J. at al, University of Žilina, 2016 http://eu-advance.eu

Name of the good practice	Shared Space/encounter Zone for the university roundabout
Country of origin	Austria, Styria
City of origin	Graz
Population of the city of origin	280,200

Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	Transport mode mix	Awareness raising and motivation	**Regulation**	Other

The problem the good practice addresses	General rehabilitation of the „Sonnenfelsplatz“ was long overdue. The square was used by 15.000 vehicles per day. At its rush-hours 3,400 pedestrians and 640 bikers per hour the time left its marks on the square, but at the same time it shows that the automobile traffic is not the strongest part of the traffic load anymore. The traffic was overcrowded, no one felt safe, and all the traffic participants acted in this way: the strongest comes first! Its surface is damaged by lane groves and frost damages, the pipeline infrastructure underneath was also in need of rehabilitation. During the rehabilitation of the square, all infrastructure elements of the public utilities (gas, water, power, communication, etc.) were updated with the newest technology. The costs for the renewing of the square, the movement and renewing of the pipes and line, the lighting, the urban furnishing, and the one-and-a-half-year long evaluation of the project were EUR 750,000.
Short description of the interventions implemented	The aim of the concept “Shared Space” is to create a livable space for everybody and to improve the mobility culture through more tolerant and efficient co-being of people and vehicles participated in urban mobility. The public space should be organized to be a place of human encounter which will transform into communication and social interaction. Road user are not separated in height difference, they share the space responsibly. The aim of the originally Dutch innovative traffic system is to improve the mobility culture through the improvement of the togetherness of the different ways of mobility. In the concept of “Shared Space” there are no separated pavements and roadways, traffic signs or road markings – thanks to that, basic traffic rules are instinctively applied (e.g. right-hand rule). Through this action a planned insecurity is created which forces the road users to evaluate carefully the actual traffic situation – so decisions are taken in cooperation, by making eye contact with each other.
Benefits of the interventions	The model is based on Dutch examples, which show that road users in shared spaces watch out for each other more. This model increases the traffic shared with different vehicles and road users.

	 The traffic users take each other and each other's safety into account, and drive/walk slower. Bikers and pedestrians are now able to cross without detours thanks to the eliminated height differences. Shared space makes it possible to treat every road user equal. A feel able plan helps blind and visually impaired people can use a palpable map to understand the traffic situation at the Sonnenfelsplatz, and they can take a training for safe mobility. After two years of testing, the shared space was changed into an encounter zone. Now, Austrian law allows establishment such places, and according to the regulations pedestrians always have the priority compared to the other traffic participants. Vehicles are not allowed to drive more than 20 km and all the participants can decide which way they will take: the direct way or the round about traffic. Positive is that all the traffic participants take more care about the others. In addition to the safer traffic situation, shop and restaurant owners confirmed that the new styling of the place had a positive social and economic effects.
Source of information	http://www.stadtentwicklung.graz.at/cms/beitrag/10136328/5030273/

Name of the good practice	Transport and public safety development of city centre in Varaždin					
Country of origin	Croatia					
City of origin	Varaždin					
Population of the city of origin	46,946					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	**Land use and street design**	**Transport mode mix**	Awareness raising and motivation	Regulation	**Other**
The problem the good practice addresses	Due to interest of citizens the city centre was transformed into a pedestrian zone. In the narrow city centre it is enabled to walk and ride a bike in the most part. In accordance with the space planning, the city centre is first and foremost designed for pedestrians and with the planned expansions is dominated by pedestrian zones. Considering the tradition while reconstructing and maintaining streets and squares, attention was shown to upkeeping bicycle paths. Parking spaces and public garages are located on the edges of city centre.					
Short description of the interventions implemented	City centre of Varaždin is attended for pedestrians and mostly bicycle riders. Motor vehicle transportation within city centre is restricted to certain time periods when there is no pedestrian or bike traffic. Surrounding squares were created, streets were fixed, benches were set up; scenery and landscape architecture are intended for all citizens of Varaždin as well as tourists and bypassers. It is important to note that the city centre is a protected cultural good. In the pedestrian zone of Varaždin video surveillance is set up to prevent crime, for service to traffic and communal officers but also for tourism purposes and to increase the urban safety of the city (9 cameras on 7 locations). While setting up the cameras special care was given that they cover critical points where bikes are parked and where bike thefts were reported (3 cameras).					
Benefits of the interventions	The city centre is a historic core which is dominated by pedestrian and bicycle zones. A public garage is constructed in a way that it is underground with a square for pedestrians above it. Along the city centre there are partly created bicycle paths. Also, there is a bus station that is yet to be reconstructed as well as a bus stop for locally organised city minibus transport. While Špancirfest is held (festival of street walkers) wooden houses are set up in the city centre that serve as stores of traditional and handmade products as well as stands and stages					

	for concerts and other contents, offering all tourists and citizens safety and calmness across the city centre.
Source of information	Municipality of City Varaždin

Name of the good practice	Development of cyclotourism in and around Varaždin					
Country of origin	Croatia					
City of origin	Varaždin					
Population of the city of origin	46,946					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	**Land use and street design**	**Transport mode mix**	**Awareness raising and motivation**	Regulation	Other
The problem the good practice addresses	Based on its specific natural attraction, the area around Drava is growing from a local recreation zone into a tourist destination. This movement is supported by developing tourist attractions like the unique and innovative Drava Museum with a potential to be a new landmark for Varaždin. Considering the existing high value of natural surroundings, responsible management of space is not only a premise but a theme for tourism development of this zone. Setting up an arriving point for cyclotourism will enable the arrival of cyclotourists in the city. Specific cultural and tourism offers of the city are not suited for cyclists and one of the problems is that the city's bicycle paths are relatively poorly equipped with tourism signs and interpretations. Besides, in the city centre there is no information point and no rest stop for cyclists that would be adapted to the architectural specifics of the protected zone.					
Short description of the interventions implemented	Equipment and quality of sport infrastructure: uniqueness, challenge, path configuration, concentration of different paths in a small space, safety of paths (distance from traffic, signs), equipment of paths (rest stops, interpretations…) The pedestrian and bicycle paths are located in a regional park Drava Mura which is a protected natural good. Also, the realisation of project 'Cyclotourism Arriving Point' is underway; it will have its own power collector. The complete object will consist of a roof with steel construction, storage for bikes and toilet facilities with a shower and laundry. The roof will be transparent and made of polycarbonate plates. Under the roof there will be a notice board, a bench and charging stations for cell phones. The work continues on developing new bike paths for the needs of cyclotourism in accordance with the Strategic Plan for Tourism Development until 2020 (in 2016 there was a traffic signalisation marking done for the cyclotourism route City route Varaždin.)					

	In the city of Varaždin there are currently 6 charging stations for electric cars where two vehicles can be charged at the same time which supports the regulation and decrease of CO2 emissions.
Benefits of the interventions	Attraction of destination due to maintenance of space, uniqueness and atmosphere. Sense of place, authenticity as well as ecological considerations are valued. Locations in the city of Varaždin: - Drava, - Drava Forest Park, - international path, - surroundings: numerous paths of Varaždin and surrounding counties. Varaždin organises bicycle tours through different NGO's, including a night bicycle tour. It is intended to further promote tours and socialization of cyclists from the city and beyond. Setting up of the arriving point will enable recreation, while also provide rest stops in our city with the availability of other facilities (sports, cultural manifestations, festivals, events, shopping).
Source of information	Municipality of City Varaždin

Name of the good practice	Integrated urban transport project implementation
Country of origin	Bulgaria
City of origin	Varna
Population of the city of origin	400,000

Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	**Transport mode mix**	Awareness raising and motivation	Regulation	Other

The problem the good practice addresses	Traffic conditions in the city of Varna are relatively good and offer adequate level of service for private cars resulting in high vehicle speed and limited number of congested roads and intersections. This can be attributed to the Municipal policy that prioritises private cars traffic by enhancing the road network capacity, managing traffic and ensuring smooth car traffic flow at intersections. On the other hand, public transport in Varna, suffers from all kind of problems prevailing in similar big cities: old bus and trolleybus fleet, low operational speed, expensive fare system, especially for trips involving transfer/s, poor service quality, lack of adequate information for passengers, high operational cost and minimal length of dedicated public urban transport (PUT) lanes. In compliance with EU policy adopted in the Operational Programme "Regional Development" (OP RD), priority 1.5: "Sustainable Urban Transport Systems" aiming at attractive, fast, accessible and environmentally friendly urban transport, deployment of automated systems for traffic control and management of the urban transport processes and development of programmes for construction of cycling facilities, Varna Municipality has adopted a vision oriented to effective, attractive and sustainable urban transport development.
Short description of the interventions implemented	Promoting public transport, including: Developing a Bus Rapid Transit (BRT) corridor as a backbone of the PUT network with important priority to reduce travel time as well as incentive for passengers to shift to public transport on one hand and reduce expenses for PUT operator/s on the other hand. Achieving a faster PUT system by giving PUT vehicles priority within the existing right of way and at intersections and by introducing modern automated ticketing system. Ensuring attractive and high quality PUT service: this could be achieved by suitable reorganisation of the current route network, purchasing high quality, modern rolling stock, introducing

	competitive fares, and providing passengers with travel information in real time. Developing non-motorized modes: Cycling, together with walking, encapsulates all benefits of sustainable transport: it is free of charge, environmentally friendly, hardly causes any externalities (such as congestion, accidents, harmful emissions), could be satisfied in a limited space and requires relatively limited investment. Varna Municipality has a large investment potential in cycling facilities development due to the following reasons: 1. distances are relatively short and terrain is flat (except for specific limited sections and/or locations) 2. private cars usage or even PUT becomes less affordable due to rising fuel prices 3. a large number of students and young people 4. favourable weather conditions throughout the year. Public transport development policy: Development of the city centre and some residential areas along the main public transport corridors should be adjusted to take advantage of the new BRT system and minimize the need to invest in further expansion of the road network.
Benefits of the interventions	Component 1 Automated ticketing system Component 2 Bus Priority at Intersections Component 3 Real time passenger information system Component 4 PUT control centre Component 5 BRT corridor Component 6 Rolling Stock Component 7 Cycling facilities Component 8 Upgrade 3 bus terminals Component 9 Depot upgrading Component 10 Accessibility improvement
Source of information	Varna integrated urban transport project

Name of the good practice	Modernization of the railway node Pilsen - new pedestrian underpass and shortened pedestrian routes					
Country of origin	Czech Republic					
City of origin	Pilsen					
Population of the city of origin	169,858					
Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	**Transport mode mix**	Awareness raising and motivation	Regulation	**Other**
The problem the good practice addresses	The City of Pilsen as the fourth largest city in the Czech Republic has been until recently characterized by poor access to the main railway station by walking. The main problem was the spatial configuration of the accessing pedestrian routes to the main railway station and to the railway platforms. Although shortest distance between the centre and the main railway station is approximately 700 meters, the real walking distance has been amounted to cc. 1200 m. Walking distance to nearest public transit stop then amounted to 400 m. In both cases it was necessary to complete a walking trip through underpass under the heavily loaded crossroads. For these reasons, there has been realized the common investment by the City of Pilsen and RIA in the modernization of the railway node Pilsen.					
Short description of the interventions implemented	In the years 2013-2014, the first stage of modernization of the railway junction Pilsen was realised, which included the construction of new non-barrier accessible platforms. As a part of the modernization railway station, a new pedestrian underpass was building that resulted in shorter walking routes and adaptation walking routes and significant rerouting traffic flow of pedestrians. The accessibility of the city centre by walking has been significantly improved thanks to the design of new pedestrian underpass leading directly from the railway platforms to the tram and trolleybus stop. Taking into account that the new pedestrian underpass is designed as a passage through the whole area of the main railway station, there is a much better interconnection of two city parts.					
Benefits of the interventions	The new pedestrian underpass reduces the walking distance from the main railway station to the city centre from 1 200 m to 900 m. The city centre is also accessible in 10 – 12 minutes by walking. Thanks to reduced walking distance to nearest tram stop from 400 m to 100 m, it is also possible to access the city centre using the					

	tram. On this tram stop are operating two tram lines with relative short intervals (5 minutes interval in peak hour on each line). The average waiting time takes also cc. 2 minutes and motivates the pedestrians to use the tram to speed up the travel on short and medium distances. Nowadays, approximately 25,000 passengers use the Pilsen main railway station per day. Cc. 70% of them use the newly built pedestrian underpass. This can be estimated that on an average shorter path about 4-5 minutes there is a total daily travel time savings of about 75 000 - 87 500 person-minutes. The new pedestrian underpass and adjusted pedestrian routes will also connect the railway station with planned intermodal node, which should be realised between the railway station and trolleybus stop up to 2019.
Source of information	RIA (SŽDC) http://www.szdc.cz/modernizace-drahy/prehled-staveb/op-doprava/plzen1-prazske-z_cile.html City of Pilsen www.plzen.eu

Name of the good practice	Design pedestrian traffic solutions					
Country of origin	Czech Republic					
City of origin	Pilsen					
Population of the city of origin	169,858					
Preliminary categorization						
Measuring walkability	**Walkability** analysis / survey / **planning**	**Land use and street design**	Transport mode mix	Awareness raising and motivation	Regulation	Other
The problem the good practice addresses	At local level City of Pilsen – as the first city in the Czech Republic – designed the pedestrian traffic solutions in 2005. These have been considered best practice in the Czech Republic. Following up this document has been prepared the master plan of walking routes for the City of Pilsen. Master Plan aimed at improving conditions for pedestrians in urban area and recreational walking. Social function of pedestrian traffic was also reflected. The mandatory elements of the Master Plan were the important pedestrian connections and multi-purpose sports and recreational routes for pedestrians and cyclists – "greenways". The overall objective of this policy is to improve walkability as follows: - ensuring pedestrian accessibility and permeability across the city – improving accessibility of city parts, city centre and city landscape-hinterland for recreation, - establishing comfortable routes in terms of technical parameters and user-friendliness, - in urban areas preferring the level-crossings with roads using the advanced safety and calming elements – increased crossings, separating islands, reduced speed, - in case of multilevel crossing ensuring the non-barrier accessibility, - common coordination of public transport and urban planning.					
Short description of the interventions implemented	Comfortable routes for the pedestrians are ensured by following measures and interventions: - placing the crossings in natural routes of pedestrian, - protected crossings on the access routes to schools and healthcare facilities, - preferring separation of pedestrians and cyclists to mixed paths for pedestrians and cyclists, - fulfilment conditions for high quality walking routes – removing barriers and obstacles,					

	- furnishing the pedestrian routes, parks and squares by appropriate street furniture, - replenishing the pedestrian routes through accompanied shading vegetation, - developing the tourist function of urban areas and parks, increase their usefulness for short-term recreation and relaxation, - coordinating the development of pedestrian traffic with public transport, bicycle traffic and other mode of transport (Park & Go system), - coordinating the development of pedestrian traffic with the functional land use, creating the conditions for locating of commercial and non-commercial activities supporting the attractiveness of public spaces and pedestrian routes.
Benefits of the interventions	- Traffic calming (narrowing of the road for cars and a significant extension of sidewalks) on the main street "Americká" leading from the railway station to the city centre, - more enjoyable and comfortable pedestrian routes thanks to the planting of greenery (especially in the summer), - increasing the attractiveness of walking and public transport thanks to newly built non-barrier bus and trolleybus stops with on-line information system, - popular pedestrian zones between the central square and two revitalized major city parks.
Source of information	Department of Urban Planning and Development - City of Pilsen https://ukr.plzen.eu/analyticke-a-koncepcni-dokumenty/doprava/pesi-doprava/pesi-doprava.aspx

Name of the good practice	**Reabilitare, modernizare şi refacere scuaruri în Piaţa Unirii Rehabilitation, modernization and restoration of squares in Unirii Square**
Country of origin	Romania
City of origin	Oradea
Population of the city of origin	222.193 people

Preliminary categorization						
Measuring walkability	**Walkability analysis / survey / planning**	**Land use and street design**	**Transport mode mix**	**Awareness raising and motivation**	**Regulation**	**Other**

The problem the good practice addresses	The advanced state of degradation of an urban infrastructure of the **Union Square** and the peripheral area right in the centre of the city where sidewalks are crammed in rush hour and the level of pollution is high due to the large circulation of vehicles. The impossibility to capitalize on its entire cultural and tourist potential also justified the necessity to start the process of functional modernization of the whole ensemble through restoration, preservation and rehabilitation works. This project came to save the area, rehabilitating the related urban infrastructure by providing more space for pedestrian traffic at the expense of road traffic. Also, providing space for a social and multicultural manifestation this lead to a dialogue with city guests in a defining space for local identity.
Short description of the interventions implemented	The main investment consisting of the rehabilitation of the entire square was finalised at the end of 2015. The overall objective of the project was to increase the quality of life in the city of Oradea through improving transport and mobility conditions, as well as increasing touristic attractiveness. The specific objectives of the proposed project were: - Whole rehabilitation of road infrastructure (4,723.00 sqm of cubic pavement surface areas) and pedestrian areas (18,113.00 sqm) - Reduction of power consumption by 30 M /year and of light pollution by modernizing and improving the public lighting system by creating a lighting system increasing comfort by 100%, through replacing all the old elements. - Decrease of environmental pollution by 25% and fluidization of traffic by reconfiguration of car traffic

	in the Unirii market by the significant reduction of the movement of vehicles in its area, reduction of waiting times and removal of car parks. - Maximizing the mobility in the Unirii Square area by providing more space to pedestrian traffic. - The architectural and urban reconfiguration of the Unirii Square, respectively the remodelling of green spaces and vegetation.
Benefits of the interventions	1. Economic advantages caused by the increase in the number of tourists who will visit Unirii Square and Oradea and will use the services determined by the organization of events, conferences, various events in the arranged space. Considering that the objective lies in the central area of the city and is close to other important heritage monuments, it is estimated that the number of tourists will increase by approximately 10% each year until 2029. 2. Regarding the environment, there will be more green spaces and vegetation and in the medium and long term, the sustainability of their strength will cause a sharp decline in environmental pollution across the area. 3. Reducing CO^2 and noise emissions in favour of safer cities where living is at a high standard. At the same time, due to a further development of the sustainability of urban mobility in mixed transport, it is necessary to encourage active forms of transport, such as walking or cycling. 4. Health benefits for the inhabitants of Oradea city because people who walk are less likely to have cancer, heart disease, stroke, diabetes and other deadly diseases. They live longer and get more benefits for mental and spiritual health as a result of this practice. The main beneficiaries of the practice are: - The inhabitants of Oradea from all categories of age/gender/workplace, etc. - Tourists belonging to the category of cultural, religious and heritage tourism.
Source of information	Municipality of Oradea

Name of the good practice	Cycle path construction between Berettyóújfalu and Oradea
Country of origin	Romania
City of origin	Oradea
Population of the city of origin	222.193 people

Preliminary categorization						
Measuring walkability	Walkability analysis / survey / planning	Land use and street design	Transport mode mix	Awareness raising and motivation	Regulation	Other

The problem the good practice addresses	The construction of a cycle path connecting Berettyóújfalu and Oradea aims at creating a rational and safe transport network. The development is necessitated by the high rate of mainly employment oriented transit traffic between the Hungarian and Romanian settlements. Unfortunately, the bicycle, which is a highly preferred vehicle among the inhabitants of the area is very dangerous to use on the extremely busy highways 42 and DN1. Finding a solution to the common needs is a common cause for the two countries and could only be realized in an investment transcending the border as national initiatives would not reach the goal. The investment has a considerable multiplicator effect, the cycle path will, in the future, will serve as a backbone, which can be expanded in all the involved settlements as well as creating the basic facilities for cross-border bicycle tourism.
Short description of the interventions implemented	The bicycle track made through this project in Oradea are divided into 3 sections. The first two sections of the track have a length of 8948.67 meters and 5740 meters respectively, the execution of the works on these two sections being completed. The third section is 8930 meters long, divided into 5 sectors. Sector I: Str. Bridge - Stefan cel Mare Boulevard - Str. Red Lake - Mihai Viteazu Park - Dacia Blvd. - Decebal Boulevard to Raul Crisul Repede = 4.150 m Sector II: Str. The boat from the intersection with St Onestilor - Lipovei Street = 1.170 m District III: The Republic of Moldova - Stadium through Petofi Park = 840 m District IV: The Municipal Strand - Magheru Boulevard, through the Bratianu Park = 585 m

	District V: Averescu Boulevard - Dragos Voda str., to the new road bridge = 395 m Sector IV: Balcescu Park - County Library - Parau Peta - O. Densuseanu Street (on the left bank of Peta River) = 1.790 m All the above mentioned cycle paths were finalised in 2015.
Benefits of the interventions	1. Regarding social dimension, the development generated by common needs involves local communities, may induce a cooperation that can be the basis of common projects in the future thus assisting the mapping of further needs and finding common goals across the border. 2. Decreases number of bicycle accidents, improves traffic safety, reduces environmental strain, strengthens connections across the border and improves economic competitiveness of the settlements. 3. This cycle path will be the backbone of a regional cycle path network. The implementation of the city rehabilitation of Berettyóújfalu and Biharkeresztes, the renewal of the open air bath in Berettyóújfalu, the revitalization of Oradea fortress and its involment in the European tourism, the creation of „Nymphaea" wellness, thermal complex increase the touristic importance of the cycle path, but the cycle path can also increase the popularity of the above-mentioned projects creating also a prosperous economy. 4. Health benefits like when you travel by bicycle, you mostly use your feet and this sport carves them nicely. Especially if you spend a lot of time sitting in the office, it is important to do exercises with your feet, so you will not feel tired, heavy and with a lot of pain at the end of the day. Statistics show that 30% of cases of insomnia are caused by sedentarism! Any physical exercise can help you sleep better and the bike is even recommended by the specialists who made these discoveries. It's also the cheapest way to transport & eco-friendly!
Source of information	Municipality of Oradea

Name of the good practice	Implementierung Büro für Umwelt und Mobilität
Country of origin	Austria, Styria
City of origin	Stadtgemeinde Weiz, Municipality of Weiz
Population of the city of origin	12285

Preliminary categorization						
Measuring walkability	**Walkability analysis / survey / planning**	**Land use and street design**	**Transport mode mix**	**Awareness raising and motivation**	**Regulation**	**Other**

The problem the good practice addresses	Since the 1960s it was a widely accepted fact that motorized mobility had absolute priority and city planning had to integrate this kind of mobility as much as possible. Unfortunately, this development had a serious disadvantage: increasing emissions, noise and bad air quality. Permanent congestions and the demand for new roads worsened the situation enormously. And this high volume of car traffic is also the leading problem in Weiz. Every day app. 8,000 commuters come into the city and app. 2,000 commuters go out. 88 % of them use a car to commute to work, because public transport by bus and train is no useful alternative. In addition to that 3,900 pupils attend one of the twelve schools in town every day, around 2,000 of them come from out of the city and take the bus or train to school. The remaining 1,900 pupils walk or cycle and around 500 of them are brought to school by car by their parents or use their own car. During rush hour in the morning and at midday traffic jams are particularly bad and the local challenge is to reduce the high amount of car traffic and to promote "Alternative Mobility" through walking, cycling and using public transport. The share of car traffic should be reduced in the next ten years by 20 %.
Short description of the interventions implemented	In the year 2012 a Local Action Plan was created. The Local Action Plan (LAP) is part of the overall strategy of the Municipality of Weiz for traffic planning. The planned activities are divided into three main areas: **Planning Activities** (close the gaps in the walking and cycling net, create walking friendly zones, create a walking information system, install a counting maschine, improve the infrastructure for walking and cycling and also for public transport, make the ways safer…) **Awareness Campaigns** (install car-free center, **w**alking and cycling to school, campaign- bike to work, thematic walks, walks with the mayor, information campaigns in different parts of the city, walking and cycling with our policemen,….)

	Implement Public Relations (campaigns for "walking and **c**ycling" monthly in the City Newspaper- p.e. the first steps, cycler of the month) • **Install an "Office for Mobility":** asking citizens transport and the ongoing car use and the steady increase of motorization is an often mentioned problem. For small and medium sized municipalities the focus on active travel modes is an appropriate approach to tackle transport problems. Mobility is something that can be influenced. To change the habits of the people you have to do a lot of campaigns and a lot of convincing work. In the future mobility should not happen but it should be a managed mobility. This work cannot be done beside the daily work of establishing hard infrastructure and therefore the city of Weiz decided to establish an own office responsible for soft mobility measures. Since two years now this office is established and is the place where campaigns are planned and citizens will be informed about mobility possibilities. The Mayor and town councilors are convinced that information campaigns and educational effort at the end will help to change the mind of the citizens. Because we all knew that there is a lack of information among the potential users of alternatives and with the installation of this office the main target groups, decision makers and stakeholders as well as end users benefit from the successfully implemented mobility management campaigns and measures.
Benefits of the interventions	Mobility management is an appropriate way to change behavior towards a sustainable transport system with a considerable share of active modes of transport. Problems regarding emissions, noise, safety, lack of space and (car) traffic are faced from one strategic place which will help to implement strategies to overcome these problems. Compared to rather expensive and time-consuming infrastructure building information, awareness raising or marketing is quite cheap and quick to implement. But you need one person or office where all the strategies will be developed and published. To change the mind of the citizens you must push awareness raising campaigns, you must publish items about soft mobility, you must work together with the kindergarten, schools, young people, shop owners, workers, commuters, industry and at the end with all representatives of the city to change the modal split. It is important to mention that both areas the hard facts and the soft facts overlap and positively support each other but changing the mind and the

	behavior of the citizens is much more hard work because it lasts a much longer time until you can see a success. The benefits for the city and their citizens are a livable city with less air pollution and less noise, it is a city for the people and not for cars.
Source of information	http://www.weiz.at/umwelt/projekte

6 ANNEXES

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6.2 Annex 3 - Preliminary walkability profile of CityWalk partner cities

The preliminary walkability profiles of the partner cities are presented in a separate document.

- Kamnik
- Nyíregyháza
- Oradea
- Ptuj
- Stribro
- Valjevo
- Varazdin
- Varna
- Weiz
- Zilina

6.3 Annex 4 – Short introduction of CityWalk non-city partners

The short introductions of CityWalk non-city partners are presented in a separate document

- Cassovia Life Sciences
- Development Centre Of the Heart of Slovenia
- First Hungarian Responsible Innovation Association
- Regional Development Agency of the Pilsen Region
- Scientific Research centre Bistra Ptuj
- University of Zilina, Faculty of Civil Engineering