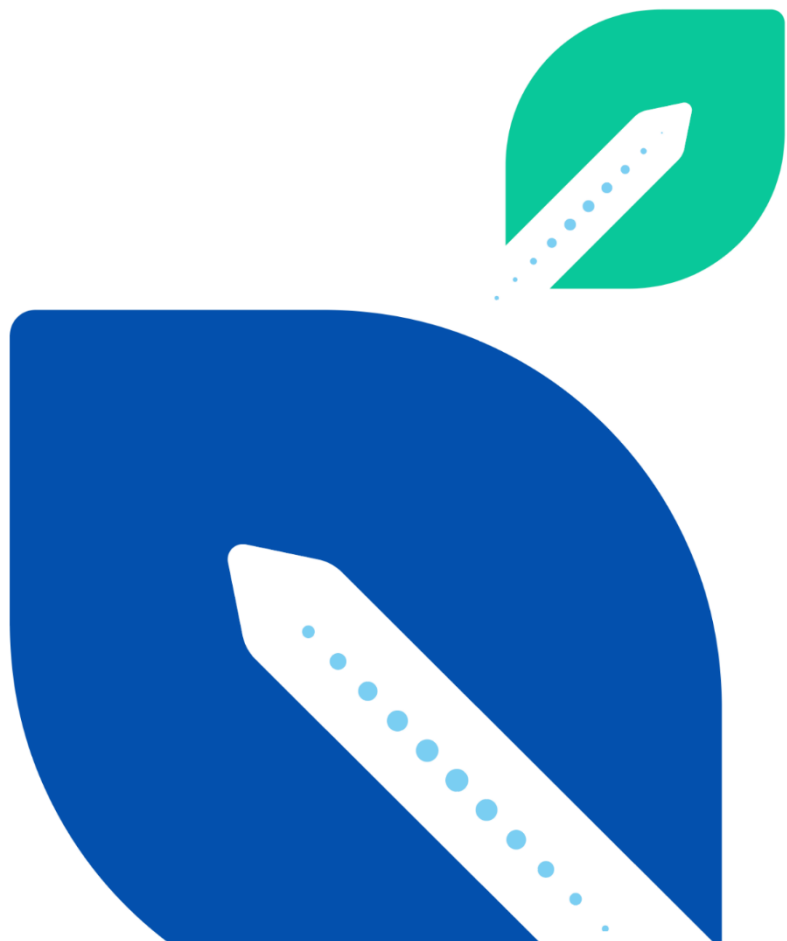




D3.1: City-specific urban mobility scenarios

Determining the impacts of emerging urban mobility environments



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Executive Summary

The goal of SPROUT is to generate innovative policy responses to the challenges presented by the emergence of digitally enabled business models, by new mobility patterns, and by corresponding travel/transport behaviour and decisions. To do this, SPROUT pursues a city-led approach. In the first stage of the project city-specific 'do-nothing' scenarios are created that describe the possible development of the urban mobility system in the first-layer cities if no new policies are introduced to harness transition. The scenario building consists of four main steps: 1. The analysis of drivers and trends; 2. Compilation of draft scenarios based on a set of city-specific drivers; 3. Sustainability and policy impact assessment of the draft scenarios; 4. Consolidation of narrative scenarios. This deliverable presents the results of the second stage of this process, i.e. Task 3.1: "Co-creation of city-specific scenarios", during which drafts of the city-specific were created for the 1st-layer SPROUT cities.

To build the scenarios, it was chosen to make use of two complementary techniques:

- Cross-impact balance analysis; a software-aided technique that allows for discerning internally consistent scenarios from non-consistent ones.
- Participatory scenario narration.

The input for the cross-impact balance procedure consists of two elements:

- the selection of drivers and possible states of the future mobility situation in each of the 1st-layer SPROUT cities, which were identified in WP2 (Understanding transition in urban mobility) of this project,
- an assessment of interactions between each of the driver-states.

The scenarios are based on a cross-impact balance analysis performed on the drivers selected by each city in Task 2.3 (Urban mobility transition drivers), and on the narrative description of each of these drivers provided by the cities. In this sense, each scenario is based on two components, which are the cross-impact balance analysis and the narrative descriptions.

The cross-impact balance analysis part of the scenario development was done by assessing the existence and magnitude of the direct impact of each driver on one another, through judgement by experts on urban mobility, city logistics, electric mobility, and e-commerce at the Vrije Universiteit Brussel. This was validated and changed where necessary by the cities, and then inputted into the ScenarioWizard software, a cross-impact balance analysis software, which looks for scenarios that are 'internally consistent' among the millions of possible scenarios. Internally consistent scenarios are scenarios for which each of the selected variant states are most strongly supported by the sum of the influences of the other drivers. For all 1st-layer cities, between 1 and 7 consistent scenarios resulted from the cross-impact balance analysis. From these, 2 scenarios were selected based on their 'news value', which is an indication of how different scenarios are from each other. These first two scenarios reflect the consistent, and therefore plausible scenarios, but are not a measure of likelihood. For this reason, a third scenario was added for every pilot city, which contains the representation of the most likely future development according to city stakeholders. This was done based on the results of the workshops held in the different 1st-layer cities, during which stakeholders

discussed the different future states of each driver and the impacts the future developments would have on mobility. In addition, the stakeholders were also asked to evaluate which variant state was most likely for every driver. It was this last part that was used to create the 'most likely' scenarios. These scenarios will, in Tasks 3.2 (Sustainability impact analysis of city-specific scenarios) and 3.3 (Policy impact analysis of city-specific scenarios), be subjected to sustainability and policy impact analyses, which will result in definite narrative scenarios in Task 3.4 (Validation and development of narrative scenarios).

1 Introduction

1.1 SPROUT project introduction and aims

SPROUT provides a new city-led, innovative, and data driven policy response to address the impacts of the emerging mobility patterns, digitally-enabled operating and business models, and transport users' needs. Previously tested and implemented policy responses employing access restrictions, congestion charging or infrastructure provision, seem unable to adequately address the changes underway in the urban mobility scene. Furthermore, any policy response should take into account all stages of the policy lifecycle and should have an eye not only to the present, but also to the future.

Therefore, starting from an understanding of the transition taking place in urban mobility, SPROUT will define the resulting impacts at the sustainability and policy level, will harness these through a city-led innovative policy response, will build cities' data-driven capacity to identify, track and deploy innovative urban mobility solutions, and will navigate future policy by channelling project results at the local, regional, national and EU level. To achieve its goals, SPROUT will employ 6 pilot cities (Valencia, Padua, Kalisz, Budapest, Tel Aviv and Ningbo) with real-life policy challenges faced as a result of urban mobility transition in both passenger mobility and freight, covering urban and peri-urban areas, different emerging mobility solutions, and context requirements. These pilot cities are the project's 1st-layer cities, the results of which will be evaluated in the project's nine 2nd-layer cities, who are the validation cities. This enables the project to adopt a true city-led approach.

The project pays special attention to the needs of vulnerable groups and users with different cultural backgrounds, also taking gender issues into account. SPROUT ensures an active participation of numerous representatives from authorities of small and medium-sized cities through a 3-layer structure of cities' engagement approach, and through the creation of an Open Innovation Community on Urban Mobility Policy.

1.2 Aim of the deliverable

The second stage of the SPROUT project is dedicated to determining the impacts of emerging urban mobility environments, where 'do-nothing' scenarios will be co-created for the 1st-layer pilot cities. These 'do-nothing' scenarios are scenarios for which no policy intervention is assumed for a 2025/2030 timescale, and they are co-created with the involvement of local stakeholders that were identified in task 2.3. These scenarios will represent plausible and probable future urban mobility environments, considering the current urban mobility environments, policies currently in effect assuming no further policy interventions, and the transition drivers explored in WP2.

The scenario building consists of four main steps: 1. The analysis of drivers and trends; 2. Compilation of draft scenarios based on a set of city-specific drivers; 3. Sustainability and policy impact assessment of the draft scenarios; 4. Consolidation of narrative scenarios. This deliverable presents the results the second stage of this process, i.e. the compilation of draft

scenarios based on a set of city-specific drivers. First drafts of consistent scenarios for each 1st-layer pilot city, based on a cross-impact balance analysis of drivers selected in D2.3, have been drawn up. This cross-impact analysis is supplemented with the results of workshops held in every 1st-layer city with local stakeholders, who discussed the local impact of each driver's future developments.

1.3 How this deliverable relates to other deliverables

This deliverable presents the results of task 3.1 'Co-creation of city-specific scenarios'. It builds on the results of tasks 2.1, 2.2 and 2.3, which were presented in D2.1, D2.2, and D2.3. D2.1 was an inventory of universally relevant urban mobility transition drivers and was the template that was used for the survey among the SPROUT cities. D2.2 presented and compared the data that was collected in 1st- and 2nd- layer cities based on the inventory developed in D2.1. Lastly, D2.3 presented an overview of the urban mobility transition drivers that are considered relevant in each of the SPROUT cities, as well as city-specific stakeholders that will be involved in various stages of the project, like the construction of narrative scenarios in the present work package. This deliverable contains the draft versions of the co-created scenarios that will be used in Tasks 3.2 and Task 3.3 for the sustainability and policy impact analyses of city-specific scenarios, and that will eventually lead to the definite narrative scenarios for each city in Task 3.4. Furthermore, the 'do-nothing' scenarios developed in Task 3.1 will serve as basis for the pilots in 1st-layer cities in WP4 and will help define the minimum data needs for the urban mobility shared data space in Task 6.1- Urban mobility shared data space.

1.4 Structure of the deliverable

The section that follows first describes the methodology that was used to generate scenarios that combine drivers and trends in a consistent way, as well as the methodology that was employed by 1st-layer pilot cities to generate narrative descriptions. This is followed by the presentation of three scenarios for every city, based on the results of the cross-impact balance analysis and the cities' workshops with local stakeholders. Concluding remarks are presented at the end of the deliverable. The annex contains the changes made by the cities to their cross-impact tables, as well as the cross-impact tables themselves, and instructions on how to evaluate them. Additionally, the annex also contains the template employed for the workshops and the instructions to the workshop organizers.

2 Methodology

In order to develop the necessary scenarios as part of Task 3.1, a two-step approach was used within the broader methodology of scenario planning. The first step is the cross-impact balance analysis of the city-specific drivers selected in Task 2.3. The second step, which enhances the analysis, is the participatory development of narrative descriptions produced by the 1st-layer cities. This section gives some background to the scenario planning method, followed by a section that describes the specific methods employed behind these different steps.

2.1 The scenario method

Scenarios are a concept that are often quite fuzzy, and the term is often misused (Mietzner & Reger, 2005). It is often used along the concept of forecasts, but it is important to distinguish the two from each other. A forecast is the “description of a relatively unsurprising projection of the present” (Lindgren & Bandhold, 2003, p. 21), and often has a shorter timeframe than scenarios (Lindgren & Bandhold, 2003). Scenarios do not have a single definition, because different ways of conceiving the future underlie the different conceptions of what scenarios are (Kosow & Grassner, 2008). For the purpose of this project, however, Porter’s (1985) definition is used: “An internally consistent view of what the future might turn out to be.” (Porter, 1985, p. 63).

It is important to note that, although they describe hypothetical developments, scenarios are not arbitrary, which means they need to comply with a number of basic requirements (Kosow & Grassner, 2008):

- *Plausibility*: The scenario must represent a development that is at least possible. This does not mean it is probable or desirable, but it cannot be an impossible development.
- *Consistency*: A scenario needs to be internally consistent (Lindgren & Bandhold, 2003). This means that the paths within the scenario cannot be mutually contradictory or exclude each other.
- *Comprehensibility and traceability*: A scenario needs to give enough detail to be comprehensible, which also entails that the developments presented within the scenario need to be traceable.
- *Distinctness*: The selected scenarios need to be different enough from one another to allow for comparison.
- *Transparency*: To come to scenarios, a series of assumptions and decisions are made. It is important to have transparency on these assumptions and decisions.

There are three groups of techniques that can be used to develop scenarios (Kosow & Grassner, 2008):

- *Trend-based*: Scenarios developed by the trend-based technique are based on existing trends, or trends that have existed in the past, for which a projection is made into the future. An example of such a method is Trend Impact Analysis (TIA),

- *Systematic-formalized*: Within this technique, the starting point is the definition of key factors that will be varied and combined to generate different scenarios. Examples of methods include Impact Analysis, Consistency Analysis, and Cross-Impact Analysis.
- *Creative-narrative*: Under this technique, scenarios are produced through creative techniques, intuition, and implicit knowledge. Examples of methods include Morphological Analysis and Intuitive Logics.

According to Kosow and Grassner (2008), it is advisable to keep the number of scenarios between three and five. Finlay (1998) states that the appropriate number varies between two and four, with three being the optimal number.

The following section describes the methodology followed within Task 3.1 when it comes to scenario building.

2.2 Cross-impact balance analysis as a method for scenariobuilding

In the context of this project, it was decided to use cross-impact balance analysis to develop the 'do-nothing' scenarios for the pilot cities for two different time horizons (2025 and 2030). This is a modification of cross-impact analysis developed by Weimer-Jehle (2006) that has two main advantages. The first is that the method is able to process qualitative as well as quantitative input. It only requires expert judgements with regards to a system structure, and does not require quantitative assessments (Weimer-Jehle, 2006). The second is that it offers a high level of transparency when it comes to the calculations and the output, even without mathematical training (Weimer-Jehle, 2006). The result of a cross-impact balance analysis is a set of scenarios that, from the millions of possible scenarios, are internally consistent. This is important, as it is one of the core scenario characteristics described by Kosow and Grassner (2008).

2.2.1 Introduction to cross-impact balance analysis

Within the cross-impact balance analysis method, one begins by selecting the factors that have a significant direct or indirect influence on the subject being examined. These factors are called 'descriptors' in cross-impact balance analysis, but the term 'drivers' is used within this project. These drivers can have different variant states, which are the different future directions in which a driver can develop. For a driver called, for example, 'Oil prices', the different variant states can be different price evolutions. After having selected the drivers, the direct impact of each of these variants is then evaluated on a one-to-one basis with all other variants, and can be positive, negative, or having no discernible impact. Weimer-Jehle (2006) mentions impact levels between -3 and +3, but also mentions that this scale can be adapted depending on the specific requirements of a project. This impact evaluation is normally done by asking experts. The relations between the drivers will result in a network of influences, which can be partially (one-way) or completely (two-way) connected. The figure below shows a simplified impact network between three drivers, where a single arrow shows the one-way influence of a driver, and a double arrow a two-way influence.

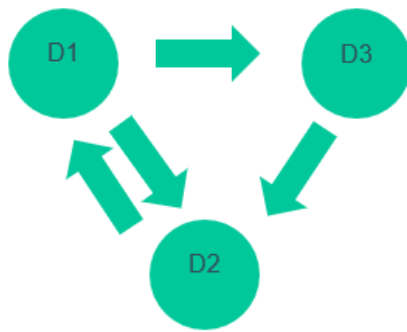


Figure 2.2-1 Simple impact network (figure based on Weimer-Jehle, 2010)

The impact matrix that is the result of this evaluation is then checked for internally consistent assumption bundles in the context of scenario analysis. Checking the scenarios for internal consistency takes place in two steps, because the role of each driver as both the source and the target of influence is investigated. Only when the causal relations between the evolutions of each of its drivers do not contradict, a scenario is considered to be consistent. This means that the scenarios produced will consist of mutually supporting assumptions. In cross-impact balance analysis, consistent scenarios are scenarios for which each of the selected variant states are most strongly supported by the sum of the influences of the other drivers. If an alternative variant state produces a higher influence than the one under consideration, the assumption is considered inconsistent and another variant state will be selected. The figure below illustrates this principle. From the selected variants, all but '5. Oil price' are consistent, because none of the alternatives produce a higher impact score than the selected assumptions. For the oil price driver, a price of 35-50\$ yields a higher impact score than the selected assumption of 20-35\$.

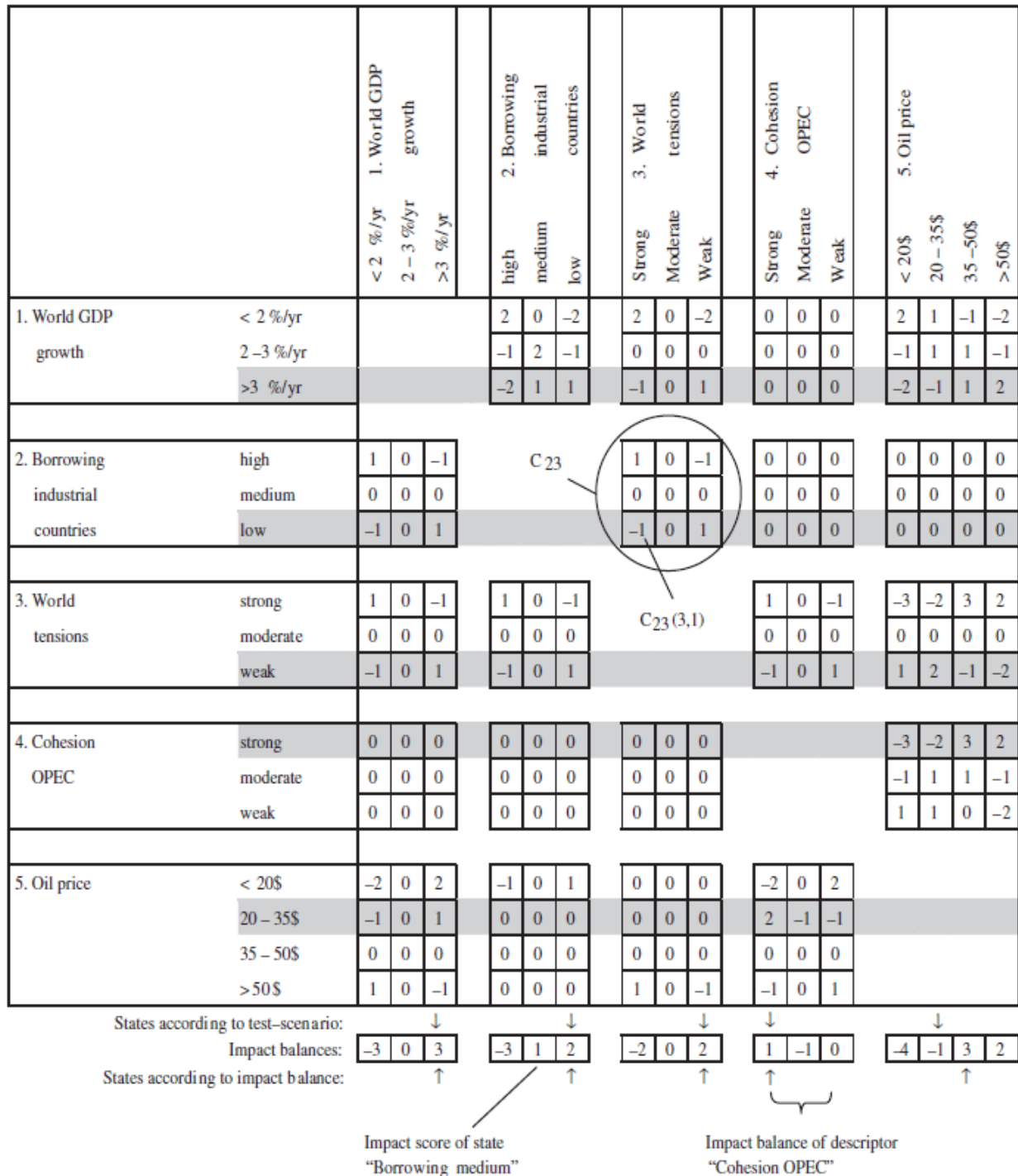


Figure 2.2-2 Example of a cross-impact matrix. Reprinted from Weimer-Jehle (2006)

In a second step, in order to reach descriptive narrative scenarios, as is the aim of this project, the quantitative output of the cross-impact analysis is enhanced by a narrative description of each driver state. These narrative descriptions were obtained through workshops organized in all 1st-layer cities with local stakeholders.

3 Application of methodology within SPROUT

This section describes how the above-mentioned methods were applied within the context of the SPROUT project. The first section describes cross-impact balance analyses, the second the narrative descriptions

3.1 Cross-impact balance analysis

3.1.1 Cross-impact balance analysis for 1st-layer cities

The cross-impact balance method described in the previous section was used to develop the 'do-nothing' scenarios for all pilot cities. In the first phases of the project (Task 2.1), urban mobility transition drivers were identified through the PESTEL approach to trend analysis. The results of these task can be found in D2.1. In a following phase (Task 2.3), 1st- and 2nd- layer cities were asked to rate the level of importance of all urban mobility transition drivers identified on a pre-defined 5-point scale, ranging from 'not important' to 'very important'. This assessment on the level of importance of all drivers was done through a combination of:

- analysis of internal documents and communications (within the city council, transport authority etc.);
- expert interviews;
- focus group discussions with local urban mobility stakeholders;
- media analysis.

This resulted in D2.3; a summary overview for the 1st-layer cities can be found in table 3.1-1. For the city-specific scenario building, only the drivers that were rated as 'very important' or 'extremely important' for each city were used in the further analysis

Table 3.1-1 Stated level of importance of the predefined drivers in the 1st-layer SPROUT cities (0 = not important (dark blue), 1= slightly important (light blue), 2 = moderately important (white), 3 = very important (light red), 4 = extremely important (dark red))

	Valencia	Padova	Kalisz	Budapest	Tel Aviv
Political Drivers					
P1: Liberalization	2	2	2	0	1
P2: Political agenda	4	3	2	2	3
P3: Transparency and corruption	4	4	1	2	0
P4: Tax policy	3	2	3	1	3
Economic Drivers					
Ec1: New employment arrangements	3	3	2	2	0
Ec2: Tourism	3	2	3	3	3
Ec3: New business models	4	3	3	1	2
Ec4: Economic growth and crisis	3	2	3	2	3
Ec5: Transformation of retail	3	3	3	1	2
Social Drivers					
S1: Migration	3	1	3	0	0
S2: Urban structure	3	3	3	4	3
S3: Demographic composition	2	1	4	2	3
S4: Health consciousness	2	2	2	2	0
S5: Changing behaviour towards car ownership	3	2	4	1	2
S6: Environmental consciousness	3	3	3	3	3
S7: Safety Concerns	2	2	3	3	3
S8: Security Concerns	2	1	0	1	2
S9: Individualization	2	1	2	1	0
S10: The rise of next-hour to same-day (on-demand) delivery requirement	2	3	1	0	2
Technological Drivers					
T1: Electrification of mobility	3	3	3	3	1
T2: Adoption of smart-city technology	3	3	3	1	3
T3: Consumer- and citizen-oriented digitalization	3	2	3	3	3
T4: Automation	1	3	1	1	1
Environmental Drivers					
En1: Climate change	3	2	3	4	1

En2: Local environmental quality	3	4	4	3	2
Legal Drivers					
L1: Labour and employment laws	3	1	1	2	0
L2: Consumer protection laws	2	0	1	3	0
L3: Data and privacy laws	2	3	1	3	0
L4: Health and safety laws	2	3	2	3	3

It was noticed that some of the drivers were identified as ‘not important (0)’ or ‘slightly important (1)’, or ‘moderately important (2)’ by all the 1st-layer cities (P1, S4, S8, S9). These were filtered out because they did not need to be evaluated. After that, two states were attributed to each of the drivers, i.e. future evolutions of the driver in question. Although the cross-impact balance method allows for the attribution of multiple states, only two states were attributed to each driver in order to limit the number of interactions that needed to be evaluated and hence the time. These states relate either to a positive or a negative evolution of the phenomenon in question. However, for some drivers, like ‘Ec1 New employment arrangements’ or ‘T1 Electrification of mobility’, it was deemed highly unlikely that they would undergo a decrease, so the states for these drivers were not defined as ‘increase’ vs. ‘decrease’ but as ‘strong growth’ vs. ‘weak (limited) growth’. The difference therefore lies in the strength of the increase.

The various future states were then evaluated on a range between -2 and +2, with the following measurements:

+2: strongly promoting influence

+1: weakly promoting influence

0: no influence

-1: weakly restricting influence

-2: strongly restricting influence

The reasons why it was decided to work with a scale from -2 to +2, and not with a scale from -3 to +3, as recommended by Weimer-Jehle (2006), is because it was deemed that the differences between a 1, 2, or 3 impact would be difficult to distinguish with certainty. Having a smaller grading level allows for a bigger difference between the impacts, making it easier to assess the relationships.

3.1.2 Elicitation of interactions between driver-states

An important step in assessing the consistency of scenarios consists of eliciting the interactions (causal relations) between each of the drivers. The drivers, corresponding states and their interactions refer to universal phenomena that could theoretically be relevant in all cities. To limit differences in the assessment due to differences in personal interpretation, it was chosen to constitute one central macro-matrix, containing all interactions between all drivers. This macro-matrix was completed by a team of experts from the Vrije Universiteit Brussel (VUB), including specialists on urban mobility, electric mobility, urban logistics and e-commerce. In total, 4 subsequent workshops were held to discuss all the cross-impacts the drivers have on each other (on January 15, 16, 17 and 20, 2020). In total, 1,660 cross-impact relations were evaluated over the course of 20 hours. The evaluation process was structured as follows:

1. First, the question was asked for a certain driver what impact the different variant states have on another driver’s variant states. The evaluation was first done on an individual basis by three experts for the drivers that did not involve urban logistics, e-commerce or electric mobility. For e-commerce and urban logistics, the evaluations were done by

two other experts on the subject, and electric mobility was evaluated by yet another expert in the topic.

2. After the individual evaluation, the attributed impacts of the driver were compared. When the impacts differed, they were discussed until a consensus was reached. The results of the discussions were written down and can be found as comments in the macro table.

This evaluation process resulted in the macro-impact matrix depicted below (Table 3.1-1). Access to the full macro-table and the outcomes of the discussion around the attribution of cross-impacts can be found at the following link: https://osf.io/9jxzq/?view_only=ccb3678de84e41f183042e9f547b5467. The specific interrelations between drivers that did not occur for any 1st-layer cities were not discussed because of the important amount of interrelations to examine. These interrelations were attributed a grey shade in the macro-table.

Based on the drivers selected by each city and on the macro cross-impact table, city-specific tables were made. These were then sent to the cities for validation.

Kalisz, Tel Aviv and Valencia validated the proposed impacts without changes, whereas Budapest and Padua made changes to their city-specific table. It must be noted that these changes were made based on a different understanding of some of the drivers. However, because the workshops held in the cities were based on each city's understanding of the drivers, and because ultimately the scenarios will come to reflect city-specific situations, it was decided to use Budapest's and Padua's cross-impact values and understanding of drivers in their respective scenarios. Additionally, in order to reflect this new meaning given to some drivers, it was decided to rename them for Budapest and Padua. The following changes were made:

S7: Safety concerns (in modal choice) => S7: Safety concerns

Ec1: New employment arrangements => Ec1: New job opportunities

The overview of the changes to the tables made by Budapest and Padua can be found in Annex 7.1. All cities' cross-impact tables can be found in Annex 7.2.

After having received feedback from the cities, the city-specific tables were inserted into ScenarioWizard, an open-source software¹ designed by Dr. Weimer-Jehle for applying cross-impact balance analysis. Based on this input, the software generated between 1 and 7 consistent scenarios in the cities. For the scenariobuilding purposes of this task, two scenarios were selected from the ones produced by the software. The reason for this is that, as seen in the previous section, a total of three scenarios is considered optimal (Finlay, 1998). As will be seen below, another scenario was generated using cities' input of most likely developments, meaning that another two scenarios needed to be selected. In order to have scenarios that were not too similar to each other and therefore respect the criterion of distinctiveness (Kosow & Grassner, 2008), it was decided to filter them based on the 'news value' indicator. The news value is a measurement for how different scenarios are from each other. The higher the news value, the more drivers show a different variant state. For example, a news value of 6 for two scenarios means that they differ in 6 variant states from each other. In ScenarioWizard, a selection manager can be activated that selects scenarios based on their news value. For the purpose of Task 3.1, two scenarios were selected for each of the cities, which resulted in scenarios that were as different as they could be.

The scenarios obtained through this method reflect the most consistent and plausible scenarios based on the cross-impact balance analysis of the drivers selected by each city. However, they are not a reflection of how the future will likely develop in 2025 and 2030. In order to take the opinion of the likelihood of occurrence of certain driver states into account, the cities were also asked to evaluate which variant state they saw as most likely to occur. This input was used to generate an additional scenario for every city by selecting the variant states chosen during the workshops. This is done by using the 'Force variant' commando in the

¹ https://cross-impact.de/english/CIB_e_ScW.htm

ScenarioWizard software, which holds certain selected variant states constant when generating a scenario.

3.2 City-specific narrative descriptions

The workshops organized by all 1st-layer cities to complement the output of the cross-impact balance analysis were aimed at assessing the local impact of the previously identified drivers, in order to write scenarios that are relevant for every city individually. This therefore needed to be done with input from local stakeholders, who participated in the different workshops. The workshops took place on the following dates:

- Valencia: February 5, 2020.
- Padua: January 21, 2020.
- Kalisz: January 16, 2020.
- Budapest: January 16, 2020.
- Tel Aviv: January 14, 2020.

During the workshops, the stakeholders were asked to reflect on how each future state of a driver would impact the mobility situation for their own city through a template that can be found in Annex 7.5. The timelines for the scenarios are 2025 and 2030, and if stakeholders saw a clear difference in impact on their urban mobility situations for those two timelines, they were asked to describe the situation for both time horizons. At the end of the workshop template, they also had the possibility to give their opinion on which future variant state is most likely to happen.

The results of the workshops were translated by the cities in order to be incorporated in the scenarios being developed. These were then used as components to enhance the scenarios produced by the ScenarioWizard software. Combining both components resulted in the city-specific scenarios described in the next section.

4 City-specific urban mobility scenarios

4.1 Valencia (Spain)

The city-specific cross-impact evaluation table that resulted from a macro-analysis and that was validated by the city of Valencia was inputted into the ScenarioWizard software for the scenario analysis. Based on the cross-impact evaluation, the software produced 5 scenarios that it evaluated as being internally consistent (who did not have any internal contradictions). From these 5 scenarios, 2 were selected based on their 'news value', i.e. in how many drivers they differ from each other. The selected scenarios differed in 12 out of the 19 drivers, and are described below.

The first scenario generated for Valencia has a total impact score of 127, which is the sum of all impact scores of the selected variants and is a measure of the plausibility of a scenario. The first scenario is depicted in the table below.

Table 4.1-1 Scenario 1 (Valencia)

Driver	Variant state	Narrative description
P2: Political agenda	Growing support	<ul style="list-style-type: none"> Adapting the politics/legislation to encourage car sharing would greatly increase this option by allowing more sustainable mobility. If a comprehensive and intermodal metropolitan transport network were promoted, sustainable transport could grow significantly. Currently the car (private vehicle) is the option chosen for more than 70% of urban journeys and with the appropriate policies, it could be reduced in favour of more sustainable options. When the works on line 10 of Metrovalencia are completed, there will be a transfer of users from private transport to the public transport option of metro/tram in areas such as Nazareth, Monteolivete, the City of Justice and the City of Arts and Sciences. (https://www.20minutos.es/noticia/3778311/0/fgv-linea-10-estimacion-viajeros-valencia/)

		<ul style="list-style-type: none"> • The future line 10 of Metrovalencia could also facilitate the transfer of current users of the public bus service (EMT) to this new alternative (metro) and reducing the number of passengers on the bus. However, this option could be positive for the EMT by being able to distribute resources to other bus lines and areas of the city that do not have metro coverage or service. • The new line 10 of Metrovalencia will improve mobility by 3%. While if the frequency of metro and tram services is set every 5 minutes in urban areas and in 10 minutes in interurban areas, sustainable mobility would improve by 20%. • Encouraging tariff coordination between the different modes (both public and private) by increasing investment, optimising resources and developing new digital technologies could be very positive for urban mobility. • Financing of metropolitan transport could reach 12% by 2025. • Pedestrianisation of the city centre in 2025 would serve to revitalise the economy of the city centre. • Increasing the budget of the MOVES Plan and promoting electrification will facilitate the gradual renewal of the vehicle fleet. • The implementation of the exclusive parking area for residents (ORA area) would improve urban mobility by 20%. The extension of the network of bicycle lanes would also mean a 20% improvement, as well as the connection of the city's bicycle lanes with its metropolitan area. • By 2030, a 25% growth in the volume of metropolitan transport passengers (bus/metro) can be expected. • In the metropolitan area, bus use will increase by 3%, connecting surrounding towns such as Sedaví, Burjasot and El Saler.
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		<ul style="list-style-type: none"> • Monitoring and compliance with the mobility ordinance and the DGT will improve mobility by 20%. • The renewal of the EMT bus fleet will allow a 30% increase in passengers by 2030 based on a more efficient service. • All neighbourhoods will be covered by an electric vehicle-recharging infrastructure. • There will be a 5-10% annual growth in the number of cyclists (meaning less pollutant emissions). • By 2025-2030, the city centre will be closed to road traffic, which will translate into increased investment and public spending on transport as a guarantee for the success of the initiatives. The use of public transport will increase, as will the use of bicycles. • Increasing the public budget for mobility and increasing communication to users will improve the efficiency of the system. • Three examples of positive trends are the pedestrianisation of the city centre, the improvement of the EMT (urban public bus) network and the promotion of public transport. • The GVA's Metropolitan Mobility Plan (PMoMe (*)) provides for a large number of changes in the structure and layout of metro and tram lines (connections between lines and increased frequency) that will increase the number of passengers by +15%. (*) http://politicaterritorial.gva.es/es/web/movilidad-urbana/valencia/-/asset_publisher/AMTckYGUkr3B/content/pmome-valencia • The EMT 95 and 4 lines will improve the connectivity of the city's coastal facade (Malvarrosa and Cabañal). • EMT services will serve to promote mobility for the elderly and children.
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		<ul style="list-style-type: none"> • With respect to the scooters, recharging-stations and garage services (parking) of these VMP (Personal Mobility Vehicles) will facilitate the use of these mobility options in the city. Policies will have to favour the use of this urban transport option and the installation of lockers. • The improvement of the electric vehicle-recharging infrastructure will increase the purchase of electric vehicles by 30%. • The project to extend the network of EMT lines to towns near Valencia will reduce pollutant emissions because of transport by 30%.
P3: Corruption	Increase	<ul style="list-style-type: none"> • The technical specifications for public procurement are still not transparent and seem to be awarded (beforehand) in advance. • Among the negative trends are bureaucracy, complexity of public processes and limits to contracting. • Excessive bureaucracy and corporate control favours precisely that corruption by resisting lack of oversight. • The lack of coordination between administrations generates inefficiencies in the contracting of uncoordinated transport services. • Disparity of technical criteria due to personal interests in citizen participation. • The public procurement systems continue to give priority to economic decline (awarding the contract to the lowest budgeted cost proposal), with the subsequent repercussions on unforeseen costs. • The LCP system limits the execution of projects. • A negative trend would be if the national budgets did not cover projects in the city of Valencia or if the approved local projects were not executed.

<p>P4: Tax policy</p>	<p>Increase</p>	<ul style="list-style-type: none"> • Electro-mobility grants are positive because they will help reduce CO2 emissions with a more efficient and sustainable fleet. • Set aside tax revenues to investments in sustainable mobility will increase it. • Higher taxes will be levied on the purchase of combustion vehicles and the bonus will be extended to electric vehicles. • Subsidy to companies or sustainable mobility operators accrediting their reduction of CO2 emissions in their vehicles. • Incentive plans for the purchase of electric vehicles and the installation of recharging points. • Cleaner mobility, less environmental impact. • Imposing taxes on the circulation of private vehicles in the city centre (if they are not residents of the area). • Those companies subsidize public transport for their own employees and then those companies can benefit from deduction or savings on the payment of certain taxes. • Aid for the purchase of electric vehicles. • Encouraging reduced VAT for sustainable transport would be a positive incentive. At present, public bicycle transport services are not covered by the transport law and therefore do not benefit from reduced VAT. • Incentive policies for teleworking or working from home to reduce the number of trips. • Electric recharge rights for personal mobility vehicles (VMP) or electric cars included in transport tickets. • Incentives for "zero emissions" transport options, payment according to the emissions generated and the recovery of sustainable and healthy habits. • The social voucher for the use of public transport will increase the number of passengers by 20%.
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		<ul style="list-style-type: none"> • Access to credit (under optimal conditions) for investments.
Ec1: New employment arrangements	Strong growth	<ul style="list-style-type: none"> • It will promote the efficiency of multimodality. • The shared economy will generate new employment patterns in the logistics sector and greater competitiveness in services and prices.
Ec2: Tourism	Increase	<ul style="list-style-type: none"> • Improvements in mobility and its cost (low cost, bonuses, MaaS) will lead to its increase. • More tourism means more mobility because the tourist has to move around. • Tourism will help to improve the efficiency of services. • Increased tourism and events will be positive for economic consolidation. • Tourists are usually users of public transport and therefore the growth of tourism will mean more users of public transport. • As the number of visitors to the city increases, the critical mass will increase, the interests of transport service operators will be greater, and the supply of public transport will grow. • It will improve the ease of access to certain places and areas of the city and will boost the economy. • Tourist packages should include the city's sustainable mobility catalogues (options). • The projection of a city that has and bets on sustainable mobility alternatives will attract more tourists. • Proliferation of fewer businesses related to bicycle rental mobility. • The increase in tourism provides new business opportunities in sustainable mobility.
Ec3: New business models (e.g. collaborative)	Strong growth	<ul style="list-style-type: none"> • Strong increase thanks to personal modes of transport. • Strong increase due to short distance travel.

consumption, sharing economy)		<ul style="list-style-type: none"> • It will have a strong impact by last mile logistics. • New business models are opening up to a new generation and they will reduce the number of own vehicles. • There will be more collaboration between complementary mobility companies.
Ec4: Economic growth and crisis	Increased growth	<ul style="list-style-type: none"> • Positive historical evolution despite oscillations. • An increased economic growth means more displacement and should be performed in sustainable ways.
Ec5: Transformation of retail	Strong growth	<ul style="list-style-type: none"> • The local trade and specialized retail will be destroyed. • Online commerce will grow moderately and be more efficient with the use of Big Data technologies. • Online retailing is (mainly) based on price politics while proximity retailing focuses on quality and customer satisfaction.
S1: Immigration	Decrease	No narrative description provided.
S2: Urban structure	Increasing densification	<ul style="list-style-type: none"> • The return to the more urban model as opposed to the single-family homes will lead to lower transport costs.
S5: Changing behavior towards car ownership	Increase	<ul style="list-style-type: none"> • The new generations are no longer so interested in the private vehicle and prefer the MaaS (mobility as a service). • The number of people who own a car will be reduced by improving public or alternative transport systems. • The new models of mobility sharing differ (move away) from the purchase of private vehicles.

S6: Environmental consciousness (choice of sustainable mode)	Strong growth	<ul style="list-style-type: none"> The climate emergency will increase environmental and sustainability awareness. Environmental awareness will condition/influence the selection of the mode of transport.
S11 Population change	Decrease	<ul style="list-style-type: none"> Population growth must go aligned with the supply of transport services.
T1: Electrification of mobility	Strong growth	No narrative description provided.
T2: Adoption of smart-city technology	Strong growth	No narrative description provided.
T3: Consumer- and citizen-oriented digitalization	Strong growth	No narrative description provided.
En1: Climate change	Slight increase	No narrative description provided.
En2: Local environmental quality	Decrease	No narrative description provided.
L1: Labour and employment laws	More regulation	<ul style="list-style-type: none"> Teleworking and online administrative procedures will reduce urban travel.

Valencia's second scenario has a total impact score of 58 and is depicted in the table below.

Table 4.1-2 Scenario 2 (Valencia)

Driver	Variant state	Narrative description
<p>P2: Political agenda</p>	<p>Growing support</p>	<ul style="list-style-type: none"> • Adapting the politics/legislation to encourage car sharing would greatly increase this option by allowing more sustainable mobility. • If a comprehensive and intermodal metropolitan transport network were promoted, sustainable transport could grow significantly. Currently the car (private vehicle) is the option chosen for more than 70% of urban journeys and with the appropriate policies, it could be reduced in favour of more sustainable options. • When the works on line 10 of Metrovalencia are completed, there will be a transfer of users from private transport to the public transport option of metro/tram in areas such as Nazareth, Monteolivete, the City of Justice and the City of Arts and Sciences. (https://www.20minutos.es/noticia/3778311/0/fgv-linea-10-estimacion-viajeros-valencia/) • The future line 10 of Metrovalencia could also facilitate the transfer of current users of the public bus service (EMT) to this new alternative (metro) and reducing the number of passengers on the bus. However, this option could be positive for the EMT by being able to distribute resources to other bus lines and areas of the city that do not have metro coverage or service. • The new line 10 of Metrovalencia will improve mobility by 3%. While if the frequency of metro and tram services is set every 5 minutes in urban areas and in 10 minutes in interurban areas, sustainable mobility would improve by 20%.

		<ul style="list-style-type: none"> • Encouraging tariff coordination between the different modes (both public and private) by increasing investment, optimising resources and developing new digital technologies could be very positive for urban mobility. • Financing of metropolitan transport could reach 12% by 2025. • Pedestrianisation of the city centre in 2025 would serve to revitalise the economy of the city centre. • Increasing the budget of the MOVES Plan and promoting electrification will facilitate the gradual renewal of the vehicle fleet. • The implementation of the exclusive parking area for residents (ORA area) would improve urban mobility by 20%. The extension of the network of bicycle lanes would also mean a 20% improvement, as well as the connection of the city's bicycle lanes with its metropolitan area. • By 2030, a 25% growth in the volume of metropolitan transport passengers (bus/metro) can be expected. • In the metropolitan area, bus use will increase by 3%, connecting surrounding towns such as Sedaví, Burjasot and El Saler. • Monitoring and compliance with the mobility ordinance and the DGT will improve mobility by 20%. • The renewal of the EMT bus fleet will allow a 30% increase in passengers by 2030 based on a more efficient service. • All neighbourhoods will be covered by an electric vehicle-recharging infrastructure. • There will be a 5-10% annual growth in the number of cyclists (meaning less pollutant emissions). • By 2025-2030, the city centre will be closed to road traffic, which will translate into increased investment and public spending on transport as a guarantee for the
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		<p>success of the initiatives. The use of public transport will increase, as will the use of bicycles.</p> <ul style="list-style-type: none"> • Increasing the public budget for mobility and increasing communication to users will improve the efficiency of the system. • Three examples of positive trends are the pedestrianisation of the city centre, the improvement of the EMT (urban public bus) network and the promotion of public transport. • The GVA's Metropolitan Mobility Plan (PMoMe (*)) provides for a large number of changes in the structure and layout of metro and tram lines (connections between lines and increased frequency) that will increase the number of passengers by +15%. (*) http://politicaterritorial.gva.es/es/web/movilidad-urbana/valencia/-/asset_publisher/AMTckYGUkr3B/content/pmome-valencia • The EMT 95 and 4 lines will improve the connectivity of the city's coastal facade (Malvarrosa and Cabañal). • EMT services will serve to promote mobility for the elderly and children. • With respect to the scooters, recharging-stations and garage services (parking) of these VMP (Personal Mobility Vehicles) will facilitate the use of these mobility options in the city. Policies will have to favour the use of this urban transport option and the installation of lockers. • The improvement of the electric vehicle-recharging infrastructure will increase the purchase of electric vehicles by 30%. • The project to extend the network of EMT lines to towns near Valencia will reduce pollutant emissions because of transport by 30%.
P3: Corruption	Decrease	<ul style="list-style-type: none"> • Increasing the transparency during the process of bidding, contracting and execution phases of works and service contracts will be positive for the mobility situation.

		<ul style="list-style-type: none"> • Optimise investments by paying more attention to the needs of citizens than to the media needs of politicians. • With regard to the EMT, some of the initiatives it could implement would be participatory processes, transparency portals with public information and a stricter regulatory framework (LCSP). • If the proportion of the public budget allocated to sustainable mobility (urban and interurban cycle paths, public transport, pedestrian mobility, etc.) increases, it alternative sustainable mobility options could grow by +50%. • Selecting the best service providers will benefit the sustainable mobility adoption. • The implementation of participatory processes will improve citizen involvement in all phases, open and online data and make service companies accessible. • The creation and promotion of participatory processes linked to transport policies has a positive effect on policies and their transparency. • In the horizon 2025-2030, an increase in investment in mobility related actions would encourage competition and improve the supply of transport services.
P4: Tax policy	Increase	<ul style="list-style-type: none"> • Electro-mobility grants are positive because they will help reduce CO2 emissions with a more efficient and sustainable fleet. • Set aside tax revenues to investments in sustainable mobility will increase it. • Higher taxes will be levied on the purchase of combustion vehicles and the bonus will be extended to electric vehicles. • Subsidy to companies or sustainable mobility operators accrediting their reduction of CO2 emissions in their vehicles. • Incentive plans for the purchase of electric vehicles and the installation of recharging points.

		<ul style="list-style-type: none"> • Cleaner mobility, less environmental impact. • Imposing taxes on the circulation of private vehicles in the city centre (if they are not residents of the area). • Those companies subsidize public transport for their own employees and then those companies can benefit from deduction or savings on the payment of certain taxes. • Aid for the purchase of electric vehicles. • Encouraging reduced VAT for sustainable transport would be a positive incentive. At present, public bicycle transport services are not covered by the transport law and therefore do not benefit from reduced VAT. • Incentive policies for teleworking or working from home to reduce the number of trips. • Electric recharge rights for personal mobility vehicles (VMP) or electric cars included in transport tickets. • Incentives for "zero emissions" transport options, payment according to the emissions generated and the recovery of sustainable and healthy habits. • The social voucher for the use of public transport will increase the number of passengers by 20%. • Access to credit (under optimal conditions) for investments.
Ec1: New employment arrangements	Weak growth	<ul style="list-style-type: none"> • It will be moderate, but it may affect tot: collective agreements (company plans, collective transport, etc.), teleworking, in itinere accidents (from home to the office), promotion of sustainable mobility (bonuses) and last mile logistics. • The change will be negative for the working population and the sector must be regulated with employment guarantees. • Creation of precarious and dangerous employment. • This would generate mobility needs that did not exist and greater job insecurity.

		<ul style="list-style-type: none"> • There is a real need for mobility solutions that did not exist before. • The lack of regulation encourages strong uncontrolled growth. • It will have a weak increase, but it could help people with reduced mobility. • The shared economy increases unnecessary mobility and encourages precarious work. • The creation of new jobs will be very poor and will lead to a loss of purchasing power. • The economic benefit will be shared among few actors and they will take advantage of the lack of regulation or possible legal loopholes
Ec2: Tourism	Increase	<ul style="list-style-type: none"> • Improvements in mobility and its cost (low cost, bonuses, MaaS) will lead to its increase. • More tourism means more mobility because the tourist has to move around. • Tourism will help to improve the efficiency of services. • Increased tourism and events will be positive for economic consolidation. • Tourists are usually users of public transport and therefore the growth of tourism will mean more users of public transport. • As the number of visitors to the city increases, the critical mass will increase, the interests of transport service operators will be greater, and the supply of public transport will grow. • It will improve the ease of access to certain places and areas of the city and will boost the economy. • Tourist packages should include the city's sustainable mobility catalogues (options). • The projection of a city that has and bets on sustainable mobility alternatives will attract more tourists. • Proliferation of fewer businesses related to bicycle rental mobility.

		<ul style="list-style-type: none"> The increase in tourism provides new business opportunities in sustainable mobility.
Ec3: New business models (e.g. collaborative consumption, sharing economy)	Weak growth	<ul style="list-style-type: none"> The regulation of these business models does not allow for strong growth. An excess of sharing mobility companies could negatively affect mobility. The number of users of sharing services will increase and the number of vehicles in daily circulation will be reduced. The impact will be moderate from sharing with low impact on the economy. It will cover marginal, not massive, needs.
Ec4: Economic growth and crisis	Economic crisis	<ul style="list-style-type: none"> There will be a small (moderate) change. The new models will lead to the creation of new models and services, but the destruction of other classics. Loss of management autonomy with respect to the new giants (Amazon; Google; Uber; etc.). The recession will lead to a decline in mobility and the economy.
Ec5: Transformation of retail	Weak growth	<ul style="list-style-type: none"> The logistical distribution should be optimised and reverse logistics enhanced. The proportion of goods purchased online will increase and the prices of the items will fall down.
S1: Immigration	Decrease	No narrative description provided.
S2: Urban structure	Increasing densification	<ul style="list-style-type: none"> The return to the more urban model as opposed to the single-family homes will lead to lower transport costs.
S5: Changing behavior towards car ownership	Decrease	No narrative description provided.

S6: Environmental consciousness (choice of sustainable mode)	Weak growth	No narrative description provided.
S11 Population change	Decrease	<ul style="list-style-type: none"> Population growth must go aligned with the supply of transport services.
T1: Electrification of mobility	Weak growth	<ul style="list-style-type: none"> Electric mobility will experience strong growth due to new technologies. Electric mobility will experience a strong growth due to public aids, people's awareness and infrastructure improvements. Infrastructure will be improved, and its massive use will be extended.
T2: Adoption of smart-city technology	Weak growth	<ul style="list-style-type: none"> Everything must revolve around the smart city concept.
T3: Consumer- and citizen-oriented digitalization	Weak growth	<ul style="list-style-type: none"> Need for mobile applications that bring together all modes and alternatives of transport. It will improve the information in real time.
En1: Climate change	Strong increase	<ul style="list-style-type: none"> In situations of extreme events, the offer the sustainable transport must work at its very best. Use of shared mobility according to climatic conditions. Private mobility will grow too. Personal mobility vehicles (PMVs) will be more difficult to maintain.
En2: Local environmental quality	Increase	<ul style="list-style-type: none"> The greater the sustainable transport options, the fewer the pollutants and noise.
L1: Labour and employment laws	More regulation	<ul style="list-style-type: none"> Teleworking and online administrative procedures will reduce urban travel.

In order to reflect the most likely future development as imagined by Valencia’s stakeholders, an additional scenario was generated by forcing the variant states that were deemed most likely ((P2, P4, Ec1, Ec2, Ec3, Ec4, Ec5, S1, S2, S5, S6, T1, T2, T3, En1, En2, L1). The variant states for which there was no agreement with regards the future developments between the stakeholders were left unforced, and the ScenarioWizard software generated a variant state in accordance with the cross-impacts. Similarly, the variant states for which the stakeholders had indicated that they expected no change were also left unforced. The reason for this is that it was deemed necessary for future work packages to work with scenarios that were very contrasting, and different from the current situation. This resulted in a scenario with a total impact score of 1, depicted in the table below.

Table 4.1-3 Scenario 3 (Valencia)

Driver	Variant state	Narrative description
P2: Political agenda	Growing support	<ul style="list-style-type: none"> Adapting the politics/legislation to encourage car sharing would greatly increase this option by allowing more sustainable mobility. If a comprehensive and intermodal metropolitan transport network were promoted, sustainable transport could grow significantly. Currently the car (private vehicle) is the option chosen for more than 70% of urban journeys and with the appropriate policies, it could be reduced in favour of more sustainable options. When the works on line 10 of Metrovalencia are completed, there will be a transfer of users from private transport to the public transport option of metro/tram in areas such as Nazareth, Monteolivete, the City of Justice and the City of Arts and Sciences. (https://www.20minutos.es/noticia/3778311/0/fgv-linea-10-estimacion-viajeros-valencia/) The future line 10 of Metrovalencia could also facilitate the transfer of current users of the public bus service (EMT) to this new alternative (metro) and reducing the number of passengers on the bus. However, this option could be positive for the EMT by being able to distribute resources to other bus lines and areas of the city that do not have metro coverage or service. The new line 10 of Metrovalencia will improve mobility by 3%. While if the frequency of metro and tram services is set every 5 minutes in urban areas and in 10 minutes in interurban areas, sustainable mobility would improve by 20%.

	<ul style="list-style-type: none"> • Encouraging tariff coordination between the different modes (both public and private) by increasing investment, optimising resources and developing new digital technologies could be very positive for urban mobility. • Financing of metropolitan transport could reach 12% by 2025. • Pedestrianisation of the city centre in 2025 would serve to revitalise the economy of the city centre. • Increasing the budget of the MOVES Plan and promoting electrification will facilitate the gradual renewal of the vehicle fleet. • The implementation of the exclusive parking area for residents (ORA area) would improve urban mobility by 20%. The extension of the network of bicycle lanes would also mean a 20% improvement, as well as the connection of the city's bicycle lanes with its metropolitan area. • By 2030, a 25% growth in the volume of metropolitan transport passengers (bus/metro) can be expected. • In the metropolitan area, bus use will increase by 3%, connecting surrounding towns such as Sedaví, Burjasot and El Saler. • Monitoring and compliance with the mobility ordinance and the DGT will improve mobility by 20%. • The renewal of the EMT bus fleet will allow a 30% increase in passengers by 2030 based on a more efficient service. • All neighbourhoods will be covered by an electric vehicle-recharging infrastructure. • There will be a 5-10% annual growth in the number of cyclists (meaning less pollutant emissions). • By 2025-2030, the city centre will be closed to road traffic, which will translate into increased investment and public spending on transport as a guarantee for the success of the initiatives. The use of public transport will increase, as will the use of bicycles. • Increasing the public budget for mobility and increasing communication to users will improve the efficiency of the system. • Three examples of positive trends are the pedestrianisation of the city centre, the improvement of the EMT (urban public bus) network and the promotion of public transport.
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		<ul style="list-style-type: none"> • The GVA's Metropolitan Mobility Plan (PMoMe (*)) provides for a large number of changes in the structure and layout of metro and tram lines (connections between lines and increased frequency) that will increase the number of passengers by +15%. (*) http://politicaterritorial.gva.es/es/web/movilidad-urbana/valencia/-/asset_publisher/AMTckYGUkr3B/content/pmome-valencia • The EMT 95 and 4 lines will improve the connectivity of the city's coastal facade (Malvarrosa and Cabañal). • EMT services will serve to promote mobility for the elderly and children. • With respect to the scooters, recharging-stations and garage services (parking) of these VMP (Personal Mobility Vehicles) will facilitate the use of these mobility options in the city. Policies will have to favour the use of this urban transport option and the installation of lockers. • The improvement of the electric vehicle-recharging infrastructure will increase the purchase of electric vehicles by 30%. • The project to extend the network of EMT lines to towns near Valencia will reduce pollutant emissions because of transport by 30%.
P3: Corruption	Decrease	<ul style="list-style-type: none"> • Increasing the transparency during the process of bidding, contracting and execution phases of works and service contracts will be positive for the mobility situation. • Optimise investments by paying more attention to the needs of citizens than to the media needs of politicians. • With regard to the EMT, some of the initiatives it could implement would be participatory processes, transparency portals with public information and a stricter regulatory framework (LCSP). • If the proportion of the public budget allocated to sustainable mobility (urban and interurban cycle paths, public transport, pedestrian mobility, etc.) increases, it alternative sustainable mobility options could grow by +50%. • Selecting the best service providers will benefit the sustainable mobility adoption.

		<ul style="list-style-type: none"> • The implementation of participatory processes will improve citizen involvement in all phases, open and online data and make service companies accessible. • The creation and promotion of participatory processes linked to transport policies has a positive effect on policies and their transparency. • In the horizon 2025-2030, an increase in investment in mobility related actions would encourage competition and improve the supply of transport services.
P4: Tax policy	Increase	<ul style="list-style-type: none"> • Electro-mobility grants are positive because they will help reduce CO2 emissions with a more efficient and sustainable fleet. • Set aside tax revenues to investments in sustainable mobility will increase it. • Higher taxes will be levied on the purchase of combustion vehicles and the bonus will be extended to electric vehicles. • Subsidy to companies or sustainable mobility operators accrediting their reduction of CO2 emissions in their vehicles. • Incentive plans for the purchase of electric vehicles and the installation of recharging points. • Cleaner mobility, less environmental impact. • Imposing taxes on the circulation of private vehicles in the city centre (if they are not residents of the area). • Those companies subsidize public transport for their own employees and then those companies can benefit from deduction or savings on the payment of certain taxes. • Aid for the purchase of electric vehicles. • Encouraging reduced VAT for sustainable transport would be a positive incentive. At present, public bicycle transport services are not covered by the transport law and therefore do not benefit from reduced VAT. • Incentive policies for teleworking or working from home to reduce the number of trips. • Electric recharge rights for personal mobility vehicles (VMP) or electric cars included in transport tickets.

		<ul style="list-style-type: none"> • Incentives for "zero emissions" transport options, payment according to the emissions generated and the recovery of sustainable and healthy habits. • The social voucher for the use of public transport will increase the number of passengers by 20%. • Access to credit (under optimal conditions) for investments.
Ec1: New employment arrangements	Weak growth	<ul style="list-style-type: none"> • It will be moderate, but it may affect tot: collective agreements (company plans, collective transport, etc.), teleworking, in itinere accidents (from home to the office), promotion of sustainable mobility (bonuses) and last mile logistics. • The change will be negative for the working population and the sector must be regulated with employment guarantees. • Creation of precarious and dangerous employment. • This would generate mobility needs that did not exist and greater job insecurity. • There is a real need for mobility solutions that did not exist before. • The lack of regulation encourages strong uncontrolled growth. • It will have a weak increase, but it could help people with reduced mobility. • The shared economy increases unnecessary mobility and encourages precarious work. • The creation of new jobs will be very poor and will lead to a loss of purchasing power. • The economic benefit will be shared among few actors and they will take advantage of the lack of regulation or possible legal loopholes.
Ec2: Tourism	Increase	<ul style="list-style-type: none"> • Improvements in mobility and its cost (low cost, bonuses, MaaS) will lead to its increase. • More tourism means more mobility because the tourist has to move around. • Tourism will help to improve the efficiency of services. • Increased tourism and events will be positive for economic consolidation. • Tourists are usually users of public transport and therefore the growth of tourism will mean more users of public transport.

		<ul style="list-style-type: none"> • As the number of visitors to the city increases, the critical mass will increase, the interests of transport service operators will be greater, and the supply of public transport will grow. • It will improve the ease of access to certain places and areas of the city and will boost the economy. • Tourist packages should include the city's sustainable mobility catalogues (options). • The projection of a city that has and bets on sustainable mobility alternatives will attract more tourists. • Proliferation of fewer businesses related to bicycle rental mobility. • The increase in tourism provides new business opportunities in sustainable mobility.
Ec3: New business models (e.g. collaborative consumption, sharing economy)	Weak growth	<ul style="list-style-type: none"> • The regulation of these business models does not allow for strong growth. • An excess of sharing mobility companies could negatively affect mobility. • The number of users of sharing services will increase and the number of vehicles in daily circulation will be reduced. • The impact will be moderate from sharing with low impact on the economy. • It will cover marginal, not massive, needs.
Ec4: Economic growth and crisis	Economic crisis	<ul style="list-style-type: none"> • There will be a small (moderate) change. The new models will lead to the creation of new models and services, but the destruction of other classics. • Loss of management autonomy with respect to the new giants (Amazon; Google; Uber; etc.). • The recession will lead to a decline in mobility and the economy.
Ec5: Transformation of retail	Strong growth	<ul style="list-style-type: none"> • The local trade and specialized retail will be destroyed. • Online commerce will grow moderately and be more efficient with the use of Big Data technologies. • Online retailing is (mainly) based on price politics while proximity retailing focuses on quality and customer satisfaction.
S1: Immigration	Increase	<ul style="list-style-type: none"> • Immigration has an expectation of stable or moderate growth.

		<ul style="list-style-type: none"> • It will be positive if the profile of foreigners arriving in the city has high purchasing power, but the arrival of students and retirees is also expected. • New business models such as bicycle rentals will proliferate. • They have uses and customs associated with public transport. • Migrants (temporary or permanent) have more options with public transport.
S2: Urban structure	Increasing densification	<ul style="list-style-type: none"> • The return to the more urban model as opposed to the single-family homes will lead to lower transport costs.
S5: Changing behavior towards car ownership	Decrease	No narrative description provided.
S6: Environmental consciousness (choice of sustainable mode)	Strong growth	<ul style="list-style-type: none"> • The climate emergency will increase environmental and sustainability awareness. • Environmental awareness will condition/influence the selection of the mode of transport.
S11: Population change	Increase	<ul style="list-style-type: none"> • More people will generate more opportunities for mobility.
T1: Electrification of mobility	Strong growth	No narrative description provided.
T2: Adoption of smart-city technology	Strong growth	No narrative description provided.

T3: Consumer- and citizen-oriented digitalization	Strong growth	No narrative description provided.
En1: Climate change	Strong increase	No narrative description provided.
En2: Local environmental quality	Decrease	No narrative description provided.
L1: Labour and employment laws	More regulation	<ul style="list-style-type: none"> • Teleworking and online administrative procedures will reduce urban travel.

4.2 Padua (Italy)

For the workshop held in Padua to construct the narrative descriptions, the following stakeholders were present:

1. Public transport operators: Fabio Azzolin (Busitalia Veneto)
2. Padua Local Police: Pierantonio Cappellari and Moreno Grossole
3. Padua Municipality, administration: Arturo Lorenzoni (Deputy Mayor)
4. City Parking, Car Sharing, Advertising, mobility services providers: Diego Galiazzo (APS Holding)
5. Padua Municipality (Public works): Massimo Benvenuti
6. Padua Municipality (Mobility): Luca Coin and Raffaella Michelin
7. Urban logistics: Paolo Pandolfo (Interporto - Cityporto)
8. Academic Institutions: Marco Mazzarino (IUAV/VIU), Lucio Rubini (VIU) and Luca braidotti (University of Trieste)

The description of stakeholders present in the workshops is mentioned in the case of Padua because the narrative descriptions provided include the points of view of the different stakeholders. In the table, the numbering reflects the points of view of the stakeholders that were present and coincides with the numbering of the list above. In addition, the 'A' in the table reflects content that was generally agreed upon by all stakeholders, and the 'wrap-up' section is a summary of the discussion points.

Based on Padua's cross-impact table, 7 consistent scenarios were found. Out of these 7 scenarios, 2 were selected using the 'news value', which resulted in scenarios that differed in 12 out of the 15 drivers.

The first selected scenario has a total impact score of 90 and is shown in the table below.

Table 4.2-1 Scenario 1 (Padua)

Driver	Variant state	Narrative description
P2: Political agenda	Growing support	3,4,7- Policy: new tram lines. 3,4- Policy: bus fleet renewal (electrification). 3- Enhancing the use of railway capacity and the integration of railway networks with the urban context.

		<p>3- Policy: new bicycle lanes.</p> <p>4,6- General infrastructural investments growth.</p> <p>6- Policy: investments in enhancing users' interaction with transport networks (e.g. charging facilities, variable message signs, traffic monitoring sensors, cameras).</p> <p>5- Policy: the road network requiring to be updated due to the introduction of tram-lines and bicycle lanes.</p> <p>7-Small and targeted intervention are needed to remove bottlenecks (low cost with a high effect on congestion reduction).</p> <p>5-Exploring alternative solutions to ring roads (long term).</p> <p>6-Investments are required to increase the number of transport modes for users' choices.</p> <p>A – Impacts: traffic flows are changing due to public investments, increasing the pressure on areas that were not previously affected by traffic congestion.</p> <p>A - Impacts: new tram lines have been reducing the incomes of commercial activities located on main roads.</p> <p>WRAP-UP: The public investments in mobility will globally grow by 2030. Mainly, the budget for infrastructural investments will be boosted to enhance traffic management and multimodal public transport in both the short and long term. Thus, relevant impacts will be produced on mobility, in particular:</p> <ul style="list-style-type: none"> - A modal shift away from private cars due to the expansion of public transport network; - A reduction in urban traffic due to the development of secondary transport networks (including parking areas); - Optimization of urban mobility due to investments in IT systems and infrastructures (video cameras, ITS, etc.); - Improvement of the environmental performance of urban mobility due to the deployment of e-charging stations and e-mobility;
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		<ul style="list-style-type: none"> - Reduction of urban (central) commercial activities due to traffic increase on secondary networks (generated by an improvement of accessibility); - Overall, the increased public budget allocated to transport infrastructures determines impacts on mobility at a wide territorial level, with possible negative consequences on urban areas.
P3: Corruption	Decrease	<p>4,6-An up-to-date, effective and trusted transport network encourages the consumer to choose different transport modes (other than private vehicles).</p> <p>5-Regulatory framework to better select contracting companies in order to increase the quality of public works (execution times, cost reductions).</p> <p>7-Choice of “green” materials when they have competitive costs with respect to other alternatives.</p> <p>WRAP-UP: General improvement in public transport and urban mobility projects due to better and more efficient allocation of public budget.</p>
Ec1: New job opportunities	Strong growth	<p>7- The socio-economic system in Padua is mostly service industry-oriented (rather than manufacturing-oriented). In the service industry, virtualisation and remote working are easy to be developed, boosting the demand for advanced services, digitalisation, telework, etc., thus decreasing traffic flows.</p> <p>A-Enhancement of digital/communication infrastructures is more important than the transport network for the new employment arrangements.</p> <p>WRAP-UP: The service industry-oriented economy could raise the demand for new employment arrangements in the medium-long term. Significant improvement is expected in urban mobility performance due to the increase of “virtualization” of the urban service industry (Padua being mostly characterized by such an industry)</p>
Ec3: New business models (e.g. collaborative consumption,	Strong growth	<p>3-Increase deliveries connected to online purchase.</p> <p>3-Cycling tourism increase.</p> <p>3-New vehicles (e.g. electric scooters).</p> <p>6-Parking areas conversion into short-stop areas (weak).</p> <p>6-Weak change in the composition of vehicle fleets: more business ones, less private ones.</p>

<p>sharing economy)</p>		<p>7-The horizontal organisation will be even more difficult due to the power gained by multinational companies, leading to fictitious collaboration.</p> <p>A-Freight transport is governed by global companies which can impose their business model.</p> <p>A-Automation in optimisation and planning is growing fast creating new opportunities.</p> <p>A-Apps for multimodal transport planning can help the growth of the new sharing/collaborative models.</p> <p>WRAP-UP: sharing/collaborative models are expected to grow in the short term. Significant growth of new business models depends on large availability and degree of usage of IT services (apps, etc.) by citizens at urban level. Provided that the regulatory framework and citizens' attitudes are favourable, impacts on mobility would be positive, in particular in terms of saturation of vehicles' capacities and of the number of circulating vehicles. However, negative impacts are envisaged in terms of increased travelled distances.</p>
<p>Ec5: Transformation of retail</p>	<p>Strong growth</p>	<p>1-Growth of e-commerce in the electronic devices sector (short term).</p> <p>3-Increase of e-commerce due to young generations' relatively high purchase power.</p> <p>5-Reduction of commercial areas.</p> <p>6-Increased number of larger business vehicles in urban areas.</p> <p>6-Higher demand for temporary-stop areas (loading/unloading), not in commercial areas only.</p> <p>4-Reduced impact on transport demand (often consumers prefer to physically check a product before buying it).</p> <p>7-Very strong transformation in retail.</p> <p>A-Aging of the population will result in an increasing number of reduced-mobility people, delivery of consumer goods could consequently increase. (long term).</p> <p>A-E-commerce improves cold-chains.</p> <p>A-Strong growth of space demand by e-commerce/logistics operators in urban areas (last-mile fulfilment centres, drop lockers, temporary parking, etc.).</p> <p>A-Strong growth of garbage (packaging materials).</p> <p>A-Decline of public and private transport in favour of couriers.</p>

		<p>WRAP-UP: changes in consumers' behaviour are leading to a strong growth in e-commerce, which has to be faced by logistics operators. In detail, the following consequences are expected:</p> <ul style="list-style-type: none"> - Strong increase in the congestion of urban mobility due to the skyrocketing development of freight urban deliveries. The current urban structure is definitely not suited to manage such a development; - A dramatic need to reconfigure the whole urban logistics network would be in place as a major policy and planning decision. In particular, logistics nodes would be located closer to final customers and they would increase in number. Such a development would strongly require effective policy and planning decisions and a new regulatory framework at an urban level; - General deterioration in the efficiency of urban freight mobility would occur (including a lack of parking spaces, sub-optimization of transport operations, etc.). Freight urban deliveries rely on express services, which traditionally show poor consolidation performances of logistics flows and are less prone to cooperation (indeed, a fierce competition is in place); - The Increase of waste management operations (related to disposals of cardboards) would constitute collateral, although significant, impacts on urban mobility; - Potential rise of delivery prices in the long term, due to possible trends towards monopoly in the e-commerce sector.
<p>S2: Urban structure</p>	<p>Increasing densification</p>	<p>3-No change. 6-Specialisation of areas (residential, commercial, etc.). 8-Regeneration of the old town centre.</p> <p>WRAP-UP: Globally, the urban population is growing but the sprawl of urban areas is increasing too. In Padua and nearby municipalities, main services are being concentrated in multiple centres. A number of policy decisions at the territorial level would be in place ensuring more efficiency of mobility performance by concentrating and consolidating traffic flows along major routes connecting relevant facilities (e.g., single hospital).</p>

<p>S6: Environmental consciousness (choice of sustainable mode)</p>	<p>Strong growth</p>	<p>3-Consciousness related to the responsibilities of individual choices. 3-Young people will no longer consider the car as a status symbol. 3-Logistics network re-configurations driven by environmental parameters. 4-The introduction of traffic limitations encourages the adoption of public transport modes. 6-Growth of demand for sustainable transport modes. 6-Growth of multimodal mobility. 6-Growth of demand for e-vehicles and charging facilities. 6-Decline of demand for conventional refuelling facilities. 7-The environmental consciousness will have a very strong impact on mobility. 8-Easier introduction of limited traffic/pedestrian areas.</p> <p>WRAP-UP: it is expected a strong growth of environmental consciousness especially in young generations, in both the short and long term. Young people are historically less prone to car ownership models and open to transport “servitization” (including MaaS). This will lead to the adoption of more sustainable transport modes and to the support of environmental protection policies adoption.</p>
<p>S10: The rise of next-hour to same-day (on-demand) delivery requirement</p>	<p>Strong growth</p>	<p>3,5,7-E-commerce strong growth and related increase of freight urban transport (short term). 3,5-Revision of urban access policies for limited traffic areas in the city centre. 5,6-New areas required by last-mile logistics operators call for a strong revision of urban mobility plans (e.g. temporary parking areas). 3-Conflict among physical retail and e-commerce deliveries (24-7 and access to limited traffic areas) 6-Growth of low-environmental-impact vehicles for last-mile delivery.</p> <p>WRAP-UP: The short-term home delivery market is growing fast and it is expected to grow further. People will likely support the revision of the city-centre access policies for last-mile logistics companies. Physical retail systems in urban areas are going through historical changes and transformation. As a consequence, strong concentration is expected of urban consolidation nodes at spatial level in the urban context to deal with ever short-term deliveries. Urban consolidation centres would be located closer and closer to final customers, thus, calling for a new regulatory</p>

		framework at a strategic (e.g. SUMP) and tactical level (e.g., tendering procedures for urban logistics operators).
S11: Population change	Decrease	<p>1-Reduction of population in the city centre. 3-Reduction of births. 3-Ageing of the population. 8-Unfavourable economic context (prices in the urban areas are higher).</p> <p>WRAP-UP: a reduction of population is expected in the city centre, while population will grow in the suburbs and nearby municipalities. Overall, population will remain constant as a result, while mobility would face significant challenges due to sprawl effects.</p>
T1: Electrification of mobility	Strong growth	<p>1,3-Introduction of e-bikes, e-scooters (short term) 1-Increased number of tram lines (long term) 1,2,4-Increase in the percentage of e-vehicles without reducing the global number of vehicles (long term) 2-Possible revision of access policies to limited traffic zones. 2,5-number of public charging facilities for private cars (several companies asking for concessions) 3-Purchase of e-buses with public funds (long term). 4-Prices of e-vehicles will decrease due to growth in demand (long term). 7-strong electrification in the long term. 8-Introduction of e-car sharing systems. 8-More frequent blocks of polluting vehicles in urban areas due to more stringent environmental rules. 8-Growth of oil price. 8-Park space/service areas reduction for non-electric vehicles.</p> <p>WRAP-UP: public policies and the growth of the environmental consciousness in the population will boost the electrification in the short term. Provided that the policy framework remains stable and the growth in demand for electric vehicles leads to a reduction in prices, the trend would last in the long</p>

		term, with significant positive impacts on the environmental performance of urban mobility. However, on a wider scale, geopolitical issue should be addressed, since the deployment of electric vehicles is heavily connected to the global production of electricity (and related sources). Moreover, the overall impact on the automotive industry should be considered as well.
T2: Adoption of smart-city technology	Strong growth	<p>1-Apps to support multimodal mobility. 1-Sensors for monitoring vehicles and travels. 3-Apps for park management. 4-A smarter mobility, parking and the development of public transport adoption. 5-Solutions required by public institutions and local companies are increasing. 8-Better data access and information sharing allow a reduction of the pressure on transport services/infrastructures. 8-Better exploitation of big-data in management and planning. A-Sensor development and object interconnection (Internet of things).</p> <p>WRAP-UP: the adoption of smart technologies in planning and management of traffic/transport services is expected to grow. The deployment of smart-city innovative technologies and business models is at a core of the Padua pilot in SPROUT. It would determine the optimization of urban traffic flows (both freight and passenger) thanks to a better use of transport capacity (flows consolidation – “dynamic transport capacity allocation”) and an increase in environmental performance, including the deployment of less-pollutant vehicles. Moreover, the increase in the deployment of sensors supporting mobility choices would produce significant benefits. As an example, the increased data availability and accessibility by users could boost the multimodal mobility and public transport choices in the long term.</p>
T4: Automation	Strong progress	<p>1-Introduction of autonomous trams (short term). 1-Introduction of autonomous busses (long term). 1-Introduction of autonomous coaches for extra-urban mobility (long term). 3-Growth of local companies devoted to the new technologies’ development. 3-Destination of circumscribed areas arranged for experimentation and pilot-projects. 8-Autonomous vehicles increasing transport safety (reduction of accidents/casualties).</p>

		<p>8-Data exchange between autonomous vehicles, other vehicles and public authorities could ease traffic management.</p> <p>WRAP-UP: despite autonomous vehicles offer several advantages and Padua will test new autonomous solutions for public transport in the SPROUT pilot, some still open issues are expected to prevail in the short term. In order to change the outlook in the long term, a revision of the legal/regulatory framework is needed to deal with such issues at national and international level. In such a case, disruptive impacts on urban mobility are expected, leading to changes in business models, profiles of transport operators and an overall dramatic recovery of urban transport efficiency and effectiveness.</p>
En2: Local environmental quality	Increase	<p>3-Increase of traffic congestion.</p> <p>8-Opposition of lobbies (e.g. oil companies) to the adoption of more stringent rules.</p> <p>WRAP-UP: A non-adequate planning of transports/infrastructures to mitigate the increasing sprawl effects could increase the occurrence of traffic congestion with related negative effects on mobility and public health. Provided that a good transport planning policy is applied, this trend is considered unlikely.</p>
L3: Data and privacy laws	More regulation	<p>A – no input can be provided at local level, since the issues are considered mainly to be addressed at EU and international level.</p> <p>WRAP-UP: No relevant changes are expected.</p>
L4: Health and safety laws	Strong increase of regulation	<p>2,3,5- regulation of new vehicles types (e.g. autonomous vehicles, e-bicycles, e-scooters).</p> <p>2- regulation related to the risk for pedestrians and cyclists connected to the low noise emissions of e-vehicles.</p> <p>3-New air quality national standards.</p> <p>3-Speed limit reduction in residential areas (30km/h).</p> <p>3- regulation about drone-driven deliveries.</p> <p>8-New EU regulation to reduce emissions and pollution.</p> <p>WRAP-UP: The introduction of new types of vehicles and transport modes require a revision of the legal framework in order to ensure safety and health standards can be met and responsibility issues</p>

		solved. Therefore, significant impacts on future mobility patterns are expected as a result of more regulation on health & safety in both the short and long run.
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The second scenario selected has a total impact score of 32 and is shown in the table below.

Table 4.2-2 Scenario 2 (Padua)

Driver	Variant state	Narrative description
P2: Political agenda	Decreasing support	<p>1-Increasing conflicts among public bodies in charge of mobility, thus, calling for the establishment of a mobility agency</p> <p>1-Decreasing public subsidies (e.g., €-km) especially for tram lines.</p> <p>4-Reduction of public budget for local transport leads to an increase in the number of private vehicles and traffic congestion.</p> <p>WRAP-UP: From the contractors' point of view, decreasing subsidies for public transport would determine a deterioration in the quality of public transport services and transport sustainability might be at risk in the long term. However, a general improvement in the efficiency of public transport services is expected, provided public transport services are allocated through tendering procedures (In Padua, public transport operations have just been assigned for a period of 9 years, until 2030).</p>
P3: Corruption	Increase	<p>3-Critical management of long-term projects.</p> <p>WRAP-UP: a lack of transparency may affect long term projects management</p>
Ec1: New job opportunities	Weak growth	<p>1-very low impact on mobility.</p> <p>3- weak growth in teleworking.</p> <p>5-no growth (control over employees is necessary).</p> <p>6-More evenly distributed demand for public transport during the day (lower demand in rush-hours, higher in the other periods).</p> <p>A-Difficult integration of new employment arrangements due to national job legislation.</p>

		<p>WRAP-UP: In the short term, very weak growth of new employment arrangements is expected. Without revising the regulatory framework, changing the public/private employment policies and developing investments in digital/communication infrastructures, the situation might last in the long term. As a consequence, only relative positive impacts on mobility performance are expected, mainly due to a lack of investments in data and information networks (which are considered as the most significant bottleneck) leading to a low degree of “virtualization” in the service industry.</p>
<p>Ec3: New business models (e.g. collaborative consumption, sharing economy)</p>	<p>Weak growth</p>	<p>3-Critical issues in the sharing mobility are envisaged. 3-Weak replacement of private cars with car-sharing policies. 8-Expected population ageing could not foster the growth of new business models. A-Uncertain financial sustainability in the long term. A-Several studies highlight that sharing economy leads to higher distances travels. A-Currently, algorithms at the base of effective sharing/collaborative business models do not easily consider all relevant characteristics of peoples' behaviour. A-Questionable effects of new models on traffic reduction.</p> <p>WRAP-UP: the growth of new business models might be affected by behavioural, operational, financial and social issues in the medium-long term. New business models in the field of the sharing economy heavily rely on effective e-platforms and algorithms. However, social and behavioural aspects still strongly characterize users' choices in the mobility sector, thus, possibly reducing the positive impacts on mobility of such new business models. Moreover, the proportion of elderly people – hardly using these services – would imply a less proportion of travels using new business models. Finally, also operational and financial issues might affect the new business models: parasitic effects due to ineffective optimisation may increase the traffic and lead to the model revision/replacement.</p>
<p>Ec5: Transformation of retail</p>	<p>Weak growth</p>	<p>1-Weak growth of demand of food and clothing deliveries (short term). 8-Ageing of population may slow down the e-commerce growth (short term). A-Questionable financial sustainability of current e-commerce/last-mile logistics operators. A-Delivery personnel instability. A-Skyrocketing increase of demand for urban space by e-commerce/last-mile logistics operators. A.Lack of cooperation among last-mile logistics operators.</p>

		WRAP-UP: the weak growth of e-commerce may be caused by the impracticality for last-mile logistics operators to face the increasing demand. Moreover, the increasing demand of urban space and the personnel-related issues may affect the growth of e-commerce. In such a scenario, the importance will increase of current urban logistics network design, which is based on the role of the urban consolidation centre of Padua (freight village and couriers - Cityporto).
S2: Urban structure	Increasing densification	<p>3-No change. 6-Specialisation of areas (residential, commercial, etc.). 8-Regeneration of the old town centre.</p> <p>WRAP-UP: Globally, the urban population is growing but the sprawl of urban areas is increasing too. In Padua and nearby municipalities, main services are being concentrated in multiple centres. A number of policy decisions at the territorial level would be in place ensuring more efficiency of mobility performance by concentrating and consolidating traffic flows along major routes connecting relevant facilities (e.g., single hospital).</p>
S6: Environmental consciousness (choice of sustainable mode)	Weak growth	<p>3-Ageing of the population (adult and aged people still consider the car as status-symbol). 4-Users are not encouraged to search for different alternative transport modes by ineffective transport services. 4-Private vehicles are considered the most comfortable transport mode, disregarding their environmental impact. 8-Unfavourable economic context (sustainable technologies are usually more expensive).</p> <p>WRAP-UP: The ageing of the population, ineffective public transport services and an unfavourable economic outlook could reduce the effect of the increasing environmental consciousness in the population, especially in the short term. Such a weak growth would determine a reinforcement of current mobility patterns.</p>
S10: The rise of next-hour to same-day (on-demand) delivery requirement	Weak growth	<p>8-Ageing of population. 8-lack of urban areas required by last-mile logistics operators. 8-traffic increase leading to the adoption of limitations. 8-Growth of delivery prices due to delivery personnel regulation and the emergence of global monopolistic companies (long term).</p>

		WRAP-UP: a weak growth of short-term deliveries is considered unlikely, especially in the short run. However, in that case, a moderate and relative “densification” of the urban logistics network would be expected.
S11: Population change	Decrease	<p>1-Reduction of population in the city centre. 3-Reduction of births. 3-Ageing of the population. 8-Unfavourable economic context (prices in the urban areas are higher). WRAP-UP: a reduction of population is expected in the city centre, while population will grow in the suburbs and nearby municipalities. Overall, population will remain constant as a result, while mobility would face significant challenges due to sprawl effects.</p>
T1: Electrification of mobility	Weak growth	<p>1-e-buses (no adequate funding sources). 7-weak electrification in the short term. 8-High acquisition cost (short term). 8-High charging prices. 8-Strong correlation between electricity and fossil fuels. 8-Non-sufficient availability of public charging facilities (short term). 8-Growth of natural gas adoption in the road transport sector. 8-Opposition of lobbies (e.g. oil companies). 8- Relative positive impacts on the environmental performance of urban mobility.</p> <p>WRAP-UP: public transport contractors consider funding sources for electrification to be scarce. In addition, the unfavourable economic contest may reduce the procurement of private electric vehicles in the short term. However, effective public policies are expected to mitigate these problems.</p>
T2: Adoption of smart-city technology	Weak growth	<p>5-Complicated and costly installation of required devices on a large urban area (including suburbs and nearby municipalities). 8-Ageing of the population may affect the usage of mobile/digital technologies. 8-Privacy and data property concerns lead to difficult data acquisition and management. 8-Relative impacts on urban mobility and logistics performance. A-Fast ageing of the technologies. A-Need for investment planning involving multiple public bodies.</p>

		<p>A-Difficult exploitation of data collected by sensors.</p> <p>WRAP-UP: the very specific knowledge required to gain advantages from smart city technologies may lead to weak growth in the short term. However, the municipality is interested in new technologies and effective policies could change the outlook in the long term.</p>
T4: Automation	Little progress	<p>2-Required strong revision of road transport regulatory framework (civil and penal liability).</p> <p>3-Decree 70/2019 (Ministry of Transport).</p> <p>8-Reduction of low qualified jobs number may lead to political and ethical questions.</p> <p>8-Increase of security vulnerability of transports (especially cybersecurity).</p> <p>8-Relative positive impacts on urban mobility.</p> <p>WRAP-UP: In the short term, little progress is expected on the way towards autonomous vehicles' widespread circulation. Although the technology is mature, main legal and regulatory issues still remain to be addressed and cannot be solved at a local level.</p>
En2: Local environmental quality	Increase	<p>3-Increase of traffic congestion.</p> <p>8-Opposition of lobbies (e.g. oil companies) to the adoption of more stringent rules.</p> <p>WRAP-UP: A non-adequate planning of transports/infrastructures to mitigate the increasing sprawl effects could increase the occurrence of traffic congestion with related negative effects on mobility and public health. Provided that a good transport planning policy is applied, this trend is considered unlikely.</p>
L3: Data and privacy laws	Less regulation	<p>A – no input can be provided at local level, since the issues are considered mainly to be addressed at EU and international level.</p> <p>WRAP-UP: No relevant changes are expected.</p>
L4: Health and safety laws	Weak increase of regulation	<p>WRAP-UP: no reason for a lower regulation about health and safety is foreseen.</p>

Based on the indications of likelihood provided by the city of Padua during their workshop, a third scenario was developed by ‘forcing’ variant states in accordance with what the most likely future developments are. In total, 9 out of the 15 variant states were forced (P2, P3, Ec1, Ec5, S2, S5, S6, S10, T4) because it was these variant states that reflected a level of consensus among the stakeholders involved. The ‘no change’ variants were also left open. This led to a third scenario, which can be found in table 4.2-3; the total impact score of this third scenario is 18.

Table 4.2-3 Scenario 3 (Padua)

Driver	Variant state	Narrative description
<p>P2: Political agenda</p>	<p>Growing support</p>	<p>3,4,7- Policy: new tram lines. 3,4- Policy: bus fleet renewal (electrification). 3- enhancing the use of railway capacity and the integration of railway networks with the urban context. 3- Policy: new bicycle lanes. 4,6- General infrastructural investments growth. 6- Policy: investments in enhancing users’ interaction with transport networks (e.g. charging facilities, variable message signs, traffic monitoring sensors, cameras). 5- Policy: the road network requiring to be updated due to the introduction of tram lines and bicycle lanes 7-Small and targeted intervention are needed to remove bottlenecks (low cost with a high effect on congestion reduction). 5-Exploring alternative solutions to ring roads (long term). 6-Investments are required to increase the number of transport modes for users’ choices.</p> <p>A – Impacts: traffic flows are changing due to public investments, increasing the pressure on areas that were not previously affected by traffic congestion.</p> <p>A - Impacts: new tram lines have been reducing the incomes of commercial activities located on main roads.</p> <p>WRAP-UP: The public investments in mobility will globally grow by 2030. Mainly, the budget for infrastructural investments will be boosted to enhance traffic management and multimodal public transport in both the short and long term. Thus, relevant impacts will be produced on mobility, in particular:</p> <ul style="list-style-type: none"> - A modal shift away from private cars due to the expansion of public transport network;

		<ul style="list-style-type: none"> - A reduction in urban traffic due to the development of secondary transport networks (including parking areas); - Optimization of urban mobility due to investments in IT systems and infrastructures (video cameras, ITS, etc.); - Improvement of the environmental performance of urban mobility due to the deployment of e-charging stations and e-mobility; - Reduction of urban (central) commercial activities due to traffic increase on secondary networks (generated by an improvement of accessibility); <p>Overall, the increased public budget allocated to transport infrastructures determines impacts on mobility at a wide territorial level, with possible negative consequences on urban areas.</p>
P3: Corruption	Decrease	<p>4,6-An up-to-date, effective and trusted transport network encourages the consumer to choose different transport modes (other than private vehicles).</p> <p>5-Regulatory framework to better select contracting companies in order to increase the quality of public works (execution times, cost reductions).</p> <p>7-Choice of “green” materials when they have competitive costs with respect to other alternatives.</p> <p>WRAP-UP: General improvement in public transport and urban mobility projects due to better and more efficient allocation of public budget.</p>
Ec1: New job opportunities	Weak growth	<p>1-very low impact on mobility.</p> <p>3- weak growth in teleworking.</p> <p>5-no growth (control over employees is necessary).</p> <p>6-More evenly distributed demand for public transport during the day (lower demand in rush-hours, higher in the other periods).</p> <p>A-Difficult integration of new employment arrangements due to national job legislation.</p> <p>WRAP-UP: In the short term, very weak growth of new employment arrangements is expected. Without revising the regulatory framework, changing the public/private employment policies and developing investments in digital/communication infrastructures, the situation might last in the long term. As a consequence, only relative positive impacts on mobility performance are expected, mainly due to a lack of investments in data and</p>

		information networks (which are considered as the most significant bottleneck) leading to a low degree of “virtualization” in the service industry.
Ec3: New business models (e.g. collaborative consumption, sharing economy)	Strong growth	<p>3-Increase deliveries connected to online purchase.</p> <p>3-Cycling tourism increase.</p> <p>3-New vehicles (e.g. electric scooters).</p> <p>6-Parking areas conversion into short-stop areas (weak).</p> <p>6-Weak change in the composition of vehicle fleets: more business ones, less private ones.</p> <p>7-The horizontal organisation will be even more difficult due to the power gained by multinational companies, leading to fictitious collaboration.</p> <p>A-Freight transport is governed by global companies which can impose their business model.</p> <p>A-Automation in optimisation and planning is growing fast creating new opportunities.</p> <p>A-Apps for multimodal transport planning can help the growth of the new sharing/collaborative models.</p> <p>WRAP-UP: sharing/collaborative models are expected to grow in the short term. Significant growth of new business models depends on large availability and degree of usage of IT services (apps, etc.) by citizens at urban level. Provided that the regulatory framework and citizens’ attitudes are favourable, impacts on mobility would be positive, in particular, in terms of saturation of vehicles’ capacities and of the number of circulating vehicles. However, negative impacts are envisaged in terms of increased travelled distances.</p>
Ec5: Transformation of retail	Strong growth	<p>1-Growth of e-commerce in the electronic devices sector (short term).</p> <p>3-Increase of e-commerce due to young generations’ relatively high purchase power.</p> <p>5-Reduction of commercial areas.</p> <p>6-Increased number of larger business vehicles in urban areas.</p> <p>6-Higher demand for temporary-stop areas (loading/unloading), not in commercial areas only.</p> <p>4-Reduced impact on transport demand (often consumers prefer to physically check a product before buying it).</p> <p>7-Very strong transformation in retail.</p> <p>A-Aging of the population will result in an increasing number of reduced-mobility people, delivery of consumer goods could consequently increase. (long term)</p> <p>A-E-commerce improves cold-chains.</p>

		<p>A-Strong growth of space demand by e-commerce/logistics operators in urban areas (last-mile fulfilment centres, drop lockers, temporary parking, etc.).</p> <p>A-Strong growth of garbage (packaging materials)</p> <p>A-Decline of public and private transport in favour of couriers.</p> <p>WRAP-UP: changes in consumers' behaviour are leading to a strong growth in e-commerce, which has to be faced by logistics operators. In detail, the following consequences are expected:</p> <ul style="list-style-type: none"> - Strong increase in the congestion of urban mobility due to the skyrocketing development of freight urban deliveries. The current urban structure is definitely not suited to manage such a development; - A dramatic need to reconfigure the whole urban logistics network would be in place as a major policy and planning decision. In particular, logistics nodes would be located closer to final customers and they would increase in number. Such a development would strongly require effective policy and planning decisions and a new regulatory framework at an urban level; - General deterioration in the efficiency of urban freight mobility would occur (including a lack of parking spaces, sub-optimization of transport operations, etc.). Freight urban deliveries rely on express services, which traditionally show poor consolidation performances of logistics flows and are less prone to cooperation (indeed, a fierce competition is in place); - The Increase of waste management operations (related to disposals of cardboards) would constitute collateral, although significant, impacts on urban mobility; <p>Potential rise of delivery prices in the long term, due to possible trends towards monopoly in the e-commerce sector.</p>
<p>S2: Urban structure</p>	<p>Increasing sprawl</p>	<p>1-Hospitals delocalisation.</p> <p>1-Shared services between different municipalities (schools, health services, sports/recreational facilities).</p> <p>3-no change.</p> <p>4,5,6-The increasing sprawl of commercial and residential areas in suburbs as well as in the nearby areas.</p> <p>4,6-Increased pressure on main infrastructures connecting specialised areas</p>

		<p>4-The sprawl of services, working and directional areas are required, otherwise, traffic might lead to the collapse of main infrastructures towards the city centre.</p> <p>8-need for more efficient multimodal public transport.</p> <p>8-Unfavourable economic situation and prices increases are pushing people out of the city centre.</p> <p>WRAP-UP: The continuous expansion of urban areas (both commercial and housing) would determine a worsening in traffic congestion conditions, distance travelled and poor saturation of vehicles' capacities on main urban connections ensuring the access to central urban services, especially during rush-hours.</p> <p>Today, Padua has some 100.000 residents; however, residential and commercial areas are moving out of the city centre, but are not followed by services and working areas. Hence, the city is becoming a large conurbation of some 1 ml inhabitants in the middle of the Veneto region, which constitutes a pretty large mobility market. It is seen as such particularly by transport and logistics operators. This development calls for an integrated transport and land-use policy approach (aiming at a joint optimization of locations and mobility choices) and would certainly promote investments in mobility operations by both private and public organizations.</p>
<p>S6: Environmental consciousness (choice of sustainable mode)</p>	<p>Strong growth</p>	<p>3-Consciousness related to the responsibilities of individual choices.</p> <p>3-Young people will no longer consider the car as a status symbol.</p> <p>3-Logistics network re-configurations driven by environmental parameters.</p> <p>4-The introduction of traffic limitations encourages the adoption of public transport modes.</p> <p>6-Growth of demand for sustainable transport modes.</p> <p>6-Growth of multimodal mobility.</p> <p>6-Growth of demand for e-vehicles and charging facilities.</p> <p>6-Decline of demand for conventional refuelling facilities.</p> <p>7-The environmental consciousness will have a very strong impact on mobility.</p> <p>8-Easier introduction of limited traffic/pedestrian areas.</p> <p>WRAP-UP: it is expected a strong growth of environmental consciousness especially in young generations, in both the short and long term. Young people are historically less prone to car ownership models and open to transport "servitization" (including MaaS). This will lead to the adoption of more sustainable transport modes and to the support of environmental protection policies adoption.</p>

<p>S10: The rise of next-hour to same-day (on-demand) delivery requirement</p>	<p>Strong growth</p>	<p>3,5,7-E-commerce strong growth and related increase of freight urban transport (short term). 3,5-Revision of urban access policies for limited traffic areas in the city centre. 5,6-New areas required by last-mile logistics operators call for a strong revision of urban mobility plans (e.g. temporary parking areas). 3-Conflict among physical retail and e-commerce deliveries (24-7 and access to limited traffic areas). 6-Growth of low-environmental-impact vehicles for last-mile delivery.</p> <p>WRAP-UP: The short-term home delivery market is growing fast and it is expected to grow further. People will likely support the revision of the city-centre access policies for last-mile logistics companies. Physical retail systems in urban areas are going through historical changes and transformation. As a consequence, strong concentration is expected of urban consolidation nodes at spatial level in the urban context to deal with ever short-term deliveries. Urban consolidation centres would be located closer and closer to final customers, thus, calling for a new regulatory framework at a strategic (e.g. SUMP) and tactical level (e.g., tendering procedures for urban logistics operators).</p>
<p>S11: Population change</p>	<p>Decrease</p>	<p>1-Reduction of population in the city centre. 3-Reduction of births. 3-Ageing of the population. 8-Unfavourable economic context (prices in the urban areas are higher).</p> <p>WRAP-UP: a reduction of population is expected in the city centre, while population will grow in the suburbs and nearby municipalities. Overall, population will remain constant as a result, while mobility would face significant challenges due to sprawl effects.</p>
<p>T1: Electrification of mobility</p>	<p>Strong growth</p>	<p>1,3-Introduction of e-bikes, e-scooters (short term). 1-Increased number of tram lines (long term). 1,2,4-Increase in the percentage of e-vehicles without reducing the global number of vehicles (long term). 2-Possible revision of access policies to limited traffic zones. 2,5-number of public charging facilities for private cars (several companies asking for concessions). 3-Purchase of e-buses with public funds (long term). 4-Prices of e-vehicles will decrease due to growth in demand (long term). 7-strong electrification in the long term.</p>

		<p>8-Introduction of e-car sharing systems. 8-More frequent blocks of polluting vehicles in urban areas due to more stringent environmental rules. 8-Growth of oil price. 8-Park space/service areas reduction for non-electric vehicles.</p> <p>WRAP-UP: public policies and the growth of the environmental consciousness in the population will boost the electrification in the short term. Provided that the policy framework remains stable and the growth in demand for electric vehicles leads to a reduction in prices, the trend would last in the long term, with significant positive impacts on the environmental performance of urban mobility. However, on a wider scale, geopolitical issue should be addressed, since the deployment of electric vehicles is heavily connected to the global production of electricity (and related sources). Moreover, the overall impact on the automotive industry should be considered as well.</p>
<p>T2: Adoption of smart-city technology</p>	<p>Strong growth</p>	<p>1-Apps to support multimodal mobility. 1-Sensors for monitoring vehicles and travels. 3-Apps for park management. 4-A smarter mobility, parking and the development of public transport adoption. 5-Solutions required by public institutions and local companies are increasing. 8-Better data access and information sharing allow a reduction of the pressure on transport services/infrastructures. 8-Better exploitation of big-data in management and planning. A-Sensor development and object interconnection (Internet of things).</p> <p>WRAP-UP: the adoption of smart technologies in planning and management of traffic/transport services is expected to grow. The deployment of smart-city innovative technologies and business models is at a core of the Padua pilot in SPROUT. It would determine the optimization of urban traffic flows (both freight and passenger) thanks to a better use of transport capacity (flows consolidation – “dynamic transport capacity allocation”) and an increase in environmental performance, including the deployment of less-pollutant vehicles. Moreover, the increase in the deployment of sensors supporting mobility choices would produce significant benefits. As an example, the increased data availability and accessibility by users could boost the multimodal mobility and public transport choices in the long term.</p>

T4: Automation	Little progress	<p>2-Required strong revision of road transport regulatory framework (civil and penal liability). 3-Decree 70/2019 (Ministry of Transport). 8-Reduction of low qualified jobs number may lead to political and ethical questions. 8-Increase of security vulnerability of transports (especially cybersecurity). 8-Relative positive impacts on urban mobility.</p> <p>WRAP-UP: In the short term, little progress is expected on the way towards autonomous vehicles' widespread circulation. Although the technology is mature, main legal and regulatory issues still remain to be addressed and cannot be solved at a local level.</p>
En2: Local environmental quality	Decrease	<p>1-Reduction of PM, NOx, noise. 3-Reduction of PM. 8-Widespread adoption of vehicles will reduce the pollutants/noise emissions. 8-Extension of limited traffic areas. 8-More frequent pollutant vehicles block in the urban area. 8-Adoption of more stringent environmental rules. 8-UE will, even more, encourage and invest in the green economy.</p> <p>WRAP-UP: the investments in multimodal transport and infrastructures will have positive effects on urban mobility performance in terms of pollution. Moreover, the adoption of more stringent environmental regulations and the contribution from national and UE government will further foster this trend. As a consequence, the general quality of life will be improved. However, negative impacts should be considered as well in terms of increasing housing prices.</p>
L3: Data and privacy laws	More regulation	<p>A – no input can be provided at local level, since the issues are considered mainly to be addressed at EU and international level.</p> <p>WRAP-UP: No relevant changes are expected.</p>
L4: Health and safety laws	Strong increase of regulation	<p>2,3,5- regulation of new vehicles types (e.g. autonomous vehicles, e-bicycles, e-scooters). 2- regulation related to the risk for pedestrians and cyclists connected to the low noise emissions of e-vehicles. 3-New air quality national standards. 3-Speed limit reduction in residential areas (30km/h).</p>

	<p>3- regulation about drone-driven deliveries. 8-New EU regulation to reduce emissions and pollution.</p> <p>WRAP-UP: The introduction of new types of vehicles and transport modes require a revision of the legal framework in order to ensure safety and health standards can be met and responsibility issues solved. Therefore, significant impacts on future mobility patterns are expected as a result of more regulation on health & safety in both the short and long run.</p>
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4.3 Kalisz (Poland)

Based on Kalisz’s selected drivers and its cross-impact matrix, 6 different consistent scenarios were found. Out of these, 2 were again selected based on their ‘news value’, which resulted in 2 scenarios that differed in 12 out of the 17 drivers.

The first scenario selected has a total impact score of 113 and is shown in Table 4.3-1.

Table 4.3-1 Scenario 1 (Kalisz)

Driver	Variant state	Narrative description
P4: Tax policy	Increase	<p>The increase in parking fees, e.g. up to 12 PLN per hour (~3 EUR) will significantly reduce the traffic density in the city. On the other hand, it will increase the number of parking spaces available at a given time and the number of people using public collective transport. The rotation of passenger cars in the city centre will also increase (due to the desire to reduce parking time). Some residents will decide not to come to the city centre until the time during which the fee will not apply. The final effect will be a reduction of peaks in traffic density during the day.</p> <p>The successive introduction of taxes for the use of vehicles with high CO2 emissions will increase the use of low-emission, hybrid and electric vehicles, which, however, will not affect the overall number of vehicles in the city (environmentally friendly vehicles will displace classic combustion cars).</p> <p>The introduction of restrictions for combustion cars entering the city centre (entry ban or entry fee) will reduce the number of combustion cars moving around the city, increase the demand for collective transport and improve air quality in the city.</p> <p>The introduction of free public transport for all residents will significantly increase the demand for this way of travelling.</p> <p>The introduction of tax breaks for renewable energy installations will contribute to the development of infrastructure for charging electric vehicles, which may encourage users to buy electric cars.</p>

Ec2: Tourism	Increase	<p>The number of tourists in the city will increase by 10% (mainly tourists on group trips), which will increase the demand for parking spaces for coaches.</p> <p>The increase in the total number of tourists will increase the demand for parking spaces outside the city centre and for public transport to the city centre. There will also be additional transport services for tourists (e.g. tourist buses to the most popular places in Kalisz).</p> <p>The increase in the number of tourists will increase the activity in the commercial and service industry (restaurants, souvenir shops), which will result in a higher demand for cargo delivery services and more intensive movement of delivery vehicles within the centre. The demand for unloading spaces for cargo vehicles will increase.</p> <p>Business tourism will increase by 10% (the development of companies in the city is conducive to an increase in the number of business trips), which will contribute to increasing car traffic (passenger cars are the main means of transport in business and for moving between the economic zone, companies and hotels).</p>
Ec3: New business models (e.g. collaborative consumption, sharing economy)	Strong growth	<p>A 15% increase in the proportion of travels, using the new business models, will reduce the number of private cars in the city and the need for parking spaces.</p> <p>In 2030 the interest in the car-sharing model will increase significantly. The number of people opting for carpooling to work will increase by 25%. As a result, the city's congestion and exhaust emissions will decrease, which will improve air quality.</p> <p>The number of companies providing rental service of cars, bicycles and scooters will grow, which will increase the number of trips made without using a private car.</p>
Ec4: Economic growth and crisis	Increased growth	<p>The increased wealth of the society will contribute to the increase in the number of low-emission and electric cars in the city. The number of used cars will drop, especially those of more than a dozen years old and high-emission ones, which will improve the quality of air in the city and road safety.</p> <p>The increase in GDP will increase the demand for mobility in all age and social groups (higher revenues mean higher consumption and expenditure on culture, restaurants, travel, shopping - which often requires traveling).</p>

		The increase in the income of the city's inhabitants will contribute to the increasing sprawl of housing and commercial activities. At the same time, the number of kilometres that residents will cover every day will increase. The demand for fast and efficient public transport from the suburban area to the centre will increase.
Ec5: Transformation of retail	Strong growth	<p>The percentage of products purchased online will increase by approximately 25-35%, causing a significant increase in traffic generated by courier companies.</p> <p>The demand for parking spaces will increase both in the city centre and in the outskirts. There will be problems with parcels unloading and delivery due to an insufficient number of parking spaces. The demand for free "short-term" parking spaces will increase (for the time of delivery).</p>
S1: Immigration	Increase	<p>If the number of people of foreign origin increases by around 5-10%, it will lead to the need to implement several language versions in various devices, applications, and services (ticket vending machines, information boards, timetables, websites dedicated to public transport, etc.). The demand for both public transport and its alternatives (taxis, bicycles) will also increase. Road traffic will also increase.</p> <p>Some immigrant drivers may not know all traffic rules and habits in Poland, which may lead to an increase in the number of accidents and conflicts between foreign and local drivers.</p>
S2: Urban structure	Increasing densification	The increase in concentration will cause the growth of morning and afternoon traffic jams by about 20%. Residents from the city centre will be less interested in buying private cars because all the necessary facilities (shops, services, workplace) will be located near their homes and easily accessible on foot or by public transportation.
S3: Demographic composition	Decreasing	The decrease in the average age of the city's population will increase the number of cars purchased (by families with young children) and, as a result, the need for parking spaces. At the same time, the demand for modes of transport enabling active recreation, e.g. bicycles, scooters, and modes of transport considered relatively "innovative" (e.g. scooters and electric scooters, cars for minutes and various modes of transport "reserved" and paid via mobile applications) will increase. Interest in active recreation will contribute to the development of bicycle routes.

<p>S5: Changing behavior towards car ownership</p>	<p>Increase</p>	<p>By 2025, there will be a slight increase in the number of people who do not own a private car. As a result, the demand for public transportation will increase slightly.</p> <p>People who are not willing to use public transport will more often choose car-sharing and taxi services or an active way of travelling (bicycle, on foot).</p> <p>By 2030, there will be a noticeable increase in the number of people who do not own a private car. Such people will choose to live as close as possible to all the necessary facilities (e.g. shops, services, and recreation centres), which will impact the growth of traffic in the city centre.</p> <p>Other transport options (an alternatives to private cars), will be intensively used: taxis (also ordered with the usage of mobile applications, e.g. Uber), city bikes and scooters ("traditional" and electric). The demand for public transportation will increase, which may increase the congestion in buses during rush hours. The air quality in the city will improve and the demand for parking spaces for cars will decrease.</p>
<p>S6: Environmental consciousness (choice of sustainable mode)</p>	<p>Strong growth</p>	<p>A large increase in environmental awareness will result in an intensive increase in the demand for public transport. As a result, the frequency of city buses will increase and new, long-range routes will be introduced. Interest in city bike rental and the demand for bike paths will increase. The number of electric vehicles will increase in the city, generating high demand for vehicle charging stations. Various public means of transport will be electrified: electric taxis, scooters, bicycles, etc. will be introduced.</p>
<p>S7: Safety Concerns</p>	<p>Weak growth</p>	<p>A slight increase in the importance of safety issues will increase the number of trips by alternative means of transport: bicycles, scooters. In addition, public transport will become more crowded.</p> <p>It will lead to taking steps to change the law regulations, concerning the ban of riding a bicycle on the sidewalk, once it will be officially allowed, it will encourage more people to use these types of transportation (bicycles, scooters).</p>
<p>S11: Population change</p>	<p>Increase</p>	<p>Population growth will contribute to urban congestion in Kalisz. Migration outside the city centre (to the suburbs) will increase, which will increase the number of kilometres travelled by each resident and increase the demand for public transport on the outskirts of the city.</p>

		<p>The increase in the number of inhabitants will contribute to the increase in the city budget revenues and the possibility of investing in new vehicles and logistics infrastructure.</p> <p>The increase in the number of inhabitants will increase the demand for public transport, which, combined with higher budget revenues, will enable the launch of new bus lines and an increase in the frequency of routes.</p> <p>Changing the network of connections will contribute to the creation of more optimal routes for residents, which may increase the demand due to the attractiveness (utility) of these connections. Circuitous routes, consuming a lot of time to reach the destination, will be eliminated.</p>
T1: Electrification of mobility	Strong growth	<p>The big growth of the number of electric vehicles will cause a problem with parking spaces with charging possibilities. This will reduce the available parking spaces by about 25%.</p> <p>The number of electric vehicles will increase by about 25%, which will cause a dynamic increase in demand for electric vehicle charging stations. At the same time, the air quality in the city will increase and the noise level will decrease. Thanks to that city inhabitants will be more willing to travel on foot and choose places for recreation and rest in the fresh air.</p>
T2: Adoption of smart-city technology	Strong growth	<p>The increase in the number of different types of applications supporting the smart-city concept will contribute to the reduction of travel time and the number of kilometres covered in one trip. At the same time, the total number of trips will increase because it will be easier to travel.</p> <p>The implementation of applications enabling monitoring the availability of parking spaces near the destination will result in a decrease in traffic in the city centre by approximately 30% (fewer vehicles will circulate the city centre in search of a parking space).</p> <p>The applications will present information on current traffic volumes, accidents, actual times of arrival of city buses (based on GPS transmitters), ongoing renovations and recommended detours, which will contribute to a much even distribution of road traffic in the city, and as a result, reduce transport times.</p>

		Adoption of the application for automatic control of lighting intensity in the city during the day will result in a decrease in electricity consumption by up to 40% while contributing to an increase in road safety and a decrease in the number of road accidents.
T3: Consumer- and citizen-oriented digitalization	Strong growth	<p>By 2025, the proportion of this type of travel will increase by approximately 10%, which will contribute to a decrease in the number of newly purchased passenger vehicles and - as a consequence, a decrease in the demand for parking spaces (which also means an increase in the availability of free parking spaces).</p> <p>By 2030, the usage of this type of application will increase by 40%, the interest in travel forms such as car rental for minutes and the use of autonomous cars will also increase (these means of transport will be offered through the mobile applications). Thus, the use of private cars within the city will decrease. In effect of all changes, the total number of trips made within the city will increase.</p>
En1: Climate change	Slight increase	<p>More frequent heat, occurring in summer, will cause a decrease in interest in walking and using means of transport that requiring effort, for example, bicycles and scooters. Instead, the popularity of means of transport that do not require physical effort (cars, scooters, electric bicycles and electric scooters) will increase.</p> <p>Besides, the increase in temperature and the occurrence of droughts will cause a decrease in the total number of trips made in the city, because people will avoid leaving home. The demand for home delivery services, and thus for short-term parking spaces, will also increase.</p> <p>Residents will mainly use their private air-conditioned passenger cars for everyday travels.</p>
En2: Local environmental quality	Increase	By 2030, the local level of air pollution may decrease by around 5%, and therefore the number of trips on foot, by bicycle and public transport will increase slightly.

Kalisz's second scenario, shown below, has a total impact score of 42.

Table 4.3-2 Scenario 2 (Kalisz)

Driver	Variant state	Narrative description
P4: Tax policy	Increase	<p>The increase in parking fees, e.g. up to 12 PLN per hour (~3 EUR) will significantly reduce the traffic density in the city. On the other hand, it will increase the number of parking spaces available at a given time and the number of people using public collective transport. The rotation of passenger cars in the city centre will also increase (due to the desire to reduce parking time). Some residents will decide not to come to the city centre until the time during which the fee will not apply. The final effect will be a reduction of peaks in traffic density during the day.</p> <p>The successive introduction of taxes for the use of vehicles with high CO2 emissions will increase the use of low-emission, hybrid and electric vehicles, which, however, will not affect the overall number of vehicles in the city (environmentally friendly vehicles will displace classic combustion cars).</p> <p>The introduction of restrictions for combustion cars entering the city centre (entry ban or entry fee) will reduce the number of combustion cars moving around the city, increase the demand for collective transport and improve air quality in the city.</p> <p>The introduction of free public transport for all residents will significantly increase the demand for this way of travelling.</p> <p>The introduction of tax breaks for renewable energy installations will contribute to the development of infrastructure for charging electric vehicles, which may encourage users to buy electric cars.</p>
Ec2: Tourism	Increase	<p>The number of tourists in the city will increase by 10% (mainly tourists on group trips), which will increase the demand for parking spaces for coaches.</p> <p>The increase in the total number of tourists will increase the demand for parking spaces outside the city centre and for public transport to the city centre. There will also be additional transport services for tourists (e.g. tourist buses to the most popular places in Kalisz).</p>

		<p>The increase in the number of tourists will increase the activity in the commercial and service industry (restaurants, souvenir shops), which will result in a higher demand for cargo delivery services and more intensive movement of delivery vehicles within the centre. The demand for unloading spaces for cargo vehicles will increase.</p> <p>Business tourism will increase by 10% (the development of companies in the city is conducive to an increase in the number of business trips), which will contribute to increasing car traffic (passenger cars are the main means of transport in business and for moving between the economic zone, companies and hotels).</p>
Ec3: New business models (e.g. collaborative consumption, sharing economy)	Weak growth	<p>Due to the very small growth of new travel models and its low availability, the number of private cars will not decrease, and the congestion in the city will increase because of the additional traffic generated by travel with rental cars.</p> <p>The number of alternative transport vehicles (scooters, bicycles, cars) will be too low in relation to the demand, therefore the rapid wear and damage are expected, which may lead to a loss of reliance on shared-vehicles and limit interest in them in the long run.</p> <p>These new travel options due to its high cost and the need for access to technology (smartphones, credit cards) will mostly be used occasionally by wealthy people who still own private cars, so congestion and traffic jams will not be eliminated.</p> <p>The new travelling options will not be popular among elderly and less prosperous people, especially due to the physical limitations of the elderly. Furthermore, the safety insecurity for electric motor-scooters or scooters might be an issue. Also, the safety insecurity for electric motor-scooters or scooters might be an issue. Besides, this type of business model is accompanied by a problematic entry barrier (especially for the elderly), which can be difficult to overcome (i.e. knowledge of smartphone or computer skills).</p>
Ec4: Economic growth and crisis	Economic crisis	<p>The economic crisis means that residents will not replace private vehicles for new ones, giving up purchasing new cars or deciding to buy used ones. As a result, cars used in the city will be getting older and less safe, refuelled with the cheapest, non-ecological fuel, which will contribute to an increase in atmospheric pollution.</p>

		Besides, the number of walking and cycling trips will increase, as not all citizens will be able to afford to keep a car. The city, in turn, will not be able to provide public transport at a satisfactory level (which is associated with a decrease in tax revenues and budget cuts).
Ec5: Transformation of retail	Weak growth	The percentage of products purchased online will increase by approximately 5%, which will be the reason why some stores will close stationary points and change for online sales only. The number of deliveries carried out by couriers will slightly increase, while the number of shop deliveries in the city will decrease. There will be a higher demand for parking spaces due to the activities of courier companies.
S1: Immigration	Increase	<p>If the number of people of foreign origin increases by around 5-10%, it will lead to the need to implement several language versions in various devices, applications, and services (ticket vending machines, information boards, timetables, websites dedicated to public transport, etc.). The demand for both public transport and its alternatives (taxis, bicycles) will also increase. Road traffic will also increase.</p> <p>Some immigrant drivers may not know all traffic rules and habits in Poland, which may lead to an increase in the number of accidents and conflicts between foreign and local drivers.</p>
S2: Urban structure	Increasing densification	The increase in concentration will cause the growth of morning and afternoon traffic jams by about 20%. Residents from the city centre will be less interested in buying private cars because all the necessary facilities (shops, services, workplace) will be located near their homes and easily accessible on foot or by public transportation.
S3: Demographic composition	Increasing	<p>The number of people aged 50+ will increase by about 15%, as same as the number of people aged 60+ and 80+. This will increase the demand for public transport because elder people will gradually give up driving cars, and will create the need for adapting additional facilities in city buses (e.g. a larger number of dedicated seating). The demand for taxis will also increase, especially if they are affordable.</p> <p>Due to the lack of restrictions on the maximum age of drivers and by the lack of requirement for more frequent tests, there will be more active drivers over the age of 60, which may result in a higher number of traffic accidents.</p> <p>By 2030, the number of citizens aged 60+ will increase by another 6-7%, which will require the improvement of walking conditions by adjusting pavements and stairs in the urban space to the needs of the "silver generation" (wide and even sidewalks, ramps for wheelchairs, elevators etc.).</p>

S5: Changing behavior towards car ownership	Decrease	If the desire to have an own car (as an indicator of wealthiness and as a result of the society's continuous enrichment) increases, it will increase the traffic in the city and the demand for parking spaces.
S6: Environmental consciousness (choice of sustainable mode)	Weak growth	A slight increase in environmental awareness, reinforced by various types of marketing and social campaigns, will increase the demand for public transport and increase the pressure to introduce cheaper or free public transport for all residents.
S7: Safety Concerns	Strong growth	Safety importance growth will lead to taking certain steps to calm down the traffic. The "tempo 30" zone will be introduced in the city centre with the usage of speed bumps. This will increase the number of walking and cycling travels. The introduction of such a zone will decrease passenger car traffic and an increase in the demand for public transportation.
S11: Population change	Decrease	<p>The number of inhabitants will decrease by approximately 5%, which will result in a decrease in demand for transport-related services. This can contribute to the decision to change the network of connections and reduce the number of public transport courses. Decreased number of inhabitants will cause that some urban spaces will remain empty (e.g. parks, restaurants, entertainment centres, shops), which will reduce the number of delivery cars in the city.</p> <p>The decrease in the population will also cause a decrease in revenues to the city budget and (as a consequence) the shortage of funds for the expansion and maintenance of current infrastructure and resources (with a significant decrease - at least 15% of the population, the budget deficit will deepen, which will result in fewer funds being allocated to current renovation and construction of new infrastructure).</p> <p>The effect of the above changes will be an increase in the number of passenger cars due to a decrease in the attractiveness and availability of public transport.</p>

T1: Electrification of mobility	Weak growth	<p>If the number of electric vehicles increases by around 10-15%, it will reduce the amount of CO2 in the atmosphere and reduce the noise intensity. It will lead to higher demand for electric vehicle charging stations.</p> <p>The small number of charging stations could cause low dynamic of transport electrification process and as a result, its impact on the city mobility will not be significant.</p>
T2: Adoption of smart-city technology	Weak growth	<p>By 2025 the number of smart-city technological applications will increase, improving the mobility within the city.</p> <p>By 2025 mobile applications popular in other Polish cities will be adopted in Kalisz, such as:</p> <ul style="list-style-type: none"> - JakDojadę (application that enables finding the optimal route using public transport, including timetables and interchange points), - Mobicet (mobile application for purchase and validation of public transport tickets). <p>As an effect, the popularity of travel using public transport will increase.</p> <p>Providing a free application that allows finding charging points for electric cars will increase the number of journeys by this mode of transport.</p>
T3: Consumer- and citizen-oriented digitalization	Weak growth	<p>There will be a slight increase in interest in information and payment applications, integrating several ways of travelling, as they will be used mainly by young people. As a result, there will be an increase in interest in the rental of city bikes and electric scooters offered through such applications.</p> <p>By 2030, digitization will increase by 10%, the diversification of different ways of travelling and the integration of services will support the traffic-free flowing.</p>
En1: Climate change	Strong increase	<p>The number of extraordinary weather events will increase by 20%, as a result of which the number of passenger cars travelling in the city will increase (travelling by car gives a greater sense of security in the event of unexpected weather phenomena). Thus, the number of trips made individually (without using public transport) will increase.</p> <p>By 2030, an increase in the number of extraordinary weather events will bring the introduction of practical solutions in the summer and winter season in public transport, e.g. city buses adapted to operate in adverse weather</p>

		<p>conditions (air conditioning in summer, adequate heating in winter) and road maintenance services, e.g. faster and more efficient removing snow from streets during the winter.</p> <p>Also, the increase in temperature and the occurrence of drought will cause a large decrease in the total number of trips made in the city - people will avoid leaving home.</p>
En2: Local environmental quality	Increase	<p>By 2030, the local level of air pollution may decrease by around 5%, and therefore the number of trips on foot, by bicycle and public transport will increase slightly.</p>

Lastly, a third scenario was developed for Kalisz by holding constant certain drivers based on the results of the workshops. In total, 13 variants were forced (P4, Ec2, Ec3, Ec5, S3, S5, S6, S11, T1, T2, T3, En1, En2). This resulted in a scenario described in the table below, which has a total impact score of 6.

Table 4.3-3 Scenario 3 (Kalisz)

Driver	Variant state	Narrative description
P4: Tax policy	Increase	<p>The increase in parking fees, e.g. up to 12 PLN per hour (~3 EUR) will significantly reduce the traffic density in the city. On the other hand, it will increase the number of parking spaces available at a given time and the number of people using public collective transport. The rotation of passenger cars in the city centre will also increase (due to the desire to reduce parking time). Some residents will decide not to come to the city centre until the time during which the fee will not apply. The final effect will be a reduction of peaks in traffic density during the day.</p> <p>The successive introduction of taxes for the use of vehicles with high CO2 emissions will increase the use of low-emission, hybrid and electric vehicles, which, however, will not affect the overall number of vehicles in the city (environmentally friendly vehicles will displace classic combustion cars).</p> <p>The introduction of restrictions for combustion cars entering the city centre (entry ban or entry fee) will reduce the number of combustion cars moving around the city, increase the demand for collective transport and improve air quality in the city.</p> <p>The introduction of free public transport for all residents will significantly increase the demand for this way of travelling.</p> <p>The introduction of tax breaks for renewable energy installations will contribute to the development of infrastructure for charging electric vehicles, which may encourage users to buy electric cars.</p>
Ec2: Tourism	Increase	<p>The number of tourists in the city will increase by 10% (mainly tourists on group trips), which will increase the demand for parking spaces for coaches.</p>

		<p>The increase in the total number of tourists will increase the demand for parking spaces outside the city centre and for public transport to the city centre. There will also be additional transport services for tourists (e.g. tourist buses to the most popular places in Kalisz).</p> <p>The increase in the number of tourists will increase the activity in the commercial and service industry (restaurants, souvenir shops), which will result in a higher demand for cargo delivery services and more intensive movement of delivery vehicles within the centre. The demand for unloading spaces for cargo vehicles will increase.</p> <p>Business tourism will increase by 10% (the development of companies in the city is conducive to an increase in the number of business trips), which will contribute to increasing car traffic (passenger cars are the main means of transport in business and for moving between the economic zone, companies and hotels).</p>
<p>Ec3: New business models (e.g. collaborative consumption, sharing economy)</p>	<p>Weak growth</p>	<p>Due to the very small growth of new travel models and its low availability, the number of private cars will not decrease, and the congestion in the city will increase because of the additional traffic generated by travel with rental cars.</p> <p>The number of alternative transport vehicles (scooters, bicycles, cars) will be too low in relation to the demand, therefore the rapid wear and damage are expected, which may lead to a loss of reliance on shared-vehicles and limit interest in them in the long run.</p> <p>These new travel options due to its high cost and the need for access to technology (smartphones, credit cards) will mostly be used occasionally by wealthy people who still own private cars, so congestion and traffic jams will not be eliminated.</p> <p>The new travelling options will not be popular among elderly and less prosperous people, especially due to the physical limitations of the elderly. Furthermore, the safety insecurity for electric motor-scooters or scooters might be an issue. Also, the safety insecurity for electric motor-scooters or scooters might be an issue. Besides, this type of business model is accompanied by a problematic entry barrier (especially for the elderly), which can be difficult to overcome (i.e. knowledge of smartphone or computer skills).</p>

Ec4: Economic growth and crisis	Increased growth	<p>The increased wealth of the society will contribute to the increase in the number of low-emission and electric cars in the city. The number of used cars will drop, especially those of more than a dozen years old and high-emission ones, which will improve the quality of air in the city and road safety.</p> <p>The increase in GDP will increase the demand for mobility in all age and social groups (higher revenues mean higher consumption and expenditure on culture, restaurants, travel, shopping - which often requires traveling).</p> <p>The increase in the income of the city's inhabitants will contribute to the increasing sprawl of housing and commercial activities. At the same time, the number of kilometres that residents will cover every day will increase. The demand for fast and efficient public transport from the suburban area to the centre will increase.</p>
Ec5: Transformation of retail	Strong growth	<p>The percentage of products purchased online will increase by approximately 25-35%, causing a significant increase in traffic generated by courier companies.</p> <p>The demand for parking spaces will increase both in the city centre and in the outskirts. There will be problems with parcels unloading and delivery due to an insufficient number of parking spaces. The demand for free "short-term" parking spaces will increase (for the time of delivery).</p>
S1: Immigration	Increase	<p>If the number of people of foreign origin increases by around 5-10%, it will lead to the need to implement several language versions in various devices, applications, and services (ticket vending machines, information boards, timetables, websites dedicated to public transport, etc.). The demand for both public transport and its alternatives (taxis, bicycles) will also increase. Road traffic will also increase.</p> <p>Some immigrant drivers may not know all traffic rules and habits in Poland, which may lead to an increase in the number of accidents and conflicts between foreign and local drivers.</p>
S2: Urban structure	Increasing densification	<p>The increase in concentration will cause the growth of morning and afternoon traffic jams by about 20%. Residents from the city centre will be less interested in buying private cars because all the necessary facilities (shops, services, workplace) will be located near their homes and easily accessible on foot or by public transportation.</p>

<p>S3: Demographic composition</p>	<p>Increasing</p>	<p>The number of people aged 50+ will increase by about 15%, as same as the number of people aged 60+ and 80+. This will increase the demand for public transport because elder people will gradually give up driving cars, and will create the need for adapting additional facilities in city buses (e.g. a larger number of dedicated seating). The demand for taxis will also increase, especially if they are affordable.</p> <p>Due to the lack of restrictions on the maximum age of drivers and by the lack of requirement for more frequent tests, there will be more active drivers over the age of 60, which may result in a higher number of traffic accidents.</p> <p>By 2030, the number of citizens aged 60+ will increase by another 6-7%, which will require the improvement of walking conditions by adjusting pavements and stairs in the urban space to the needs of the "silver generation" (wide and even sidewalks, ramps for wheelchairs, elevators etc.).</p>
<p>S5: Changing behavior towards car ownership</p>	<p>Increase</p>	<p>By 2025, there will be a slight increase in the number of people who do not own a private car. As a result, the demand for public transportation will increase slightly.</p> <p>People who are not willing to use public transport will more often choose car-sharing and taxi services or an active way of travelling (bicycle, on foot).</p> <p>By 2030, there will be a noticeable increase in the number of people who do not own a private car. Such people will choose to live as close as possible to all the necessary facilities (e.g. shops, services, and recreation centres), which will impact the growth of traffic in the city centre.</p> <p>Other transport options (an alternatives to private cars), will be intensively used: taxis (also ordered with the usage of mobile applications, e.g. Uber), city bikes and scooters ("traditional" and electric). The demand for public transportation will increase, which may increase the congestion in buses during rush hours. The air quality in the city will improve and the demand for parking spaces for cars will decrease.</p>
<p>S6: Environmental consciousness (choice of</p>	<p>Strong growth</p>	<p>A large increase in environmental awareness will result in an intensive increase in the demand for public transport. As a result, the frequency of city buses will increase and new, long-range routes will be introduced. Interest in city bike rental and the demand for bike paths will increase. The number of electric vehicles will increase in the city,</p>

sustainable mode)		generating high demand for vehicle charging stations. Various public means of transport will be electrified: electric taxis, scooters, bicycles, etc. will be introduced.
S7: Safety Concerns	Strong growth	Safety importance growth will lead to taking certain steps to calm down the traffic. The "tempo 30" zone will be introduced in the city centre with the usage of speed bumps. This will increase the number of walking and cycling travels. The introduction of such a zone will decrease passenger car traffic and an increase in the demand for public transportation.
S11: Population change	Decrease	<p>The number of inhabitants will decrease by approximately 5%, which will result in a decrease in demand for transport-related services. This can contribute to the decision to change the network of connections and reduce the number of public transport courses. Decreased number of inhabitants will cause that some urban spaces will remain empty (e.g. parks, restaurants, entertainment centres, shops), which will reduce the number of delivery cars in the city.</p> <p>The decrease in the population will also cause a decrease in revenues to the city budget and (as a consequence) the shortage of funds for the expansion and maintenance of current infrastructure and resources (with a significant decrease - at least 15% of the population, the budget deficit will deepen, which will result in fewer funds being allocated to current renovation and construction of new infrastructure).</p> <p>The effect of the above changes will be an increase in the number of passenger cars due to a decrease in the attractiveness and availability of public transport.</p>
T1: Electrification of mobility	Strong growth	<p>The big growth of the number of electric vehicles will cause a problem with parking spaces with charging possibilities. This will reduce the available parking spaces by about 25%.</p> <p>The number of electric vehicles will increase by about 25%, which will cause a dynamic increase in demand for electric vehicle charging stations. At the same time, the air quality in the city will increase and the noise level will decrease. Thanks to that city inhabitants will be more willing to travel on foot and choose places for recreation and rest in the fresh air.</p>

<p>T2: Adoption of smart-city technology</p>	<p>Strong growth</p>	<p>The increase in the number of different types of applications supporting the smart-city concept will contribute to the reduction of travel time and the number of kilometres covered in one trip. At the same time, the total number of trips will increase because it will be easier to travel.</p> <p>The implementation of applications enabling monitoring the availability of parking spaces near the destination will result in a decrease in traffic in the city centre by approximately 30% (fewer vehicles will circulate the city centre in search of a parking space).</p> <p>The applications will present information on current traffic volumes, accidents, actual times of arrival of city buses (based on GPS transmitters), ongoing renovations and recommended detours, which will contribute to a much evenier distribution of road traffic in the city, and as a result, reduce transport times.</p> <p>Adoption of the application for automatic control of lighting intensity in the city during the day will result in a decrease in electricity consumption by up to 40% while contributing to an increase in road safety and a decrease in the number of road accidents.</p>
<p>T3: Consumer- and citizen-oriented digitalization</p>	<p>Strong growth</p>	<p>By 2025, the proportion of this type of travel will increase by approximately 10%, which will contribute to a decrease in the number of newly purchased passenger vehicles and - as a consequence, a decrease in the demand for parking spaces (which also means an increase in the availability of free parking spaces).</p> <p>By 2030, the usage of this type of application will increase by 40%, the interest in travel forms such as car rental for minutes and the use of autonomous cars will also increase (these means of transport will be offered through the mobile applications). Thus, the use of private cars within the city will decrease. In effect of all changes, the total number of trips made within the city will increase.</p>
<p>En1: Climate change</p>	<p>Slight increase</p>	<p>More frequent heat, occurring in summer, will cause a decrease in interest in walking and using means of transport that requiring effort, for example, bicycles and scooters. Instead, the popularity of means of transport that do not require physical effort (cars, scooters, electric bicycles and electric scooters) will increase.</p>

		<p>Besides, the increase in temperature and the occurrence of droughts will cause a decrease in the total number of trips made in the city, because people will avoid leaving home. The demand for home delivery services, and thus for short-term parking spaces, will also increase.</p> <p>Residents will mainly use their private air-conditioned passenger cars for everyday travels.</p>
<p>En2: Local environmental quality</p>	<p>Decrease</p>	<p>By 2030, local air pollution level may increase by around 5%, which will increase the interest in hybrid, electric and other environmentally-friendly vehicles.</p> <p>Coal stoves will be used even more often than today, generating additional air pollution, which will lead to a decrease in the number of city residents and tourists and as a result, it will cause reduction of city traffic.</p> <p>The growth of air pollution will cause a further decrease in outdoor travels (on foot, by bike, by scooter). City residents will be choosing more often travelling by their private cars (in order to limit the time outside).</p> <p>The increase of noise volume will lead to the implementation of sound blocking solutions in the city, for example, soundproof screens built in the residential buildings area.</p>

4.4 Budapest (Hungary)

For Budapest, only 1 consistent scenario was found based on the cross-impact table. In order to still have different scenarios to use in the next tasks, it was decided to lower the consistency threshold. In the case of Budapest, it was decided that scenarios would be taken into consideration with the maximum inconsistency of a driver equal to 2. This means that the maximum difference between the impact score of the selected variant and the maximum impact score the variant can have is 2. By including scenarios that have a maximum inconsistency of 2, 24 scenarios were found. Out of the 24, 2 were selected based on their news value, which resulted in scenarios that differed in 11 out of the 12 drivers.

The initial results of the workshop sent over by Budapest was problematic because it contained information only for the variant state that was deemed most likely to happen. In addition, the information was very broad and did not contain any quantified expectations. It also revolved mostly around their mobility challenge only, instead of around the possible future developments of each driver. Lastly, discussion around one of the legal drivers (L2: Consumer protection laws) was missing, and the discussion for driver 'S11: Population change' was changed to a discussion around 'demographic change' instead. After organizing a call with the partners for Budapest, it was realized that there was more additional material that could be used within the deliverable, and that the documents that were originally sent were a summary of the workshop. The additional material was therefore used to fill in the gaps. However, as the discussions were mainly focused around the likely developments, and in terms of micromobility specifically, the narrative descriptions will be added to in later stages.

The first scenario selected for the city of Budapest is a scenario that is considered consistent, and that has a total impact score of 38. It can be seen in the table below.

Table 4.4-1 Scenario 1 (Budapest)

Driver	Variant state	Narrative description
Ec2: Tourism	Increase	<ul style="list-style-type: none"> Decreased demand for micromobility modes from a large group of users. Less transport related conflicts (accidents) involving micromobility vehicles.
S2: Urban structure	Increasing densification	<ul style="list-style-type: none"> Increasing urban density would reduce travel distances, so micro-mobility could replace other modes of transport.

		<ul style="list-style-type: none"> Less space for motorized transport, more efficient use of available surfaces, thus increasing the role of micro-mobility.
S6: Environmental consciousness (choice of sustainable mode)	Strong growth	<ul style="list-style-type: none"> Increase of walking and cycling is expected on short trips, while for longer journeys electric cars to be used. Decrease in the nr. of parking spaces. Conscious transport mode choice (use of micromobility vehicles instead of own car) increases. Development of incentive and regulatory system (e.g. advantage for active transport modes). Decrease in everyday traffic jams, increase in rate of sustainable transport modes. Reallocation and reformation of public space is done based on sustainability principles. Economic growth is expected (e.g. restaurants, cafés rise).
S7: Safety Concerns	Weak growth	<ul style="list-style-type: none"> The absence of the regulation repels the growth and the easy, understandable usage of the micromobility vehicles. The over-regulated environment has a dissuasive effect.
S11: Population change	Increase	<ul style="list-style-type: none"> Suitable urban transport areas are all being used by some form of transport. As a result, any increase in population is expected to change the mobility situation. The younger generation has less need to own a car and is more confident in digital systems. As a result, they are open to vehicle sharing systems. As a result, the number of owned vehicles is expected to decrease in a long-term period.
T1: Electrification of mobility	Strong growth	<ul style="list-style-type: none"> In the current regulatory environment (support for the purchase of electric cars, free parking in public areas), no reduction in passenger cars is expected. Substantial changes in the mobility situation are not expected from the replacement of existing vehicles (cars, buses, freight) to electric vehicles.
T3: Consumer- and citizen-oriented digitalization	Strong growth	<ul style="list-style-type: none"> Stronger involvement of users into city logistics process (moving of shared vehicles). A city treats the data issues (gathering and using data) as a more important matter. The importance of sharing mobility operator data is growing, the city uses the data for determining city development focus. The use of shared mobility devices become easier and more popular, more shared services are available.

		<ul style="list-style-type: none"> • The need for integration increases, more operators provide services, integrated into one application, (micromobility services integrated into monthly PT pass or launch of MaaS concept). • Public space regulation and usage practice becomes better (e.g. regulated parking).
En1: Climate change	Slight increase	<ul style="list-style-type: none"> • Further growth in tourism is expected with weak growth. • The role of micromobility would stagnate or increase slightly with weak growth. • With weak growth, there would be less awareness of the environment and the choice of instrument.
En2: Local environmental quality	Increase	<ul style="list-style-type: none"> • Decreasing indicators strengthen environmental awareness. • If there were new regulations, the scale of environmental pollution would be reduced. • Increasing air and noise pollution would encourage people and the path to micromobility.
L2: Consumer protection laws	More regulation	No narrative description provided.
L3: Data and privacy laws	More regulation	<ul style="list-style-type: none"> • The collection and appropriation of dwellers' travelling data must be regulated (frequently used areas, routes)
L4: Health and safety laws	Strong increase of regulation	<ul style="list-style-type: none"> • The mobility situation might get better in case of stronger regulation. • Micromobility vehicles must be categorized. • Micromobility vehicles might be used expansively if the built environment is suitably evolved and its usage is well regulated. • Enough and adequate space can be provided to micromobility vehicles in case of reorganisation of public space. • The faster spread of micromobility might be expected in a well and strongly regulated environment. • The improvement of road safety is expected in a well-built regulation environment. • The qualification of micromobility vehicles is a must. • With the stricter regulation of value norms' limit (e.g. PM particles) expectedly more people would give up using cars. • Developing zones (e.g. cycling zone, environmental protected zone) • The over-regulated environment has a dissuasive effect. • Strong growth is expected with the determination of a framework.

The second scenario selected for the city of Budapest is a scenario that is considered inconsistent, because 4 out of the 12 drivers have an inconsistent variant state of 2 or lower (these are italicized in the table below). The total impact score of this scenario is 9.

Table 4.4-2 Scenario 2 (Budapest)

Driver	Variant state	Narrative description
<i>Ec2: Tourism</i>	<i>Decrease</i>	<ul style="list-style-type: none"> Decreased demand for micromobility modes from a large group of users. Less transport related conflicts (accidents) involving micromobility vehicles.
<i>S2: Urban structure</i>	<i>Increasing sprawl</i>	<ul style="list-style-type: none"> With increasing sprawl, the role of micro-mobility may be enhanced, providing a good basis for public transport. This requires the restriction of individual motorized traffic. Micro-mobility devices also need to be developed to longer travel distances.
S6: Environmental consciousness (choice of sustainable mode)	Weak growth	<ul style="list-style-type: none"> Increase of walking and cycling is expected on short trips, while for longer journeys electric cars to be used. Conscious transport mode choice (use of micromobility vehicles instead of own car) increases. Development of incentive and regulatory system (e.g. advantage for active transport modes). Reallocation and reformation of public space is done based on sustainability principles. Economic growth is expected (e.g. restaurants, cafés rise).
S7: Safety Concerns	Strong growth	<ul style="list-style-type: none"> The access to the micromobility vehicles must be provided for all. At present predominantly younger generation uses micromobility vehicles. Older generation might use them frequently if the road safety is better. The mobility situation might get better if the regulated environment (road code) is well communicated and the users are well-educated and trained.

S11: Population change	<i>Decrease</i>	<ul style="list-style-type: none"> • If the population is decreasing, then the mobility situation will stagnate.
T1: Electrification of mobility	Weak growth	<ul style="list-style-type: none"> • There is a bigger place for the government to make environmental recovery zones (congestion charge, reduced speed zones), if there are less electric vehicles. So in this case there is a bigger chance for the change of mobility situation. • If regulation and environment change (congestion charge, reduced speed zones, P + R parking lots, etc.) favoring micromobility devices, the mobility situation is expected to change. If, in the future, car users switch to using micromobility devices, the space available in the city can be dedicated to these devices • According to surveys, pedestrians, tourists and public transport users will become users of micromobility devices. This also does not result in a radical change in the modal split.
T3: Consumer- and citizen-oriented digitalization	Weak growth	<ul style="list-style-type: none"> • A city treats the data issues (gathering and using data) as a more important matter • The use of shared mobility devices become easier and more popular, more shared services are available • The need for integration increases, more operators provide services, integrated into one application, (micromobility services integrated into monthly PT pass or launch of MaaS concept).
En1: Climate change	Strong increase	<ul style="list-style-type: none"> • With strong growth, there would be more frequent extreme weather conditions that would require protective equipment • More environmentally friendly modes should be chosen • Restrictions on the use of internal combustion vehicles are expected, which would increase the role of micromobility
En2: Local environmental quality	Increase	<ul style="list-style-type: none"> • Decreasing indicators strengthen environmental awareness • If there were new regulations, the scale of environmental pollution would be reduced • Increasing air and noise pollution would encourage people and the path to micromobility

L2: Consumer protection laws	Less regulation	No narrative description provided.
L3: Data and privacy laws	Less regulation	<ul style="list-style-type: none"> • At present the mode and level of regulation (GDPR) is adequate. • Most of travellers are uninterested in the usage of the information of their trips therefore it is irrelevant in most cases. It has less influence on people's mobility habits.
L4: Health and safety laws	<i>Weak increase of regulation</i>	<ul style="list-style-type: none"> • In case of weaker/less regulation the inequality usage of public place will remain. • The unregulated environment causes conflicts in the society. • If there will be a guiding regulation – there will be a regulation of where and when to use the micromobility devices – it is expected that the mobility situation will change dramatically.

Based on the indication of likelihood by stakeholders for all drivers, a third scenario was developed by holding the likely future developments constant. The drivers where no consensus was reached or where 'no change' was indicated were not forced in the ScenarioWizard software. In total, 8 out of the 12 drivers were forced (Ec2, S2, S6, S7, S11, T1, En1, L4). This resulted in the following scenario, with a total impacts score of 6.

Table 4.4-3 Scenario 3 (Budapest)

Driver	Variant state	Narrative description
Ec2: Tourism	Increase	<ul style="list-style-type: none"> • Increased demand for micromobility modes from a large group of users. • Appearance of new mobility service providers. • More transport related conflicts (accidents) involving micromobility vehicles (unknown local regulation, more users). • Public space usage reorganisation (e.g. new parking space functions, drop-off solutions). • Increased need for stricter regulation. • Increased need for bicycle-friendly infrastructure, that can be used by micromobility vehicles as well. • Development of public transport.

S2: Urban structure	Increasing sprawl	<ul style="list-style-type: none"> • With increasing sprawl, the role of micro-mobility may be enhanced, providing a good basis for public transport. • This requires the restriction of individual motorized traffic. • Micro-mobility devices also need to be developed to longer travel distances.
S6: Environmental consciousness (choice of sustainable mode)	Weak growth	<ul style="list-style-type: none"> • Increase of walking and cycling is expected on short trips, while for longer journeys electric cars to be used. • Conscious transport mode choice (use of micromobility vehicles instead of own car) increases. • Development of incentive and regulatory system (e.g. advantage for active transport modes). • Reallocation and reformation of public space is done based on sustainability principles. • Economic growth is expected (e.g. restaurants, cafés rise).
S7: Safety Concerns	Strong growth	<ul style="list-style-type: none"> • The access to the micromobility vehicles must be provided for all. • At present predominantly younger generation uses micromobility vehicles. Older generation might use them frequently if the road safety is better. • The mobility situation might get better if the regulated environment (road code) is well communicated and the users are well-educated and trained.
S11: Population change	Increase	<ul style="list-style-type: none"> • Suitable urban transport areas are all being used by some form of transport. As a result, any increase in population is expected to change the mobility situation. • The younger generation has less need to own a car and is more confident in digital systems. As a result, they are open to vehicle sharing systems. As a result, the number of owned vehicles is expected to decrease in a long-term period.
T1: Electrification of mobility	Weak growth	<ul style="list-style-type: none"> • There is a bigger place for the government to make environmental recovery zones (congestion charge, reduced speed zones), if there are less electric vehicles. So in this case there is a bigger chance for the change of mobility situation. • If regulation and environment change (congestion charge, reduced speed zones, P + R parking lots, etc.) favoring micromobility devices, the mobility situation is expected to change. If, in the future, car users switch to using micromobility devices, the space available in the city can be dedicated to these devices

		<ul style="list-style-type: none"> According to surveys, pedestrians, tourists and public transport users will become users of micromobility devices. This also does not result in a radical change in the modal split.
T3: Consumer- and citizen-oriented digitalization	Weak growth	<ul style="list-style-type: none"> A city treats the data issues (gathering and using data) as a more important matter The use of shared mobility devices become easier and more popular, more shared services are available The need for integration increases, more operators provide services, integrated into one application, (micromobility services integrated into monthly PT pass or launch of MaaS concept).
En1: Climate change	Strong increase	<ul style="list-style-type: none"> With strong growth, there would be more frequent extreme weather conditions that would require protective equipment. More environmentally friendly modes should be chosen. Restrictions on the use of internal combustion vehicles are expected, which would increase the role of micromobility.
En2: Local environmental quality	Increase	<ul style="list-style-type: none"> Decreasing indicators strengthen environmental awareness. If there were new regulations, the scale of environmental pollution would be reduced. Increasing air and noise pollution would encourage people and the path to micromobility.
L2: Consumer protection laws	More regulation	No narrative description provided.
L3: Data and privacy laws	Less regulation	<ul style="list-style-type: none"> At present the mode and level of regulation (GDPR) is adequate. Most of travellers are uninterested in the usage of the information of their trips therefore it is irrelevant in most cases. It has less influence on people's mobility habits.
L4: Health and safety laws	Strong increase of regulation	<ul style="list-style-type: none"> The mobility situation might get better in case of stronger regulation. Micromobility vehicles must be categorized. Micromobility vehicles might be used expansively if the built environment is suitably evolved and its usage is well regulated.

		<ul style="list-style-type: none"> • Enough and adequate space can be provided to micromobility vehicles in case of reorganisation of public space. • The faster spread of micromobility might be expected in a well and strongly regulated environment. • The improvement of road safety is expected in a well-built regulation environment. • The qualification of micromobility vehicles is a must. • With the stricter regulation of value norms' limit (e.g. PM particles) expectedly more people would give up using cars. • Developing zones (e.g. cycling zone, environmental protected zone) • The over-regulated environment has a dissuasive effect. • Strong growth is expected with the determination of a framework.
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4.5 Tel Aviv (Israel)

Tel Aviv’s cross-impact table resulted in 3 consistent scenarios, of which 2 were then selected based on their news value. This resulted in scenarios that differed in all variant states from each other. The narrative descriptions provided by the city through their workshops was lacking in some places, as sometimes a description was provided for only one of the two variant states. Additional information will therefore have to be provided by the city.

The first scenario consistent scenario for Tel Aviv, shown in the table below, has a total impact score of 52.

Table 4.5-1 Scenario 1 (Tel Aviv)

Driver	Variant state	Narrative description
P2: Political agenda	Growing support	<ul style="list-style-type: none"> Participants agreed that the budget allocated for mobility projects during the last few years was high and some ambitious projects were implemented or approved. Therefore, the scenario of increased budget doesn’t seem like a practical option. Increased budget to mobility can accelerate the approval of Tel Aviv metropolis Metro system.
P4: Tax policy	Increase	<ul style="list-style-type: none"> Eliminate the benefits granted for employees encouraging the usage of private vehicles, will encourage them to use public transport or ride sharing. This is especially relevant to promote the Surveying and prioritizing actions under the program to enhance sustainable accessibility to and within employment centres project. Municipal Parking Policy Update – Managing and allocating parking capacity might decrease private vehicle ownership, especially ownership of second car in a household. (Differential pricing) Increasing taxes will increase the demand for cycling as most of the trips in the city are short (less than 5 Km). Tax policy encouraging electrical vehicles will promote the Municipal preparedness for electric transportation. Congestion fees will decrease the number of private cars. <p>Comments:</p> <ul style="list-style-type: none"> Chances for changes in tax policy are minor since there are no expectations of any changes in the political agenda.

		<ul style="list-style-type: none"> • Participants empathized the importance of using budget due to tax policy changes to promote public transport.
Ec2: Tourism	Increase	<ul style="list-style-type: none"> • Increased demand for micro mobility services. • Slightly increase the demand for public transport. • Increase the density in sidewalks and other active moods infrastructure. Especially density of pedestrians. • Encourage traffic arrangements to promote walkability, such as restrictions on private vehicle traffic.
Ec4: Economic growth and crisis	Increased growth	<ul style="list-style-type: none"> • Increased cost of living and the change in the socio-economic situation of the population reduces the portion of intermediate class, especially in north Tel Aviv. This increases private vehicle ownership and reduces public transport demand among the wealthy population. • Increased demand for public transport and cycling among intermediate class (due to the high cost of living and housing). • Increased logistics demands. Municipality will need to address logistics challenges and prioritize different solutions.
S2: Urban structure	Increasing densification	<ul style="list-style-type: none"> • Increased demand from residents and commuters working in the city. All projects related to infrastructure will be promoted. • Quarters/neighbourhoods master plan for transportation and traffic will be promoted. Offering detailed, alternative and tailored solutions and services in high density areas. • Municipal Parking Policy Update – Managing and allocating parking capacity need to be updated to meet the demands and prioritize public transport in high density areas. (Expected growth is already embedded in the municipal parking policy). Managing parking will be influenced more than parking standards for new buildings. • Implementation of the Municipal parking policy will be more significant and essential to follow. • Increased demand for cycling for shorter trips in the dense areas.

		<ul style="list-style-type: none"> • Municipal preparedness for electric transportation might be accelerated. Infrastructure efficiency in dense areas will be more worthy.
S3: Demographic composition	Decrease	<ul style="list-style-type: none"> • More demand for public transport by young adults. • Increased demand for active modes (bicycles, scooters). • Increased demand for on-demand / micro-transit transport (aging population, young adults).
S6: Environmental consciousness (choice of sustainable mode)	Strong growth	<ul style="list-style-type: none"> • Promote the Municipal preparedness for electric transportation for both public transportation and private vehicles. • Promote the Implementation, updating, and expansion of the cycling master plan. Higher demand for active and sustainable modes.
S7: Safety Concerns	Strong growth	<ul style="list-style-type: none"> • Increased demand for safe infrastructure for active modes. • Increased demand for separation between road users.
S11: Population change	Increase	No narrative description provided.
T2: Adoption of smart-city technology	Strong growth	<ul style="list-style-type: none"> • Decrease of the required number of bus terminals due to better real-time fleet management. • Better logistics management. • More efficient smart parking.

T3: Consumer- and citizen-oriented digitalization	Strong growth	<ul style="list-style-type: none"> Information provided about combined services will expose connectivity problems and shortage and might contribute to better level of service of public transport. Growth of Micro-transit and car sharing initiatives. Increased usage of sustainable modes as an alternative to private vehicles.
L4: Health and safety laws	Strong increase of regulation	<ul style="list-style-type: none"> Regulation requiring usage of helmets or other safety products might reduce the usage of bicycles and other micro-mobility modes. Regulation to reduce pollution might accelerate the Municipal preparedness for electric transportation. Regulation to reduce pollution will obligate better management of logistics (deliveries) and restrict heavy vehicles traffic within the city.

Tel Aviv's second scenario has a total impact score of 6 and is shown below.

Table 4.5-2 Scenario 2 (Tel Aviv)

Driver	Variant state	Narrative description
P2: Political agenda	Decreasing support	<ul style="list-style-type: none"> Increase the number of bus terminals. The bus terminals project will be highly affected by budgets cut (Michal Miller). Other participants claimed that the main barriers for bus terminals are statutory, and not the budget. Participants agreed that the plans of the larger and ambitious terminals will be affected (cancelled or adjusted into smaller scale) while smaller terminals will not be affected by cutting the budgets. When alternatives exist any budget reduction will cause cancelling the plans for new terminals. Municipal preparedness for electric transportation. Might be slightly affected. Specially infrastructure for private cars.

		<ul style="list-style-type: none"> • The Ministry of Transport defined a national target of 60% electric public transport by 2025 seems too ambitious regardless the budget. • Quarters (neighbourhoods) master plans for transportation and traffic • Will be highly impacted. A high portion of the resources is required for detailed planning, while implementation doesn't require a major budget. In case of budget decrease most probably the project will not be prioritized. • Surveying and prioritizing actions under the program to enhance sustainable accessibility to and within employment centres, including a project to increase ride sharing. • Resources needed are minimal. Might be accelerated / prioritized if the budget allocated to mobility will be decreased. • Implementation, updating, and expansion of the cycling master plan. • Will be highly affected by a decrease of the budget. • It was mentioned that it is essential to distinguish between approved projects and planned projects. • The Metro project in Tel Aviv metropolis still not approved and might be affected by a budget decrease. Unlike the LRT that is already approved and under construction.
P4: Tax policy	Decrease	No narrative description provided.
Ec2: Tourism	Decrease	<ul style="list-style-type: none"> • No influence
Ec4: Economic growth and crisis	Economic crisis	<ul style="list-style-type: none"> • Less demand / trips. • Reduced demand for public transport. • Less trips in private vehicles. • Periods of reduced demand might encourage investment in infrastructure.

S2: Urban structure	Increasing sprawl	No narrative description provided.
S3: Demographic composition	Increase	<ul style="list-style-type: none"> • Increased demand for accessible health care facilities. • Increased demand for accessible public transport. • Increased demand for accessible on demand services. • Increased demand of deliveries.
S6: Environmental consciousness (choice of sustainable mode)	Weak growth	No narrative description provided.
S7: Safety Concerns	Weak growth	No narrative description provided.
S11: Population change	Decrease	No narrative description provided.
T2: Adoption of smart-city technology	Weak growth	No narrative description provided.
T3: Consumer- and citizen-oriented digitalization	Weak growth	<ul style="list-style-type: none"> • Connectivity and multimodality will not grow much. • Micro-transit and car sharing initiatives might not grow to their full potential.

L4: Health and safety laws	Weak increase of regulation	No narrative description provided.
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The third scenario, representing the developments deemed most likely by the stakeholders, is depicted in the table below. It was obtained by holding 7 drivers constant (Ec.4, S2, S3, S7, S11, T2, T3). The other drivers were not forced, because stakeholders either did not agree on the future development, or because they indicated that they anticipated no change. The resulting scenario has a total impact score of 24.

Table 4.5-3 Scenario 3 (Tel Aviv)

Driver	Variant state	Narrative description
P2: Political agenda	Growing support	<ul style="list-style-type: none"> Participants agreed that the budget allocated for mobility projects during the last few years was high, and some ambitious projects were implemented or approved. Therefore, the scenario of increased budget doesn't seem like a practical option. Increased budget to mobility can accelerate the approval of Tel Aviv metropolis Metro system.
P4: Tax policy	Increase	<ul style="list-style-type: none"> Eliminate the benefits granted for employees encouraging the usage of private vehicles, will encourage them to use public transport or ride sharing. This is especially relevant to promote the Surveying and prioritizing actions under the program to enhance sustainable accessibility to and within employment centres project. Municipal Parking Policy Update – Managing and allocating parking capacity might decrease private vehicle ownership, especially ownership of second car in a household. (Differential pricing) Increasing taxes will increase the demand for cycling as most of the trips in the city are short (less than 5 Km). Tax policy encouraging electrical vehicles will promote the Municipal preparedness for electric transportation. Congestion fees will decrease the number of private cars. <p>Comments:</p>

		<ul style="list-style-type: none"> • Chances for changes in tax policy are minor since there are no expectations of any changes in the political agenda. • Participants emphasize the importance of using budget due to tax policy changes to promote public transport.
Ec2: Tourism	Increase	<ul style="list-style-type: none"> • Increased demand for micro mobility services. • Slightly increase the demand for public transport. • Increase the density in sidewalks and other active moods infrastructure. Especially density of pedestrians. • Encourage traffic arrangements to promote walkability, such as restrictions on private vehicle traffic.
Ec4: Economic growth and crisis	Increased growth	<ul style="list-style-type: none"> • Increased cost of living and the change in the socio-economic situation of the population reduces the portion of intermediate class, especially in north Tel Aviv. This increases private vehicle ownership and reduces public transport demand among the wealthy population. • Increased demand for public transport and cycling among intermediate class (due to the high cost of living and housing). • Increased logistics demands. Municipality will need to address logistics challenges and prioritize different solutions.
S2: Urban structure	Increasing densification	<ul style="list-style-type: none"> • Increased demand from residents and commuters working in the city. All projects related to infrastructure will be promoted. • Quarters/neighbourhoods master plan for transportation and traffic will be promoted. Offering detailed, alternative and tailored solutions and services in high density areas.

		<ul style="list-style-type: none"> • Municipal Parking Policy Update – Managing and allocating parking capacity need to be updated to meet the demands and prioritize public transport in high density areas. (Expected growth is already embedded in the municipal parking policy). Managing parking will be influenced more than parking standards for new buildings. • Implementation of the Municipal parking policy will be more significant and essential to follow. • Increased demand for cycling for shorter trips in the dense areas. • Municipal preparedness for electric transportation might be accelerated. Infrastructure efficiency in dense areas will be more worthy.
S3: Demographic composition	Increase	<ul style="list-style-type: none"> • Increased demand for accessible health care facilities. • Increased demand for accessible public transport. • Increased demand for accessible on demand services. • Increased demand of deliveries.
S6: Environmental consciousness (choice of sustainable mode)	Strong growth	<ul style="list-style-type: none"> • Promote the Municipal preparedness for electric transportation for both public transportation and private vehicles. • Promote the Implementation, updating, and expansion of the cycling master plan. Higher demand for active and sustainable modes.
S7: Safety Concerns	Weak growth	No narrative description provided.
S11: Population change	Increase	No narrative description provided.

T2: Adoption of smart-city technology	Weak growth	No narrative description provided.
T3: Consumer- and citizen-oriented digitalization	Weak growth	<ul style="list-style-type: none"> • Connectivity and multimodality will not grow much. • Micro-transit and car sharing initiatives might not grow to their full potential.
L4: Health and safety laws	Strong increase of regulation	<ul style="list-style-type: none"> • Regulation requiring usage of helmets or other safety products might reduce the usage of bicycles and other micro-mobility modes. • Regulation to reduce pollution might accelerate the Municipal preparedness for electric transportation. • Regulation to reduce pollution will obligate better management of logistics (deliveries) and restrict heavy vehicles traffic within the city.

5 Conclusion

In this deliverable, the results of Task 3.1 were described. This task included the development of the first draft of city-specific 'do-nothing' scenarios for two different time horizons (2025 and 2003) for the 1st-layer SPROUT cities. These scenarios were built using two components: a quantitative cross-impact balance analysis based on each city's selected drivers, and a qualitative narrative description of each future variant state. For every city, two consistent scenarios were selected that were as different from each other as possible, in order to take as many future developments into account as possible. As a last step, a third scenario was generated for each city, aimed at reflecting the most likely future development, as envisioned by every city's stakeholders.

First, it is important to note how city-specific the scenarios that are being developed are. Because they are built on two components that were tailored to each city's specific input with regards to drivers and stakeholders, they are unique and therefore difficult to compare. It should also be noted that, overall, no distinction was made between the medium- and long-term timeline in any of the cities' narrative descriptions. Lastly, it is important to note that the process of gathering the input for the narrative descriptions through the workshops was not a straightforward one, as can be seen from the widely varying workshop results in each city's scenario table. Valencia, Budapest, and Tell Aviv all have narrative descriptions lacking. Because both the output of the software and the narrative descriptions are primordial to the further development of the scenarios, this will be addressed as parts of the next tasks. Where no narrative description was provided, where the information provided did not sufficiently answer the needs of this task, or where not enough information was provided in the narrative descriptions, the cities will be asked to contact the concerned stakeholders and to send over additional materials.

As a next step, in Tasks 3.2 (Sustainability impact analysis of city-specific scenarios) and 3.3 (Policy impact analysis of city-specific scenarios), these scenarios will then be analysed through a sustainability impact analysis and through a policy impact analysis. This will then lead to the polished version of the narrative scenarios in Task 3.4 (Validation and development of city-specific narrative scenarios).

6 References

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7 Annex

7.1 Changes made by Budapest and Padua

7.1.1 Padua

Change made:

1) EC1 – S11 Drivers

	S11 – Population change Decrease	S11 – Population change Increase
EC1 – New employment arrangements Weak growth	0 (no changes)	0 (no changes)
EC1 – New employment arrangements Strong growth	0 (no changes)	+1

Why?

The opportunity given by new jobs opportunities related to a strong development in new business models, could lead to attract in Padua people from the surrounding region, favoring a slight, proportional increase of people moving to work and live in the city.

Change made:

2) T1 – EC1 Drivers

	EC1 – New employment arrangements Weak growth	EC1 – New employment arrangements Strong growth
T1 – Electrification of mobility	0 (no changes)	0

Weak growth		
T1 – Electrification of mobility	+1	+2
Strong growth		

Why?

The development of e-mobility is a key factor for the full achievement of SUMP goals; a strong growth in the development of e-mobility, could have as consequence, new employment arrangements for “high-tech” contractors and, subsequently, the generation of new job positions in this field.

Change made:

2) L4 – T1 Drivers

	T1 – Electrification of mobility Weak growth	T1 – Electrification of mobility Strong growth
L4 – Health and Safety laws Weak increase of regulation	2 (no changes)	-2 (no changes)
L4 – Health and Safety laws Strong increase of regulation	- 2	2 (No changes)

Why?

The value was missing. Probably, a strong increase of regulation, has a strongly restricting influence on weak growth of e-mobility; conversely, a strong increase of regulation is expected to favor a strong growth in electrification of mobility.

7.1.2 Budapest

Change made: EC2: Tourism - S7: Safety Concerns (in modal choice)

Why? If the Tourism is increasing, than the safety concerns will growth strongly.

Change made: EC2: Tourism - L2: Consumer protection laws

Why? The increasing of tourism may cause more claims which needs more regulations.

Change made: S2: Urban structure - S6: Environmental consciousness (choice of sustainable mode)

Why? Impact inverted and weakened, we think that the increased densification means stronger growth of environmental consciousness

Change made: S7: Safety Concerns - L4: Health and safety laws

Why? The strong growth of safety concerns may result in stricter safety laws

Change made: T1: Electrification of mobility - En1: Climate change

Why? Electrification may not have that much on an impact on climate change

Because the lifetime pollution of e-vehicles is not much less than CF vehicles.

Change made: En1: Climate change - S6: Environmental consciousness (choice of sustainable mode)

Why? The stronger climate change may result in more environmental consciousness

Change made: En2: Local environmental quality - S11 Population change

Why? Increased environmental quality causes increased population. Because people prefer better living circumstances.

Change made: L4: Health and safety laws - S2: Urban structure

Why? Strong increase of health and safety laws may keep residents in the inner area of the city.

Change made: L4: Health and safety laws - S7: Safety Concerns (in modal choice)

Why? The more regulated area may cause less concerns.

Change made: L4: Health and safety laws - En1: Climate change

Why? The strong increase of regulation may have an impact on the climate change.

7.2 City-specific cross-impact tables

7.2.1 Valencia (Spain)

Table 7.2-1 Valencia's cross-impact table

		P 2	P 3	P 4	E 1	E 2	E 3	E 4	E 5	S 1	S 2	S 5	S 6	S 11	T 1	T 2	T 3	En 1	En 2	L 1	
P2: Political agenda	Decreasing support	0	0	-2	-2	0	0	1	-1	0	-2	0	0	0	0	0	0	0	0	0	0
	Growing support	0	0	2	2	0	0	-1	1	0	2	0	0	0	0	0	0	0	0	0	0
P3: Corruption	Decrease	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Increase	1	-1	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0
P4: Tax policy	Decrease	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	2	2	-2	2	-2	0
	Increase	0	0	0	0	0	0	0	0	-1	1	0	0	0	2	-2	-2	2	-2	2	0
Ec1: New employment arrangements	Weak growth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Strong growth	0	0	0	0	0	0	0	0	-1	1	-1	1	0	0	0	0	0	0	0	-2
Ec2: Tourism	Decrease	-1	1	0	0	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Increase	-1	1	0	0	0	-1	1	0	-2	2	-2	2	0	0	0	0	0	0	0	-1
Ec3: New business models (e.g. collaborative consumption,	Weak growth	-1	1	0	0	1	-1	2	-2	0	0	0	0	0	0	0	0	0	0	0	0
	Strong growth	-2	2	0	0	-1	1	-2	2	0	-1	1	0	0	0	0	0	0	0	-1	1
Ec4: Economic growth and crisis	Economic crisis	-2	-2	0	0	-2	2	0	0	-1	1	0	0	0	0	0	0	0	0	0	0
	Increased growth	-1	1	0	0	-2	2	0	0	0	0	0	0	0	-1	1	-1	1	-1	1	
Ec5: Transformation of retail	Weak growth	-1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Strong growth	-2	2	0	0	-2	2	0	0	-1	1	-1	1	0	0	0	0	-2	2	0	0
S1: Immigration	Decrease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Increase	0	0	0	0	0	-1	1	0	0	0	0	0	-1	1	0	0	0	0	0	0
S2: Urban structure	Increasing densification	-2	2	0	0	1	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0
	Increasing sprawl	2	1	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	-1	1
S5: Changing behavior towards car ownership	Decrease	2	-2	0	0	-1	1	0	0	0	0	0	0	0	-1	1	0	0	0	0	0
	Increase	-2	2	0	0	-1	1	0	0	-2	2	0	0	-1	1	0	0	0	0	0	0
S6: Environmental consciousness (choice of	Weak growth	1	-1	0	0	1	-1	0	0	0	0	0	0	0	-1	1	2	-2	0	0	0
	Strong growth	-2	2	0	0	-1	1	0	0	0	0	0	0	0	1	-1	-2	2	-2	2	0
S11: Population change	Decrease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Increase	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T1: Electrification of mobility	Weak growth	1	-1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Strong growth	-1	1	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T2: Adoption of smart-city technology	Weak growth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Strong growth	0	0	0	0	1	0	0	0	-1	1	0	0	-1	1	0	0	-2	2	0	0
T3: Consumer- and citizen-oriented digitalization	Weak growth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Strong growth	0	0	0	0	-1	1	0	0	-2	2	0	0	-2	2	-1	1	0	0	0	0
En1 : Climate change	Slight increase	0	1	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Strong increase	-2	2	0	0	-2	2	0	0	1	-1	-2	2	1	-1	0	0	0	0	0	0
En2 : Local environmental quality	Decrease	-2	2	0	0	-2	2	0	0	1	-1	-1	1	0	0	0	0	0	0	0	0
	Increase	0	1	0	0	0	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0
L1: Labour and employment laws	Less regulation	0	0	0	0	0	-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	More regulation	0	0	0	0	0	2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0

7.2.2 Padua (Italy)

Table 7.2-2 Padua's cross-impact table

		P 2	P 3	E C 1	E C 3	E C 5	S 2	S 6	S 1 0	S 1 1	T 1	T 2	T 4	En 2	L 3	L 4							
		Decreasing support	Growing support	Decrease	Increase	Weak growth	Strong growth	Weak growth	Strong growth	Weak growth	Strong growth	Weak growth	Strong growth	Little progress	Strong progress	Decrease	Increase	Less regulation	More regulation	Weak increase of regulati	Strong increase of regula		
P2: Political agenda	Decreasing support			0	0	0	0	-2	0	0	-1	1	2	-1	0	0	0	0	0	0	0	2	-2
	Growing support			0	0	0	0	2	0	0	1	-1	-1	2	0	0	0	0	0	0	0	-2	2
P3: Corruption	Decrease	-1	1			0	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Increase	1	-1			0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ec1: New employment arrangements	Weak growth	0	0	0	0			1	-1	0	0	0	0	1	-1	0	0	0	0	0	0	0	0
	Strong growth	0	0	0	0			-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ec3: New business models (e.g. collaborative consumption,	Weak growth	-1	1	0	0	2	-2			0	0	0	0	1	-1	0	0	0	0	0	0	0	0
	Strong growth	-2	2	0	0	-2	2			0	0	0	0	-1	1	0	0	0	0	0	0	0	0
Ec5: Transformation of retail	Weak growth	-1	1	0	0	1	0	0	0					2	-2	0	0	0	0	0	0	0	0
	Strong growth	-2	2	0	0	0	1	-1	1					0	0	0	0	0	0	0	0	0	0
S2: Urban structure	Increasing densification	-2	2	0	0	0	0	-1	1	1	-1			2	-2	0	0	0	0	0	0	0	0
	Increasing sprawl	2	-2	0	0	0	0	1	-1	-2	2			-2	2	0	0	0	0	0	0	0	0
S6: Environmental consciousness (choice of	Weak growth	1	-1	0	0	0	0	1	-1	-1	1			-2	2	0	0	0	0	0	0	0	0
	Strong growth	-2	2	0	0	0	0	-2	2	1	-1			2	-2	0	0	0	0	0	0	0	0
S10: The rise of next-hour to same-day (on-demand)	Weak growth	1	-1	0	0	2	-2	0	0	1	-1	0	0			0	0	-1	-1	0	0	0	0
	Strong growth	-2	2	0	0	-2	2	0	0	-1	1	-1	1	0	0			0	0	0	0	0	0
S11 Population change	Decrease	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0
	Increase	-1	1	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0
T1: Electrification of mobility	Weak growth	1	-1	0	0	0	0	1	-1	0	0	0	0	0	0			0	0	0	0	0	0
	Strong growth	-1	1	0	0	1	2	-1	1	0	0	0	0	0	0			-1	2	-2	2	-2	2
T2: Adoption of smart-city technology	Weak growth	0	0	0	0	0	0	1	-1	0	0	0	0	0	0			2	-2	0	0	0	0
	Strong growth	0	0	0	0	0	0	-1	1	-1	1	0	0	0	0			-2	2	0	0	-2	2
T4: Automation	Little progress	0	0	0	0	0	0	-1	1	1	-1	2	-2	0	0	2	-2	0	0	0	0	0	0
	Strong progress	-1	1	0	0	0	0	-2	2	-2	2	-2	2	0	0	-2	2	-2	2	0	0	-2	2
En2 : Local environmental quality	Decrease	-2	2	0	0	0	0	-1	1	0	0	-2	2	-1	1	0	0	0	0	0	0	0	0
	Increase	0	1	0	0	0	0	0	0	0	2	-2	-1	1	0	0	1	-1	0	0	0	0	0
L3: Data and privacy laws	Less regulation	0	0	0	0	0	0	-1	1	-1	1	0	0	0	0	0	0	0	0	0	0	0	0
	More regulation	0	0	0	0	0	0	1	-1	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
L4: Health and safety laws	Weak increase of regulati	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	-2	0	0	-2	2
	Strong increase of regula	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	2	0	0	2	-2

7.2.4 Budapest (Hungary)

Table 7.2-4 Budapest's cross-impact table

		Ec2	S2	S6	S7	S11	T1	T3	En1	En2	L2	L3	L4				
		Decrease	Increase	Increasing densification	Increasing sprawl	Weak growth	Strong growth	Weak growth	Strong growth	Decrease	Increase	Less regulation	More regulation	Less regulation	More regulation	Weak increase of regula	Strong increase of regul
Ec2: Tourism	Decrease			0	0	0	0	0	0	0	-1	1	0	0	0	0	0
	Increase			0	0	0	0	-1	1	0	0	-1	1	0	0	0	0
S2: Urban structure	Increasing densification	0	0			-1	-1	0	0	0	0	1	-1	1	0	0	0
	Increasing sprawl	0	0			1	-1	0	0	0	0	-1	1	-1	1	0	0
S6: Environmental consciousness	Weak growth	0	0	-1	1			0	0	0	2	-2	2	-2	-2	2	-2
	Strong growth	0	0	1	-1			0	0	0	-2	2	-2	2	-2	2	-2
S7: Safety Concerns	Weak growth	0	0	0	0	0	0			0	0	0	0	0	0	0	0
	Strong growth	0	0	0	0	0	0			0	0	0	0	0	0	0	1
S11: Population change	Decrease	0	0	0	0	0	0	0	0		0	0	0	1	-1	2	-2
	Increase	0	0	0	0	0	0	0	0		0	0	0	-1	1	-2	2
T1: Electrification of mobility	Weak growth	0	0	0	0	1	-1	0	0	0		2	-2	-1	1	-2	2
	Strong growth	0	0	0	0	-1	1	0	0	0		-2	2	1	-1	-2	2
T3: Consumer- and citizen-oriented	Weak growth	0	0	0	0	1	-1	0	0	0	2	-2		0	0	0	0
	Strong growth	0	0	0	0	-1	1	0	0	0	-2	2		0	0	0	-2
En1 : Climate change	Slight increase	-1	1	0	0	0	0	0	0	0	0	0	0		0	0	0
	Strong increase	1	-1	0	0	-2	2	0	0	0	-1	1	0	0		0	0
En2 : Local environmental	Decrease	1	-1	-2	2	-1	1	0	0	0	-2	2	0	0		0	0
	Increase	-2	2	2	-2	-1	1	0	0	-1	1	0	0	0		0	0
L2: Consumer protection laws	Less regulation	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0
	More regulation	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	0
L3: Data and privacy laws	Less regulation	0	0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0
	More regulation	0	0	0	0	0	0	0	0	0	0	0	2	-2	0	0	0
L4: Health and safety laws	Weak increase of regula	0	0	0	0	0	0	-2	2	0	0	2	-2	0	0	-2	2
	Strong increase of regul	0	0	1	-1	-2	2	2	-2	0	0	-2	2	0	0	0	0

7.2.5 Tel Aviv (Israel)

Table 7.2-5 Tel Aviv's cross-impact table

		P 2		P 4		E C 2		E C 4		S 2		S 3		S 6		S 7		S 1 1		T 2		T 3		L 4	
		Decreasing support	Growing support	Decrease	Increase	Decrease	Increase	Economic crisis	Increased growth	Increasing densification	Increasing sprawl	Decreasing	Increasing	Weak growth	Strong growth	Weak growth	Strong growth	Decrease	Increase	Weak growth	Strong growth	Weak growth	Strong growth	Weak increase of regul	Strong increase of regul
P2: Political agenda	Decreasing support			2	-2	1	-1	0	0	-1	1	0	0	2	-1	0	0	0	0	1	-1	1	-1	2	-2
	Growing support			-2	2	-1	1	0	0	1	-1	0	0	-1	2	0	0	0	0	-1	1	-1	1	-2	2
P4: Tax policy	Decrease	0	0			0	0	0	0	-2	2	0	0	2	-2	0	0	0	0	0	0	0	0	0	0
	Increase	0	0			0	0	0	0	2	-2	0	0	-2	2	0	0	0	0	-1	1	0	0	0	0
Ec2: Tourism	Decrease	-1	1	0	0			2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Increase	-1	1	0	0			-2	2	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0
Ec4: Economic growth and crisis	Economic crisis	2	-2	2	-2	-1	1			0	0	0	0	2	-2	0	0	1	-1	1	-1	0	0	0	0
	Increased growth	-1	1	-2	2	0	0			0	0	0	0	-2	2	0	0	-1	1	-1	1	-1	1	0	0
S2: Urban structure	Increasing densification	-2	2	0	1	0	0	0	0			0	0	2	-2	0	0	0	0	0	0	1	-1	0	0
	Increasing sprawl	2	1	-1	1	0	0	0	0			0	0	-2	2	0	0	0	0	0	0	-1	1	0	0
S3: Demographic composition	Decreasing	-1	2	0	0	0	0	-1	1	0	0			2	-2	0	0	0	0	0	0	-2	2	0	0
	Increasing	2	-2	0	0	0	0	1	-1	0	0			-2	2	-2	2	0	0	0	0	2	-2	-1	1
S6: Environmental consciousness (choice	Weak growth	1	-1	1	-1	0	0	0	0	-1	1	0	0			0	0	0	0	0	0	2	-2	0	0
	Strong growth	-2	2	-1	1	0	0	0	0	1	-1	0	0			0	0	0	0	0	0	-2	2	0	0
S7: Safety Concerns	Weak growth	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0
	Strong growth	-1	1	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0
S11 Population change	Decrease	0	0	0	0	0	0	0	0	0	0	-2	2	0	0	0	0			0	0	0	0	0	0
	Increase	-1	1	0	0	0	0	0	0	0	0	2	-2	0	0	0	0			0	0	0	0	0	0
T2: Adoption of smart-city technology	Weak growth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			2	-2	0	0
	Strong growth	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			-2	2	0	0
T3: Consumer- and citizen-oriented	Weak growth	0	0	0	0	0	0	0	0	0	0	0	0	1	-1	0	0	0	0	2	-2			0	0
	Strong growth	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	2	2			0	0
L4: Health and safety laws	Weak increase of regulation	1	-1	1	-1	0	0	0	0	0	0	0	0	0	0	2	-2	0	0	0	0	0	0		
	Strong increase of regulation	-1	1	-1	1	0	0	0	0	0	0	0	0	-2	2	-2	2	0	0	0	0	0			

7.3 Instructions for evaluating the city-specific cross-impact tables

Impact of chosen drivers on each other (*deadline: 29 January*)

The aim of this second part of the scenariobuilding is to see how the drivers of transition of urban mobility selected by each city impact each other, because they will be used to generate city-specific scenarios for the future development of urban mobility. These scenarios generated through the drivers and their impacts will then be enhanced by the narrative scenarios developed by each city in their workshops.

Based on the drivers each city selected in the previous task, a table was put together to highlight the influences of each driver on the others. Each of these influences is evaluated on a scale of +2 to -2, with the following measurements:

+2: strongly promoting influence

+1: weakly promoting influence

0: no influence

-1: weakly restricting influence

-2: strongly restricting influence

For example:

		P4 Tax policy	
		Decrease	Increase
P2 Political agenda	Decreasing support	2	-2
	Increasing support	-2	2

In the example, a decrease in support for the Political Agenda (defined as ‘Political support to sustainable mobility’) will have a strongly restricting influence on an increase in Tax Policy (defined as ‘Number and importance of tax policy measures intended to curb ‘unstainable’ mobility and to stimulate ‘sustainable’ mobility’, like congestion charges). In other words, a decrease in support for a sustainable Political Agenda will strongly hinder an increase in a sustainability-oriented Tax Policy. An increase support for the Political Agenda, on the other hand, will have a strongly promoting influence on an increase in Tax Policy. In other words, an increase in support for a sustainable Political Agenda will strongly promote an increase in a sustainability-oriented Tax Policy.

The selection of impact influences was performed at the macro-level for all drivers by experts at the VUB, and we now ask you to verify this evaluation. For your own city, please check the

impacts of each driver and, where needed, make changes. For the changes made, please write a short sentence to explain why.

The table for your selected drivers can be found in the excel accompanying these instructions; in appendix, you can also find short specifications of all drivers.

Changes

Change made:

Why?

Change made:

Why?

Change made:

Why?

Change made:

Why?

Change made:

Why?

Change made:

Why?

Change made:

Why?

7.4 Instructions for workshop organizers

SPROUT WP3 – Instructions for workshop organizers

Goal of the workshop

The goal of the SPROUT project is to help cities to prepare for the mobility of the future. Many large and small cities from different countries participate in the project, so they can learn from each other.

We will build different scenarios for the mobility situation for each city with the timescale of 2025/2030 if no policy interventions are made to influence transition. The scenarios will take the form of different “stories” that are internally consistent. The stories are composed of different ‘building blocks’; *drivers* and *trends* that have global relevance, i.e. we expect that they will influence the mobility system in one way or another. For putting together the drivers and trends in a consistent way, we will use computer software.

But, the local impact of each of these drivers is different in each city. For writing scenarios that are relevant in your city, we need input from local stakeholders, which is why we kindly ask you to organise this workshop.

With the combined input of the software and the local experts, we will create several scenarios for each city that we will use to develop future strategies, but also to create a knowledge platform in which cities can learn from each other.

Preparation

1. Reserve a room and ~2 hours for the workshop
2. Translate the workshop template into your local language, to make sure every participant understands
3. Print the template in large format (at least A3 format, one-sided) and hang the sheets with the tables in the room
4. Buy large *post-its*. Around 30 post-its per participant should be enough.

Alternative option if you cannot print in A3 format:

Print the template in as many copies as there are participants, plus one for the workshop leader. No post-its needed



Steps to follow during the workshop

Introduction (~10 – 20 min)

1. Introduce the SPROUT project, the template and the drivers. Further information about the drivers can be found in the attached document (see Deliverable 2.1, attached in e-mail)
2. Distribute the post-its among the participants.

In the alternative option, distribute the individual templates among the participants.

Individual work (~20 – 30 min)

3. Each participant will now write their contribution to the driver tables on post-its and stick them in the designated cases on the tables. They start with the drivers that are closest to their expertise (political, social economic, technical, legal). Not everyone has to contribute to all driver tables, but make sure that each driver table will be completed by at least one participant.

In the alternative option, the participants write their contributions in their individual templates

Group work (~40 – 50 min)

4. For each driver, the results are discussed in the group. What is the effect of each driver-trend on mobility in the city? On which contributions is there consensus, and what causes disagreement? The workshop leader indicates in the respective table.
5. In table B (Which trends are the most probable?), the participants choose the most likely trend for each driver. The probability of drivers and trends are discussed one by one in the group.
 - Is there consensus on the probability of the driver-trend? The workshop leader indicates that on the template.
 - Is there disagreement? The workshop leader counts the number of votes for each trend for each driver and indicates that on the template.
6. Kindly thank all participants for their contribution and time and inform them about the next steps including how this information will be used:
 - the co-creation of scenarios (T3.1) (half-day local workshop in 1st layer cities in June/July 2020)
 - validation/review of final scenarios (July-August 2020)
 - stakeholder-based assessment of the prioritisation of alternative policy responses (T4.4) (questionnaire and half-day workshop in 1st layer cities Nov 2021-Jan 2022)

After the workshop

1. Copy text from all participants (post-its or from individual templates into one .doc file. When several participants mention identical contributions, they do not all have to be copied.
2. Translate the input from the stakeholders into English. Keep the names of locally specific places or organisations in the text, but please provide some explanation to make it understandable for non-local readers.
3. Please send back the completed table to mdelacruz@zlc.edu.es before January 25th, 2020.

For any questions, please contact geert.te.boveldt@vub.be (available from January 2nd, 2020 onwards)

Thank you very much!

The SPROUT team

7.5 Template for workshops

SPROUT WP3 –scenario building workshop template

General instructions

The goal of the SPROUT project is to help cities to prepare for the mobility of the future. Many large and small cities from different countries participate in the project, so they can learn from each other.

We will build different scenarios for the mobility situation in for each city. The scenarios will take the form of different “stories” that are internally consistent. The stories are composed of different ‘building blocks’; drivers and trends that have global relevance. For putting together the drivers and trends in a consistent way, we will use computer software.

But, the local impact of each of these drivers is different in each city. For writing scenarios that are relevant in your city, we need input from local stakeholders, which is why we kindly ask you to organise this workshop.

With the combined input of the software and the local experts, we will create several scenarios for each city that we will use to develop future strategies, but also to create a knowledge platform in which cities can learn from each other.

Below you find the drivers that were selected as “very important” or “extremely important” for the mobility situation in your city. You also see that for each driver two possible trends are given, i.e. the direction in which the drivers could develop. Now we would like to ask you the following:

Please describe how the drivers and the trends might impact the mobility situation in your city

- We are talking about the future, so we do not know which direction the drivers will develop. That is why we ask you to describe the mobility situation for each driver, for **both trends**, even if it sounds unlikely that a driver would develop this way. Here we do not ask you which trend will happen, but how it impacts the mobility situation *if* it happens.
- If there are clear differences between the situation in 2025 and 2030, please describe the situation for both time horizons.
- In the table at the end of template (“which trend is most probable?”), you can indicate which trends are most probable, in your opinion.
- Please use your expert knowledge of the situation of the city: give examples that are local and as specific as possible using estimations (e.g. percentage increase). We are trying to forecast the *mobility transition* in your city that is driven by the drivers and their trends, therefore, it is important to think of the impact of the changes on the urban mobility system in the city in terms of *mobility demand, positive and negative consequences* (e.g. increasing safety or traffic congestion) or *disruption* (e.g. multiple free-floating e-scooter operators deploy their services causing conflicts with pedestrians and cyclists.)

e.g. **Tourism – number of visitors/increase:** “By 2030 we expect that the number of tourists visiting the city will increase by 25 per cent, which will increase demand for public transport and parking needs for coaches. Tourists will increasingly use shared e-scooters causing more and more conflicts in the city centre with pedestrians and cyclists.”

- Scenario writing is as much an art as a science, so be creative!

Thank you very much!

The SPROUT team

Template with driver tables
Political drivers

Driver P1: Liberalisation		
Specification: Degree to which the transport market is open to private operators (transport, taxis, micro-mobility)		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Increase</i>	<i>Decrease</i>
2025	<p><i>[Stick post-it here]</i></p> <p><i>Example: Local public transport company will be privatised</i></p>	<p><i>[Stick post-it here]</i></p> <p><i>Example: Local government bans private e-scooters and e-bike sharing systems, but the public transport operator implements their own local micro-mobility system</i></p>
2030	<p><i>[Stick post-it here]</i></p>	<p><i>[Stick post-it here]</i></p>

Driver P3: Transparency and corruption		
Specification: Proportion of the public budget allocated to mobility		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Increase</i>	<i>Decrease</i>

2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
	<p><i>Example: The project of the new metro line which is pending, will be approved.</i></p> <p><i>All neighbourhoods will be covered with charging infrastructure for electric vehicles</i></p>	<p><i>Example: Various infrastructure projects need to be cancelled, such as...</i></p> <p><i>Public transport subsidies will be cut, so the service level will be lowered. Night-time buses are taken out of service.</i></p>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver P4: Tax policy		
Specification: Number and importance of tax policy measures intended to curb ‘unstainable’ mobility and to stimulate ‘sustainable’ mobility		
Effect on the local mobility situation in:	Possible trends	
	Increase	Decrease
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
	<p><i>Example: A congestion charge of €2 during peak hours will be introduced, which will reduce the amount of motorised traffic in the city.</i></p>	<p><i>Example: Vehicle registration taxes will be lowered, which will stimulate car purchases.</i></p>

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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Economic drivers

Driver Ec1: New employment arrangements as a result of the sharing economy		
Specification: Proportion of the working population employed in a new employment arrangement		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Strong growth</i>	<i>Weak growth</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver Ec2: Tourism		
Specification: Number of visitors		
Effect on the local mobility situation in:	Possible trends	
	Increase	Decrease
2025	[Stick post-it here]	[Stick post-it here]
2030	[Stick post-it here]	[Stick post-it here]

Driver Ec3: New business models (e.g. collaborative consumption, sharing economy)		
Specification: Proportion of travels using modes offered through new business models (e.g. collaborative consumption, sharing economy)		
Effect on the local mobility situation in:	Possible trends	
	Strong growth	Weak growth
2025	[Stick post-it here]	[Stick post-it here]

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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Driver Ec4: Economic growth and crisis		
Specification: Economic production per capita		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Increased growth</i>	<i>Crisis</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver Ec5: Transformation of retail		
Specification: Proportion of goods purchased online		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Weak growth</i>	<i>Strong growth</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Social drivers

Driver S1: Immigration		
Specification: Number of people with a foreign background moving into the city		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Decrease</i>	<i>Increase</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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Driver S2: Urban structure		
Specification: Degree of concentration of housing and commercial activities		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Increasing densification</i>	<i>Increasing sprawl</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver S3: Demographic composition		
Specification: Average age of the population		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Decreasing</i>	<i>Increasing</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver S4: Health consciousness		
Specification: Relative importance of health-related concerns in people's choice of transport mode		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Weak growth</i>	<i>Strong growth</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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Driver S5: Changing behaviour towards car ownership		
Specification: Proportion of people choosing not to purchase a private vehicle		
Effect on the local mobility situation in:	Possible trends	
	Decrease	Increase
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver S6: Environmental consciousness		
Specification: Relative importance of environment-related concerns in people's travel behaviour (choice of transport mode and destination)		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Weak growth</i>	<i>Strong growth</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver S7: Safety Concerns		
Specification: Relative importance in of safety-related concerns in people's choice of transport mode and destination		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Weak growth</i>	<i>Strong growth</i>

2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver S10: The rise of next-hour to same-day (on-demand) delivery requirement		
Specification: Number of short-term online purchases		
Effect on the local mobility situation in:	Possible trends	
	Weak growth	Strong growth
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

Driver S10: Population growth		
Specification: Number of inhabitants		
Effect on the local mobility situation in:	Possible trends	
	Weak growth	Strong growth
2025	[Stick post-it here]	[Stick post-it here]
2030	[Stick post-it here]	[Stick post-it here]

Driver T1: Electrification of mobility		
Specification: Proportion of electric vehicles		
Effect on the local mobility situation in:	Possible trends	
	Weak growth	Strong growth
2025	[Stick post-it here]	[Stick post-it here]

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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T2: Adoption of smart-city technology		
Specification: Number and importance of smart-city technological applications in the management of mobility and logistics		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Weak growth</i>	<i>Strong growth</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

T3: Citizen- and consumer-oriented digitalization

Specification: Proportion of travels (public transport, shared cars, bicycles, etc.) using an information and payment application in which multiple travel modes are integrated (Mobility as a Service)

<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Weak growth</i>	<i>Strong growth</i>
2025	[Stick post-it here]	[Stick post-it here]
2030	[Stick post-it here]	[Stick post-it here]

T4: Automation

Specification: Degree of technological and legal progress allowing the uptake of automated vehicles

<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Little progress</i>	<i>Strong progress</i>
2025	[Stick post-it here]	[Stick post-it here]

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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En1: Climate change		
Specification: Number of extraordinary weather events in your city		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Little progress</i>	<i>Strong progress</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

En2: Local environmental quality		
Specification: Level of local air pollution (PM, NOx, etc.) and noise		
<i>Effect on the local mobility</i>	<i>Possible trends</i>	
	<i>Decrease</i>	<i>Increase</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

<i>situation in:</i>		
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

L1: Labour and employment laws		
Specification: Level of regulation of labour and employment conditions		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Less regulation</i>	<i>More regulation</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
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L3: Data and privacy laws		
Specification: Level of regulation concerning the collection and usage of travellers' data		
<i>Effect on the local mobility situation in:</i>	<i>Possible trends</i>	
	<i>Less regulation</i>	<i>More regulation</i>
2025	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>
2030	<i>[Stick post-it here]</i>	<i>[Stick post-it here]</i>

L4: Health and safety laws		
Specification: Level of regulation concerning health and safety		
Effect on the local mobility situation in:	Possible trends	
	Less regulation	More regulation
2025	[Stick post-it here]	[Stick post-it here]
2030	[Stick post-it here]	[Stick post-it here]

Which trend is most probable?

Drivers	Specification	Indicate the most probable trend (Workshop leaders: if no consensus, indicate number of votes)		
		Decrease	Increase	No change
P1: Liberalization	Degree to which the transport market is open to private operators (transport, taxis, micro-mobility)	Decrease	Increase	No change
P2: Political agenda	Proportion of the public budget allocated to mobility	Decrease	Increase	No change
P3: Transparency and corruption	Level of public power abuse for private gains	Decrease	Increase	No change
P4: Tax policy	Number and importance of tax policy measures intended to curb	Decrease	Increase	No change

	'unstainable' mobility and to stimulate 'sustainable' mobility			
Ec1: New employment arrangements	Proportion of the working population employed in a new employment arrangement	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
Ec2: Tourism	Number of visitors	<i>Decrease</i>	<i>Increase</i>	<i>No change</i>
Ec3: New business models (e.g. collaborative consumption, sharing economy)	Proportion of travels using modes offered through new business models (e.g. collaborative consumption, sharing economy)	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
Ec4: Economic growth and crisis	Economic production per capita	<i>Increased growth</i>	<i>Crisis</i>	<i>Continuation of existing economic trend</i>
Ec5: Transformation of retail	Proportion of goods purchased online	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
S1: Immigration	Number of people with a foreign background moving into the city	<i>Decrease</i>	<i>Increase</i>	<i>No change</i>
S2: Urban structure	Degree of concentration of housing and commercial activities	<i>Increasing densification</i>	<i>Increasing sprawl</i>	<i>No change</i>
S3: Demographic composition	Average age of the population	<i>Decrease</i>	<i>Increase</i>	<i>No change</i>
S4: Health consciousness	Relative importance of health-related concerns in people's choice of transport mode	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
S5: Changing behaviour towards car ownership	Proportion of people choosing not to purchase a private vehicle	<i>Decrease</i>	<i>Increase</i>	<i>No change</i>

S6: Environmental consciousness	Relative importance of environment-related concerns in people's travel behaviour (choice of transport mode and destination)	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
S7: Safety Concerns	Relative importance in of safety-related concerns in people's choice of transport mode and destination	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
S10: The rise of next-hour to same-day (on-demand) delivery requirement	Number of short-term online purchases	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
S11: Population growth	Number of inhabitants	<i>Decrease</i>	<i>Increase</i>	<i>No change</i>
T1: Electrification of mobility	Proportion of electric vehicles	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
T2: Adoption of smart-city technology	Number and importance of smart-city technological applications in the management of mobility and logistics	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
T3: Consumer- and citizen-oriented digitalization	Proportion of travels (public transport, shared cars, bicycles, etc.) using an information and payment application in which multiple travel modes are integrated (Mobility as a Service)	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
T4: Automation	Degree of technological and legal progress allowing the uptake of automated vehicles	<i>Little progress</i>	<i>Strong progress</i>	<i>No progress</i>
En1: Climate change	Number of extraordinary weather events in your city	<i>Weak growth</i>	<i>Strong growth</i>	<i>No growth</i>
En2: Local environmental quality	Level of local air pollution (PM, NOx, etc.) and noise	<i>Decrease</i>	<i>Increase</i>	<i>No change</i>
L1: Labour and employment laws	Level of regulation of labour and employment conditions	<i>Less regulation</i>	<i>More regulation</i>	<i>No change</i>

L3: Data and privacy laws	Level of regulation concerning the collection and usage of travellers' data	<i>Less regulation</i>	<i>More regulation</i>	<i>No change</i>
L4: Health and safety laws	Level of regulation concerning health and safety	<i>Less regulation</i>	<i>More regulation</i>	<i>No change</i>