



D 3.4 – Report on the macro level process (Scenario Building)

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Executive summary

The deliverable aims at providing a summary and structured presentation of the results of the scenario building process as part of the DIGNITY approach tested in the four DIGNITY pilot cities-regions: Ancona (IT), Barcelona (ES), Flanders (BE) and Tilburg (NL). The focus of the report is on the documentation and the mapping of the local processes and on some comparative considerations among the pilots' experiences. A further in-depth analysis of the individual processes will be included in the forthcoming DIGNITY report D4.2 - Pilot cases evaluation Report.

All four pilots successfully carried out the process envisaged in the DIGNITY approach and used the materials provided for this purpose (D2.3 Guidelines for scenario building process). Differences and variations have arisen due to the individual adoption of the method and the specific challenges of the pilots. Differences can be seen especially in the situation analysis and in the resulting scenarios.

Except for the special process in Flanders, the scenario-building processes were carried out consistently and three scenarios were developed in each case. The scenarios themselves differ in their design and analytical depth.

For an application of the approach beyond the DIGNITY project, improvements in the moderation of the scenario development and an optimization of the further use of the scenarios for strategy building are recommended. The transfer requires further methodological support. The same applies to the integration of the Inclusive Design Wheel process into the scenario work.

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Contents

Executive summary	2
Document History	2
List of Figures and Tables	4
Introduction	5
1. Initial conditions	8
1.1 Implementation structure	8
1.2 Ancona	9
1.3 Barcelona.....	9
1.4 Flanders	9
1.5 Tilburg	10
2. Process and outcomes	11
2.1 Ancona.....	11
2.2 Barcelona.....	19
2.3 Flanders.....	25
2.4 Tilburg.....	29
3 Comparative analysis and lessons learnt.....	37
3.2 Methodical improvement.....	39
3.3 Effects for the pilots	39
3.4 DIGNITY approach: project integration.....	40
4 References.....	42



List of Figures and Tables

Figure 1: Macro level analysis	6
Figure 2: Scenario process Ancona.....	12
Figure 3: Macro categories and assigned key factors Ancona	13
Figure 4: Combination of projections for scenario 1: Green and Smart	16
Figure 5: Combination of projections for scenario 2: Oriented to e-car	17
Figure 6: Combination of projections for scenario 3: Partnership between public and private entities.....	18
Figure 7: The Flanders scenario process.....	26
Figure 8 : Mobility scenarios Flanders 2040.....	28
Figure 9: Visual illustration of the scenario “Dare! to travel”, Tilburg.....	34
Figure 10: Visual illustration of the scenario “Moppie”, Tilburg	35
Figure 11: Visual illustration of the scenario “Mobi”, Tilburg.....	36
Table 1: List of key factors and projections Ancona.....	14
Table 2: Main dimensions scenario 1: Green and Smart	16
Table 3: Main dimensions scenario 2: Oriented to e-car.....	17
Table 4: Main dimensions scenario 3: Partnership between public and private entities.....	19
Table 5: Key factors and projections Barcelona	20
Table 6: Main dimensions scenario 1: “Continuity”	21
Table 7: Main dimensions scenario 2: “Lost opportunity”	22
Table 8: Main dimensions scenario 3: “World of Contradictions”	23
Table 9: List of key factors and projections Tilburg.....	32
Table 10: List of all key factors	39
Table 11: Positive aspects and aspects to be improved scenario building.....	41



Introduction

Project Summary

The overarching goal of DIGNITY is to foster a sustainable, integrated and user-friendly digital travel eco-system that improves accessibility and social inclusion, along with the travel experience and daily life of all citizens. The project delves into the digital transport eco-system to grasp the full range of factors that might lead to disparities in the uptake of digitalized mobility solutions by different user groups in Europe. Analyzing the digital transition from both a user and provider's perspective, DIGNITY looks at the challenges brought about by digitalization. This will inform the design, testing, and validation of the DIGNITY approach, a novel concept that seeks to become the 'ABCs for a digital inclusive travel system'.

The approach combines proven inclusive design methodologies with the principles of foresight analysis to examine how a structured involvement of all actors - local institutions, market players, interest groups, and end-users - can help to bridge the digital gap by co-creating more inclusive mobility solutions and by formulating user-centered policy frameworks.

The idea is to support public and private mobility providers in conceiving mainstream digital products or services that are accessible to and usable by as many people as possible, regardless of their income, location, social or health situation, or age; and to help policymakers formulate long-term strategies that promote innovation in transport while responding to global social, demographic and economic changes, including the challenges of poverty and migration.

By focusing on the end-users and involving them throughout the process of designing policies, products, or services, it is possible to reduce social exclusion while boosting new business models and social innovation. The result that DIGNITY is aimed at is an innovative decision support tool that can help local and regional decision-makers to formulate digitally inclusive policies and strategies, and digital providers to design more inclusive products and services.



The scenario building process in the context of DIGNITY

The DIGNITY approach looks from three different perspectives on the mobility sector. While the micro-level focuses on the end-users of mobility services, and the meso-level looks at the supply of different mobility products and services, the macro-level analysis is focused on the institutional framework, i.e. the policies and strategies in place. This macro-level analysis within the DIGNITY approach includes three process stages. (1) The situation analysis, which starts with the current situation in the administration and related networks. At the start of the analysis, a questionnaire based on specific indicators and criteria examined the current institutional set-up of the DIGNITY pilot regions and municipalities. (2) Based on the results of these tests, scenario processes were performed in the pilots. Within the scenario-building processes, alternative projections for digitally based and inclusive mobility ecosystems were developed. (3) The work on the macro level is completed by the elaboration of concrete action plans and roadmaps in the regions. The following figure illustrates the three-step process:



Figure 1: Macro level analysis

Objectives of this deliverable

This deliverable has three key objectives:

- (1) documentation and summary of the scenario building process in all pilots
- (2) systematic analysis and assessment of the results
- (3) critical evaluation of the practicability of the results for implementation at the policy level

(1) The documentation and summary provide a descriptive record of the entire scenario building process. Based on the documentation of the individual process steps and the outcomes of the workshops, the procedure and the results are outlined. This overview prepares the comparative evaluation and assessment of the results. The documentation starts from the specific challenges and environmental circumstances of the pilots and summarizes the implementation in response to the macro-political question of the conditions for an inclusive and equitable mobility ecosystem. Both the formal design of the process and the results in terms of content are considered.



(2) One of the purposes of the scenario building process is to develop long-term political and institutional strategies. The scenarios, key factors and their projections are the key outputs of the process. By comparing the scenario building processes of the four different pilot partners and their outputs, differences as well as similarities are highlighted. This will help building a basis for other projects beyond DIGNITY and the involved cities and municipalities to work with and conduct their own strategic process.

(3) The critical evaluation of the practicability of the results for implementation at the policy level is the concluding objective of the report. One of the central questions is: what contribution has the process made towards better dealing with the issue of inclusivity? The role of the scenario-building process in the development of long-term policy strategies is questioned. Furthermore, it is about the integration into the DIGNITY approach. The lessons learned from the process to optimize its design completes the report.

Outline of this deliverable

The report consists of three parts. The first section briefly describes the initial conditions of the pilots. The second part documents the scenario-building processes and the outcomes of the individual pilots. The last and third part focuses on the comparative analysis and critical assessment of the processes.





1. Initial conditions

The DIGNITY approach confronts the pilots with a paradoxical situation. On the one hand, each individual pilot has a specific challenge and particular target groups. On the other hand, the scenario question was the same for all pilots: “How must digitally inclusive mobility ecosystems be designed?” (Kollosche and Florian 2021, p. 26). Based on this question, the pilots started the scenario building process.

The pilots did not have to start completely from scratch to do this. They were prepared through various project's steps. All pilots had been intensively studying the current state of their mobility system. This situation analysis was supported within the DIGNITY approach by a survey on the status of the vulnerable groups. In addition, the municipal administration level was examined to what extent it is regulatory prepared for the challenges of inclusive mobility. A specially designed questionnaire examined the existence of laws, procedures and actors dealing with these issues.

Appropriate instructions were prepared for this purpose and made available to the pilots (Deliverable 2.3). These instructions are the basis for independent implementation of the scenario building processes.

1.1 Implementation structure

The Pilots faced two key challenges. On the one hand, they had to adapt a methodology that most people were not yet familiar with and that is very demanding. Running a structured scenario process without direct professional support can easily fail. The second challenge was the conditions of conducting the workshops. Given the consequences of the C-19 pandemic, the workshops could only take place online. This is an additional difficulty for the implementation of scenario processes. The workshops were conducted in the respective national language. This was an additional challenge from the perspective of documenting the results and analyzing them within the DIGNITY approach.

A multi-stage process was implemented to provide optimal support for the pilots. First, all pilots were introduced to the scenario technique. In a second step, each pilot was advised individually and specific questions could be discussed. During the entire implementation period, the IZT team was available for the pilots and questions could be clarified between the workshops.

The material prepared for the scenario building process and the individual support activities ensured that the pilots were well prepared for implementation. Nevertheless, each pilot had their own way to go.





1.2 Ancona

Improving social inclusion and reducing the digital divide on a local level are two of the main objectives in the planning of transport in Ancona. The design and development of new services that improve the current app (ATMA) towards the users is one tool to reach these objectives. The app will be updated with new services.

Target groups to focus on are visually impaired (blind) people and/or people with reduced mobility and/or people with low income and/or migrants.

Based on the self-assessment exercise previously carried out (see Deliverable D3.1), it was found an overall low level of involvement of vulnerable groups in the policy domain. The same applies in the design of digital services. There are no policy documents or budget targeted at these vulnerable groups.

1.3 Barcelona

Employees of industrial areas with a lack of mobility options due to the low public transport coverage in the metropolitan area of Barcelona are the focus of attention. The promotion of carpooling in industrial areas, integrating the needs of users and offering them an in-kind incentive (e.g. reserved parking space in a crowded parking area) is seen as part of the solution.

These goals and target groups are embedded in the implementation of a comprehensive Mobility as a Service (MaaS) system. In this respect, the DIGNITY approach represents a test for a digitally inclusive MaaS strategy. The development of a MaaS maturity index including digital gap aspects in the methodology is a central component in this context.

1.4 Flanders

The specific objective of the Flanders region within the DIGNITY approach is also part of a larger vision of mobility development. Flanders wants to make important social functions accessible based on a demand-driven system with an optimal use of transport and financial resources facilitating 'combi-mobility' in an integrated mobility network. This network is supposed to capture all initiatives for collective transport or last mile transport, integrating and simplifying operating conditions creating a shared responsibility between the various actors.

This vision is based on three pillars: Infrastructure, data and services. A link between these pillars should be a mobility center. This is to be developed in the context of the DIGNITY approach.





The special feature of the procedure on the macro-level and the scenario building process is an already completed scenario process for the entire region on the topic of mobility development from 2019. Accordingly, the DIGNITY scenario process was closely aligned with the previous one.

1.5 Tilburg

Tilburg pursues several goals with the help of the DIGNITY approach. Mobility poverty is the central topic of investigation. Migrants, elderly, poor people in city- and rural area are the target groups. For this purpose, various pilot solutions that are both digital and analog will be developed in identified neighborhoods. The target groups concerned should be actively involved in the development of mobility solutions.

Tilburg wants to address the challenges caused by the digitalization of mobility services. The city wants to solve the issue of exclusion for the elderly and the disadvantaged people who have limitations based on their physical or mental abilities. Barriers should be identified that prevent people from using these mobility services to their advantage. The measures should enable people to be mobile without restrictions and obstacles.





2. Process and outcomes

The following chapters provide an overview of the scenario building processes in the different pilots of Ancona, Barcelona, Flanders and Tilburg. Each of the pilots conducted the participative process within two or three sequential workshops that involved participants from the public administration sector, from public transport operators and companies, as well as from different end-user groups represented by associations and organizations. For the moderation of the scenario building process the pilot partners followed a given scenario building framework provided by IZT. Apart from the guidance through this framework, each of the pilot's scenario processes differ to a certain extent due to their individual situation, sources of information and their specific regional perspectives.

2.1 Ancona

The pilot partners of Ancona conducted the scenario building process within two consecutive workshops on April 16 and June 24, 2021, which were organized and facilitated by the municipality of Ancona. Involved in the workshops were the pilot partners Conerobus as local public transport partner, the municipality of Ancona with members of the Department for Social Policies, and myCicero as technological partner who took also the role of the scenario building leader throughout the workshops. The geographical scope for the process was the Marche Region in Italy, and the defined end-user groups were the Italian Union of the Blind and Visually Impaired (UICI acronym in Italian), the National Deaf Organization (ENS acronym in Italian), young people in general, migrants, as well as people with mobility reduction.

The scenario process is summarized graphically in the figure 2. A special feature in the design of the scenarios is the audio-visual design of the individual scenarios. They can be viewed on Youtube under <https://youtu.be/nshkAWSlcbQ> (scenario 1), <https://youtu.be/-9225F0q53w> (scenario 2), and <https://youtu.be/XclNBDzHZxY> (scenario 3).



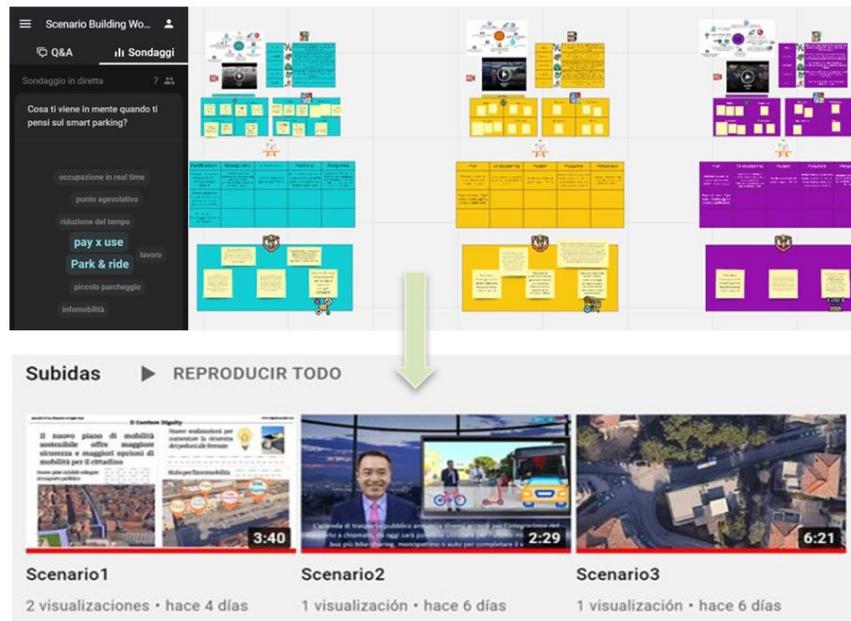


Figure 2: Scenario process Ancona

As a first step of the scenario building process, a situation analysis was conducted, and five macro categories of factors were defined: demography, energy & technology, infrastructure & transport, economy, geopolitics geography. After that a list of ten key factors within these five categories was compiled and discussed (see figure 3).

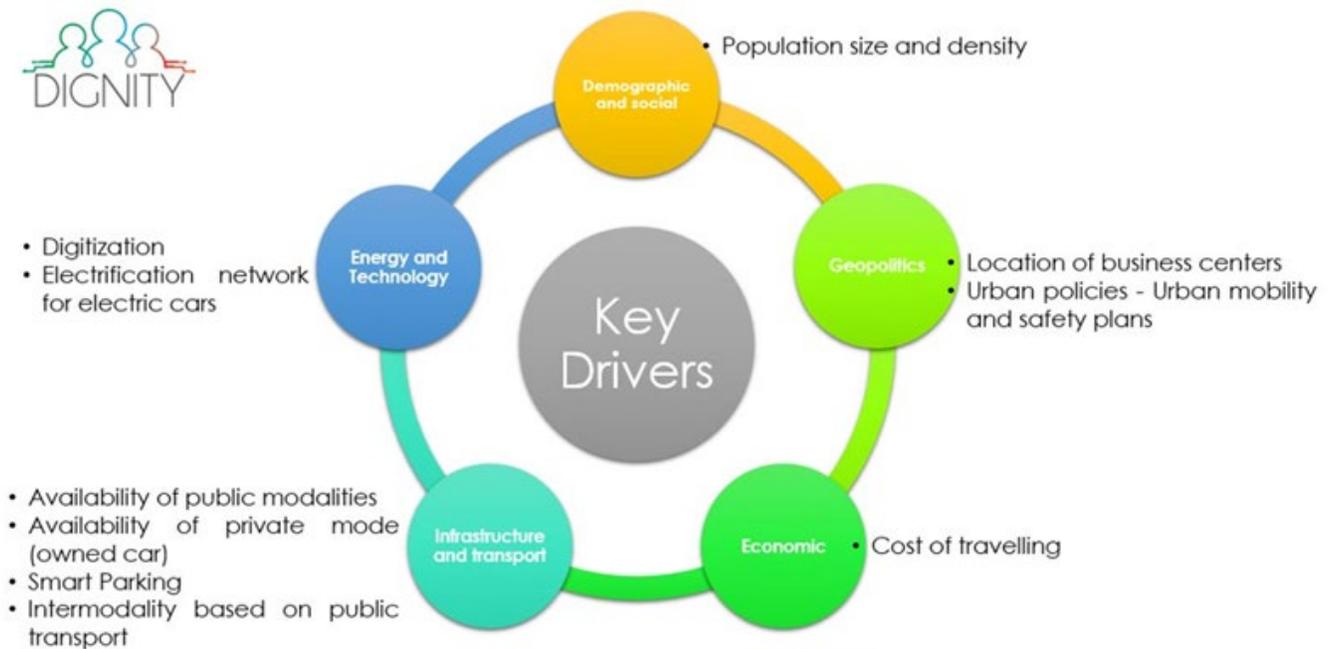


Figure 3: Macro categories and assigned key factors Ancona

The ten key factors were then further discussed in the group. In the discussion, the key factors were further specified and transferred to a finalized list. In the following step the relevant projections could be developed for all of the key factors (table 1). For example, the key factor “mobility plan” was assigned with two different projections: One titled “Inclusion of safety, sustainable mobility and interoperability” and another one named “Current mobility plan”, which basically describes a continuation of the status quo. After that, these projections were combined in three different ways to construct the basic grid for three different scenarios.

The scenarios were described according to a scheme that facilitates comparability. For this purpose, the STEEP factors were used to characterize the essential dimensions of the respective scenario.

Key Factors	Population	Activity Centre	Mobility Plan	Cost of travelling	Business Models
Projections	+ over 65, + density	New regulatory plan with new activity centres	Inclusion of safety, sustainable mobility and interoperability	+ investment on green cars + penalties for polluting vehicles	New business models to guarantee intermodal and interoperable trips
	+ over 65, - density	Empowerment of the city center	Current Mobility plan	+ investment on green cars	Integration with private entities such on-demand services

Key Factors	Private vehicle	Modal Split	Smart Parking	Digitalization	Electrification network for e-cars
Projections	restriction for non-green vehicles or non-euro 6	+ public transport +soft mobility	+ interoperability	Large investment on digitalization + training	Public network and subsidies
	Creation of a toll zone based on CO2 emissions	+ e-cars predominance	Bilateral agreements, isolated development	Lack of digitalization	Isolated private networks



		Micromobility, public transport and MaaS			Open and interoperable market
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Table 1: List of key factors and projections Ancona

For the first scenario “Green and Smart” the workshop group decided to develop three different core pillars, which function as main parameters for the future narrative:

1. “Integrated World”: The assumption made here is that nowadays many projects on different geographical levels (local, regional, national) do not contemplate the integration among them. Rather, this step is mostly during or even after the realization of the project. In this scenario, a campaign is proposed to follow a new approach. This could be achieved by setting up recurrent meetings among the project managers of different department with a focus on discussing technology and the integration of the several projects.

2. “Multi-sector Awareness”: This pillar proposed to set up a campaign on the political level. The goal is to create awareness and sensitivity for current issues regarding sustainable transport and mobility. It is focused on solutions based on a paradigm shift and the support to clean transport with a massively reduced environmental impact, such as public transport, cycling or walking.

3. “Monetary Incentives”: The third pillar highlights the importance of monetary factors. Through regional funding, the government provides vouchers for electric bikes and discount on the purchase of electric cars. Additionally, a low-emission zone in the city centre is implemented. Prices of high-emission vehicles are increased, and the government subsidizes other monetary incentives to support low-emission transport.



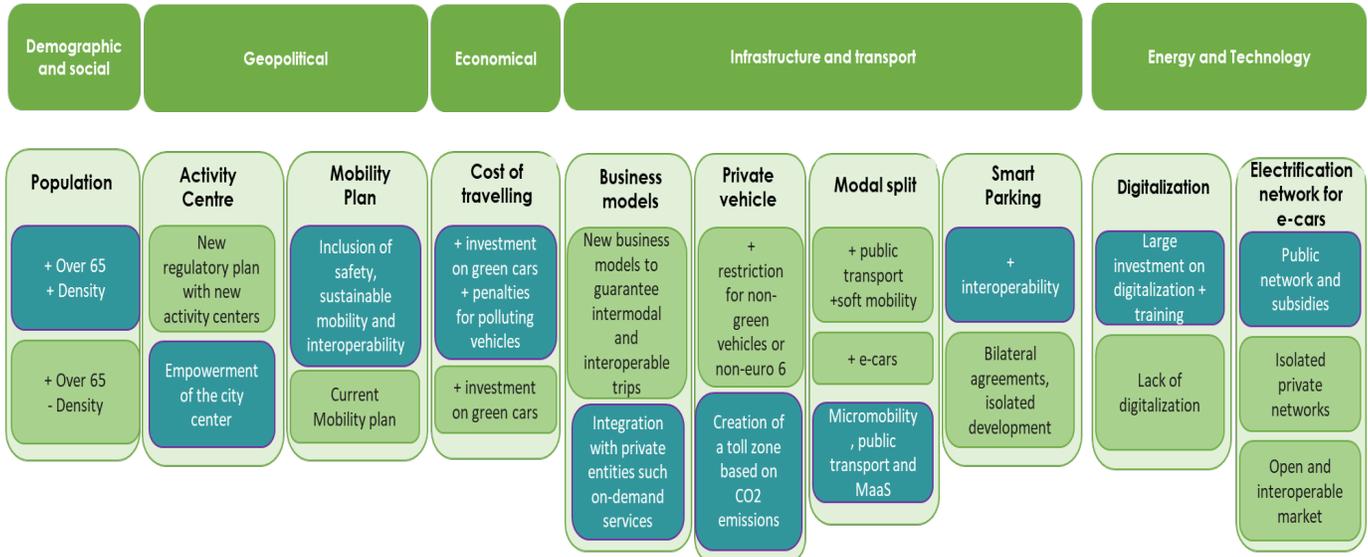


Figure 4: Combination of projections for scenario 1: Green and Smart

Society	Emphasis on a greener and more sustainable community, with organized urbanization and a high-density growing population.
Technology	Focus on overall efficiency and the environment. Promotion of the use of clean energy. Best practice technology and energy efficiency.
Economy	Organized and straight growth in the clean and green direction. The intervention of the local government in an efficient and fair formal competition.
Environment	Improvement of the environment by reducing greenhouse gas emissions and making energy use more efficient.
Politics	SUMP with focus on social and environmental areas.
https://youtu.be/nshkAWSlcbQ	

Table 2: Main dimensions scenario 1: Green and Smart

The second scenario “Oriented to e-car” focuses on the benefits that could be achieved through the implementation of a “mobility manager”. The idea of a mobility manager is

rooted in the corporate world, where the job is to optimize the systematic movements of employees inside the company. The aim is to reduce the use of private cars by developing a plan to support transport solutions with a reduced environmental impact (e.g. car pools, car sharing, bike sharing, on-demand vehicles, shuttles, etc.). Each company would have to guarantee the appointment of the company Mobility Manager to the municipalities. Each municipality would implement a specific department with the tasks of maintaining the links between the municipal structure and the local transport companies, assisting companies in the preparation of home-work travel plans, collaborating in their implementation, assist technically and provide information support. The precise functions of the mobility management department were discussed and elaborated by the workshop participants.

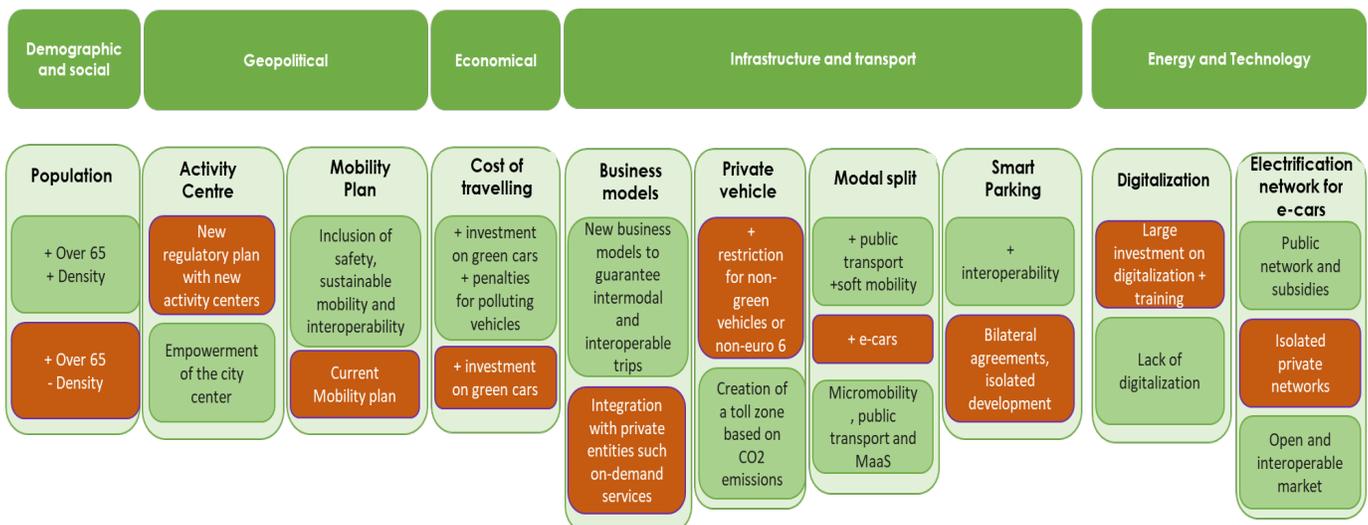


Figure 5: Combination of projections for scenario 2: Oriented to e-car

Society	Emphasis on a greener and more sustainable community with an enhancement of the entire territory not only of the central areas.
Technology	Focus on mitigation of the efforts of pollution by promoting but not imposing, clean and green vehicles.
Economy	Organized and straight growth in the clean and green direction. Local government yield its role to private sector, reducing entry barriers.
Environment	Improvement of the environment by reducing greenhouse gas emissions and making energy use more efficient by promoting and facilitating the use of electric vehicles.

Politics	Goals definition and adoption of new measures for the SUMP.
https://youtu.be/-9225F0q53w	

Table 3: Main dimensions scenario 2: Oriented to e-car

In the third scenario “Partnership between public and private entities”, the main motive is the creation of a central Control Room. Encouraged is a public private partnership to allow several transport modes to coexist and being coordinated by one operative hub, the control room, which is managed in a regional level. Goal of the installation of such a control room is to support the interoperability among the actors, for example by facilitating a unification of payment methods and providing to the end-user a single one-stop-shop. Therefore, agreements between the different stakeholders would be set up, investments would be realized through regional and national funds. Some of the specific functions of the Control Room would be to analyze the travel demand on a regional level. This would be done by organizational/governance and technical support and data analysis from a group of experts and the transport operators. The Control room would also function as the political and technical body for the definition and implementation of the payment methods, as a provider of support to service planning. Eventually, this unit may also integrate the traffic management such as traffic light networks and ZTL access.

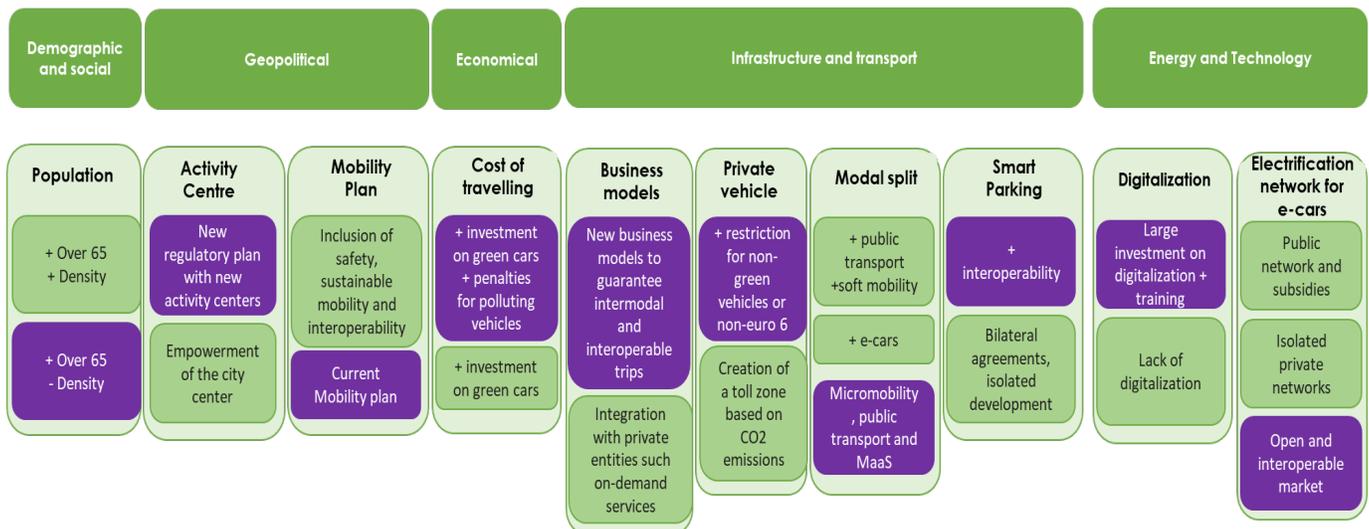


Figure 6: Combination of projections for scenario 3: Partnership between public and private entities.

Society	Emphasis on more green and sustainable community with an empowerment of whole territory not only of the central areas.
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Technology	Focus on general efficiency and environment. Promotion of clean energy use. Best practices technology and energy efficiency.
Economy	Partnership between private and public authorities for overcoming actions non indicate in the mobility plan.
Environment	Improvement of the environment by reducing greenhouse gas emissions and making more efficient the use of energy.
Politics	Goals definition and adoption of new measures for the SUMP.
https://youtu.be/XcINBDzHZxY	

Table 4: Main dimensions scenario 3: Partnership between public and private

2.2 Barcelona

The scenario building process in Barcelona was conducted within three workshops in June 15, June 28 and July 05, 2021. The pilot partners involved setting up the workshops were Barcelona Regional, Factual, and UPC. The external agency Manahmana was responsible for the facilitation and the organisation of the workshops, and Cristina Jiménez from Barcelona Regional worked as scenario building leader throughout the process. All three workshops involved participants from the public administration sector, from public transport operators and companies, from different end-user groups represented by different associations and organizations. The geographical scope was the metropolitan area of Barcelona.

In a first step of the scenario building process a comprehensive analysis of the situational context was conducted. This analysis was backed by detailed data and statistics about mobility in the Barcelona region, public transport use, and the digital mobility environment as well as access to technology solutions by different groups. After collecting a number of influential factors for the mobility sector in the Barcelona region, the workshop group mutually decided on a list of seven key factors:

1. Level of digital competence
2. User's participation on accessibility policies
3. Public regulation of the digital transformation of public transport
4. Accessibility level
5. Public transport use
6. Pace of change of the digital transformation

7. Economic context

In a next step, several future projections with regard to the key factors were discussed among the workshop participants. (see table 5).

Key Factor	SCENARIO 1	SCENARIO 2	SCENARIO 3
Level of digital competence	The majority of the population is digitally competent	The majority of the population is digitally competent	A fraction of the population is digitally competent
Participation in accessibility policies	Active listening to users	No user participation	User participation
Legislation and regulation of the digital transformation of public transport	Governments establish regulations for the digital transformation of transport, but market dynamics play an important role.	The digital transformation of transport is market-driven	Government establishes regulations for the digital transformation of transport
Level of accessibility	Accessibility to basic services	Low level of accessibility	High level of accessibility
Level of transport use	Balanced level of public transport use (trend modal split)	Increased use of individual mobility	Massive use of public transport
Pace of change and technological transformation	Gradual migration	Rapid and accelerated migration	Gradual migration
Economic context	Economic stability	Economic growth	Economic crisis

Table 5: Key factors and projections Barcelona

These future projections were then combined to build the basic narrative of three different scenarios. The final results of the workshops were three scenarios with different storylines as well as formulated policy recommendations and strategies based on these scenarios.

The first scenario was called “Continuity” and reflects a general business-as-usual future development not very much different from the current situation. It implies a stable economic context and a regulation of the digital transformation. Participation policies have improved, but the impact of the economy and the market is still dominant. The mobility sector shows more digital interconnection and a higher level of intermodality with some new modes of transport such as carpooling. Use of public transport has slightly increased thanks to the fact that the government has continued to invest in this field and

has implemented policies to promote its use. Still there has not been a quantitative leap leading to a surpass of individual transport. Data privacy is not fully guaranteed and there is digital exclusion of certain groups of the population.

Key Factor	Projection	
Level of digital competence	The majority of the population is digitally competent	The majority of the population has a sufficient level of digital competence and correctly uses ICTs in their interactions with government services, public transport and most of the commonly used applications. As such, exclusion due to lack of digital competence is rare and is limited to only some sections of the population.
Participation in accessibility policies	Active listening to users	Government, operators and developers take the needs of all types of users into account, through design processes that allow them to play an important role in the design.
Legislation and regulation of the digital transformation of public transport	Government establishes regulations for the digital transformation of transport, but market dynamics play an important role.	Regulatory scenario similar to the current one. Different governments set certain guidelines, but the guidelines are insufficient due to the prevalence of market dynamics in the provision of services, public transport in general and digitisation in particular. Improvements are gradually being incorporated, but there is no budgetary guarantee for digitisation and it is difficult for service providers to make progress. Users' purchasing power influences and determines access to many digital services. The government does as much as it can, as does the private sector, as long as it is profitable for them. Some risk of exclusion due to the banking services involved in the system. Data privacy is not 100% guaranteed.
Level of accessibility	Accessibility to basic services	Accessibility is only guaranteed for the most necessary services. Other complementary services are often not universally accessible.
Use of public transport	Balanced level of use	Trend and stable modal split (PT 20%, PV 33% Active mob. 47%), with small increases in PT to the detriment of PV. There is investment in improvements, but the structural economic deficit suffered by collective public transport (CPT) makes it difficult to invest heavily in improvements that would enhance the level of use.

Pace of technological transformation	Gradual migration	Migration to new ways of relating to technology in the field of mobility occurs gradually, without major cognitive ruptures for the general population.
Economic context	Stable	Stable with moderate investments in new digital and accessible products as well as in CPT infrastructure.

Table 6 Main dimensions scenario 1: “Continuity”

The second scenario has been given the title “Lost opportunity”. In this scenario economic growth has not led to a higher level of accessibility or sustainability in the mobility sector. Governments play a rather weak role here and have not been able to counteract the trend towards increased individual mobility after the pandemic. The private transport sector has increased to the detriment of collective transport. Public-private partnerships have not produced satisfying results. There's still a lack of inclusiveness, data is not managed transparently and the lack of governance leads to several different issues. Profit-driven market dynamics have not been able to increase accessibility for users with specific needs. Instead, service providers focus on the most profitable population groups.

Key Factor	Projection	
Level of digital competence	The majority of the population is digitally competent	The majority of the population has a sufficient level of digital competence and correctly uses ICTs in their interactions with government services, public transport and most of the commonly used applications. As such, exclusion due to lack of digital competence is rare and is limited to only some sections of the population.
Participation in accessibility policies	No user participation	Users are not involved in the design and implementation of digital accessibility policies. User diversity is hardly considered.
Legislation and regulation of the digital transformation of public transport	The digital transformation of transport is market-driven	Little regulation of the digital world by government. Each business/operator establishes the level of accessibility of its digital services to suit its target audience. Interfaces are designed for the general population with some digital competences. The mobility market is always changing. Modes of transport, operators and mobility aggregators appear and disappear. Transport operators work with narrow margins and compete with each other for customers, focusing on the most profitable niches: middle class, city centres, etc. Areas with less demand and sectors of the population with specific needs are neglected.

Level of accessibility	Low level of accessibility	Most services and/or ways of accessing them are not universally accessible, which makes them difficult to use.
Use of public transport	Increased use of individual mobility	Mobility by public transport is decreasing. (PT 15%, PV 38% Active mob. 47%). The causes may be diverse (pandemic, emergence of new forms of mobility, worsening of the CPT service, etc.). Aggravated economic deficit of the CPT. Withdrawal of investment. Investment limited to basic maintenance, no improvements.
Pace of technological transformation	Rapid and accelerated migration	Rapid and sudden changes. The causes may be varied (due to a desire to accelerate the process, unexpected external events, market dynamics, etc.). It forces the population to adapt quickly, with possible traumatic effects for some groups.
Economic context	Economic growth	A time of economic expansion It facilitates investment by government and businesses in terms of digitisation and accessibility.

Table 7 Main dimensions scenario 2: “Lost opportunity”

In scenario three, the “World of Contradictions”, the global context is one of climate crisis, economic crisis and increasing social inequalities. Governments have tackled most pressing issues with restrictive policies on the use of private vehicles, making the use of public transport much more favourable. The government is also actively involved in regulating the digitisation of transport, with a high level of accessibility for all population groups and the introduction of several new digital services. Despite these efforts, the results can still be improved and there is more room for improvement regarding the digital competence of the population.

Key Factor	Projection	
Level of digital competence	A fraction of the population is digitally competent.	<p>Only a minority of the population feels able to interact effectively with government, modes of transport and the most common basic services using ICTs.</p> <p>The low level of competence may be caused by different aspects, such as a lack of training, rapid technological evolution, no need for use, etc.</p>
Participation in accessibility policies	User participation	Users participate in the design and application of digital accessibility policies. The needs of different users are considered in a moderate way.

Legislation and regulation of the digital transformation of public transport	Government establishes regulations for the digital transformation of transport.	The government actively regulates the mobility market. It also regulates new forms of mobility. It intervenes in the supply, guarantee and quality of service provision (timetables, coverage, security, data privacy, attention to the diversity of users, etc.). Legislation obliges governments to invest in incorporating inclusion and accessibility standards into the digital world. Given the guarantee of the services provided by the government, users' purchasing power does not determine their access to these services.
Level of accessibility	High level of accessibility	All services are available to all types of users.
Use of public transport	Massive use of public transport	Governments are tackling the climate emergency in a decisive and ambitious manner. Public transport is the backbone of metropolitan mobility, with a majority modal share. (PT 27%, PV 23% Active mob. 50%). Governments and operators invest heavily in the improvement and modernisation of the system. Policies are implemented to limit the use of private transport (urban road tolls, pre-paid permissions, parking regulations, etc.). Fares are simple and appropriate for the population. A leap in the number of public transport users.
Pace of technological transformation	Gradual migration	Migration to new ways of relating to technology in the field of mobility occurs gradually, without major cognitive ruptures for the general population.
Economic context	Economic crisis	Government and business withdraw investment from services that are not profitable in the short term.

Table 8 Main dimensions scenario 3: “World of Contradictions”

Based on these three scenarios different policy recommendations and strategies were discussed and outlined within the workshop group. These are:

- Strong political commitment on public transport and its accessibility. Prioritization of public transport and other complementary sustainable modes.
- Generate legislation for universal accessibility on public transport from a digital point of view, so that this aspect is above market dynamics. Ensure compliance from framework policies to the design and certification of specific solutions.
- Digital integration of the different public transport services, with all the necessary actors, in order to facilitate access to the system. Implement the concept of Mobility as a Service (MAAS). Anticipate and plan different formats of access, so that they can be useful to the diversity of users.



- Co-creation of public policies with the users throughout the cycle process, so that the design of solutions is user-centred.
- Transparency and public control of data linked to transport digitization processes. Transparent change management and public leadership.
- Simpler and customizable fare system, to facilitate access to public transport.
- Universal guarantee of rights in accessibility. Link to basic income policies to ensure that the most vulnerable citizens have access to digital tools.
- Face-to-face assistance. Ensure that some of the access formats to the services offered by public transport involve face-to-face and personalized attention to the user. This assistance which can be used to manage specific aspects or also to help training in digital skills.
- Awareness and dissemination. Establish awareness-raising mechanisms to facilitate integration of people with difficulties into the transport system. Disseminate accessibility policies through campaigns.

At the end of the scenario building process and the last workshop the participants made some general comments. The diversity of the participants (public administrations, transport companies, users, etc.) was seen as a key factor to obtain representative conclusions while creating policy recommendations and strategies. A professional facilitation was necessary in a COVID context where face-to-face workshops are not possible. A deep reflection of the scenarios was important in order to formulate the policy recommendations.

2.3 Flanders

The DIGNITY scenario process in Flanders took place in three separate workshops on September 8, 15 and 24. The involved pilot partners were Mobiel 21, IZT and Tomorrowlab. The workshops with a geographical scope on the region of Flanders were organized and facilitated by Tomorrowlab, scenario building leader was Anne-Marie Van Wesemael. Different from the other three pilots this scenario process in Flanders was based on already existing scenarios as outcomes of the previous Mobility Vision 2040 process. During this process four different future scenarios have been created in a structured and participative process with different stakeholders that outline a possible context of the future of mobility in Flanders.



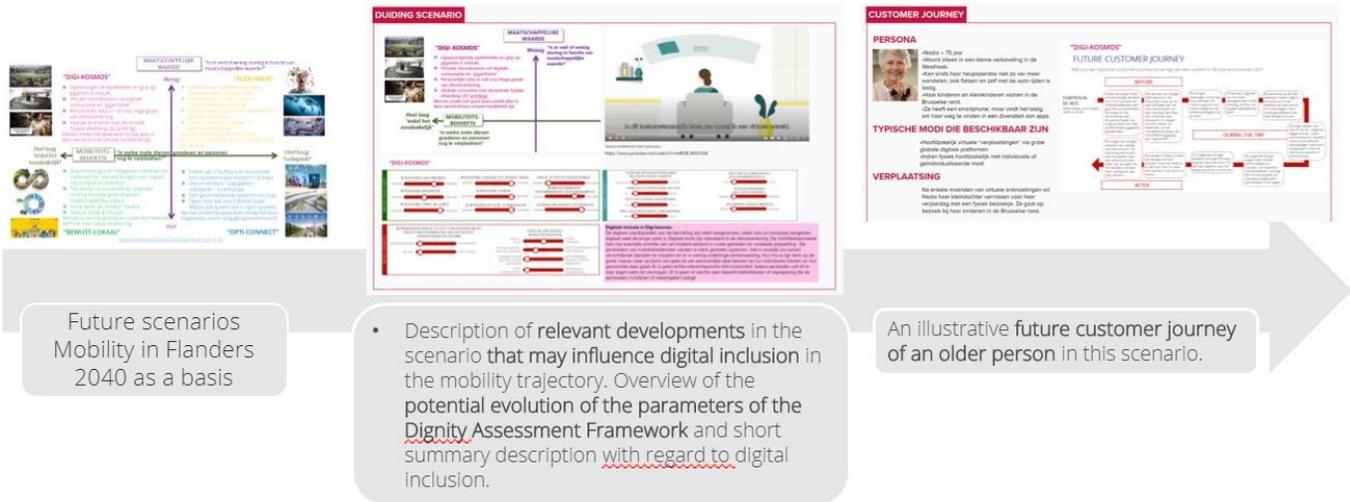


Figure 7: The Flanders scenario process

Compared to all other scenario building processes, the process in Flanders was the other way around. The scenarios already existed. The scenario building technique also differs from the methodology used in DIGNITY. The two most important key factors (social value and mobility needs) with their extreme values were used to develop the future space. The corresponding scenarios were formed from the four fields (figure 8).

The following key factors were used for scenario building:

- Social value
- Mobility needs
- Accessibility
- Network organization
- Quality of life environment
- Cooperation across borders
- Value model
- Importance of property

In the first workshop the current situation in Flanders with regard to the digital inclusion of vulnerable groups within the mobility sector was analyzed. For the second workshop, the scenario documentation was provided in advance. The participants were asked to answer three questions for each scenario:

1. If this scenario becomes a reality, what concrete challenges do you see regarding digital inclusion of vulnerable groups?

2. How does a future user experience this new reality? Step into the shoes of our persona and map out possible positive and negative experiences in the digital user experience during her trip.

3. Where do we potentially see the greatest risk regarding digital inclusion in this scenario?

In the third and last workshop the participants were guided through a 5-step-approach to create the basis for policy recommendations and strategies:

1. Challenges today & future: Insights in the challenges were identified and prioritized.

2. Vision: What is the desired future situation for a digitally inclusive mobility system that we want to achieve?

3. Innovation: How to respond to the challenges?

4. Recommendations Statements: Formulate policy recommendations based on the challenges, desired situation and solutions

5. Evaluation: What did you learn? Evaluate the process.

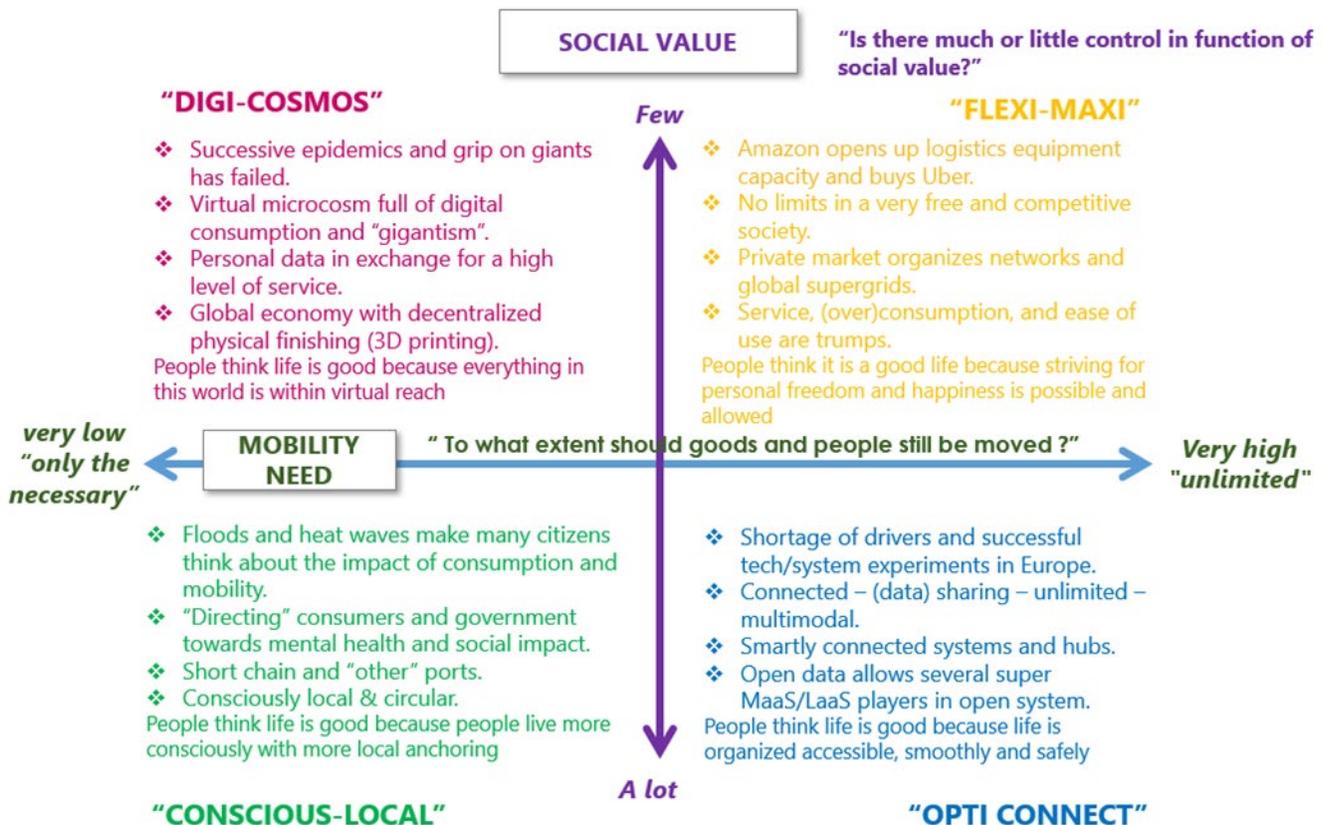




Figure 8: Mobility scenarios Flanders 2040

Each scenario was specified in terms of implications for the issue of digital inclusion of vulnerable groups. The opportunities and risks were specifically identified and evaluated.

As a result of the workshop a total of ten policy recommendations were formulated. These recommendations are based on the main challenges identified at micro level (user), meso level (service), and macro level (policy). Each recommendation contributes to the vision of a digitally inclusive mobility system and they are meant to complement each other. The workshop participants formulated the policy recommendation as follows.

Micro level (end user):

1. To increase confidence in digital mobility solutions, we need to strengthen the digital skills of vulnerable groups through a “staged system” of training and support. We recommend the integration of low-threshold programs within existing (local) initiatives.
2. In order to dream of a tailor-made mobility solution in 1 click, we need to simplify the complex flow of various screens and options by implementing an electronic “passenger” profile that will be able to propose a solution tailored to the needs of everyone. We recommend a strong standardization, simplification, exchange of relevant & high-quality data.
3. In order to dream of intensively used public transport, we must provide inclusive access to adequate information thanks to a varied network of physical touchpoints so that everyone without physical and mental barriers can easily find their way to the offer and make use of it.

Meso level (service):

4. In order to dream of personal service for everyone, we need to design a widely accessible and understandable passenger platform with the help of a good profile structure of the end user, which increases homogeneity and ease of use of offered solutions. We recommend technical standards for the exchange of total information (journey from A to Z with personal cost) in order to achieve a digital inclusive mobility system.
5. In order to dream of stress-free travel without calamities, we must guarantee a tailor-made “travel aid”, whether or not digitally. We recommend this to support the entire customer journey, making travel a matter of course and allowing vulnerable groups to make use of a varied range of products with confidence.





6. In order to dream of a smooth and stress-free user experience, the flow of digital actions in all tools must already be designed in such a way that it is intuitive and inclusive for all users. We recommend that the specific needs and requirements of vulnerable target groups when operating these tools are the starting point for the development of a digitally inclusive mobility system.

Macro level (policy):

7. In order to dream of an efficient implementation of basic accessibility ("basisbereikbaarheid"), we must join forces (knowledge and experiences), exchange and safeguard them through structural consultations with the right actors and supported decisions so the traveler is always offered the right and best solution and the confidence in the professionalism of public transport is self-evident.

8. In order to be able to evaluate and adjust digital accessibility, we must be able to continuously monitor the effectiveness of the (proposed) solutions via a monitoring and evaluation system with predetermined indicators. We recommend that digital accessibility indicators be developed and included in the Monitoring Mobility Status (MoMo) so that it can be evaluated sufficiently quickly based on high-quality data and adjusted where necessary.

9. In order to guarantee digital accessibility in the diversity of mobility solutions, governments at different levels must link conditions and success criteria of accessibility to subsidies and permit applications in their assignments.

10. In order to dream of an integrally accessible customer journey, we recommend a regulating role that monitors the exchange of knowledge and efforts between actors in the field of supply expansion, digitization and physical accessibility at all steps of that journey.

2.4 Tilburg

The scenario building process of the pilot case Tilburg was conducted within three consecutive workshops on June 8, June 22, and July 6. The pilot partner involved in the process was Nextbike, the organization and facilitation of the workshops was done by Marije Baars and Zoe van Otterloo from Bureau Zet who also had the role of the scenario building leader. All three Workshops had participants from the public administration sector, from public transport operators and companies, and from end-user groups represented by different associations and organizations. The geographical scope for the scenarios was the province Noord-Brabant in the Netherlands.





Like in the case of the other three pilots the first step in this scenario process was a comprehensive situation analysis of the mobility context in the respective geographical area. The analysis considered different information sources and key data and too the regional specifics into account, such as the fact that Tilburg faces various challenges with vulnerable groups, which differ between urban and rural areas. Mainly elderly people who may not be familiar with or at ease with the available digital services for the city's mobility populate rural areas.

Within the urban area, transport poverty is an important issue, with access to bicycles or public transport sometimes limited because of high fees. In this particular pilot, the main target group (and therefore focus) are elderly people from both urban and rural areas of the municipality. According to research the main barriers for elderly people to use transportation options are a lack of knowledge of certain mobility services, shyness or unwillingness to ask for help, certain regulations such as laws or complicated procedures, financial issues, and a lack of digital skills.

Based on the situation analysis the workshop participants discussed and compiled a list of eleven key factors and called them as follows:

1. Healthy and happy in Tilburg
2. Organizational structure
3. Traveler centered (user experience)
4. Sustainable means of transportation
5. Ownership of means of transportation
6. Positive health
7. Income differences between rich and poor among elderly
8. Accessibility
9. Active mobility
10. Payment system
11. Public transport system (booking and tickets)

As a next step in the scenario building process a list of projections was then assigned to the eleven key factors to build the basics for three different scenarios.



Key Factors	Healthy and happy in Tilburg	Organizational structure	Traveler centred	Sustainability within means of transportation	Ownership of means of transportation	Positive health
Projections	Vital city	Collaboration across domains	Demand oriented supply from individual traveler	Electrical means of transport	Only private ownership	Meaning of life
	Sustainable city	Managed from one market party	Demand oriented supply from society	Hybrid means of transport	Combination private and shared ownership	Quality of life
	Inclusive city	In hands of the state	Cultural sensitive offer: caters to certain target groups	Means of transportation natural resources (wind, sun, water power)	Only shared ownership	Participating
		Government stimulates		Means of transport on fossil fuels	Only public transport	Daily functioning
		Government facilitates			Private and public transport	Bodily functions
		Self-directedness target group				Mental wellbeing
		Participation & co-creation form				

Key Factors	Income differences between rich and poor among elderly	Accessibility	Active mobility	Payment system	Public transport system (booking and tickets)
Projections	Stay the same	Mental accessibility (knowing and daring to use)	Becomes more important	Paid	Tangible tickets
	Becomes bigger	Physical accessibility (the ability to use)	Stays the same	Free	A combination (digital & physical)
	Becomes less		Becomes less important	Depending on income	Fully digital service
					All ticket booths gone
					Personal contact remains
					Everything with face and ID recognition
					all in one system (MAAS)

Table 9: List of key factors and projections Tilburg

Scenario 1 had the time scope of 2030 and was titled “Dare! to travel”. The scenario describes a situation where in 10 years Tilburg is a vital, sustainable and vibrant city. An increasing courage and independence of the elderly Tilburg travellers is key. There is a comfortable transportation system with different extended services and personal helpdesks to help the travellers finding their ideal personal travel solutions. Travelling comfortably is the main focus within every tailored mobility solution and accessibility is always considered. By prioritizing the key points, Tilburg in 2030 is a vibrant city where people can easily and want to travel between different neighbourhoods in the



city/municipality. As an elderly person you can travel to surrounding areas and facilities as long as possible.



Figure 9: Visual illustration of the scenario “Dare! to travel”, Tilburg

Scenario 2 had the time scope of 2045 and was titled “MOPPIE”. In this scenario Tilburg is a highly inclusive city, in which all elderly can participate. Mobility is a fundamental need and accessibility has to be ensured for everyone. All public and shared transport is free, sustainability is supported on all levels. Travelling by using renewable energy is rapidly developing and encouraged. The free usage of shared transportation is funded by the government and financed by mobility taxes. In 2045 everyone has access to a personal mobility assistant called MOPPIE, an extensive Siri function for the phone. Moppie can guide the traveller through every step on a trip. A special feature is the so-called Mop-Knoop, a kind of mobility hub where you can take the train, bus, shared car or bike to continue your journey. In this case Moppie advises you to continue by bus, and after the



In some general remarks about the workshop process a common desire to use mobility to combat loneliness was emphasized. Mental health and accessibility are seen as extremely important as is the belief that the traveller should be in the centre of every developed mobility solution. 'Joining in' and 'social contact' are terms that came up continuously during all three workshops. It is also expected that, despite all the technological developments that are (or will be) taking place, human contact and the proximity of facilities will remain extremely important. The importance of 'learned young, done old' was also emphasized several times. If young people learn specific knowledge and train behaviour today, they will experience fewer digital barriers in the future to use transportation services. Despite the fact that DIGNITY focuses on the elderly of today, there are great opportunities for the municipality of Tilburg to connect young and old and in this way make a sustainable difference in how people can move from A to B.

The participants agreed that the scenario building workshops were a well-structured way to allow stakeholders to look and envision the future. However, they noticed that some of the steps provided should have taken a full day in the original planning. The steps could be gone through in more detail. Being flexible and adaptive is key while keeping the end goal in mind. The group found that balancing research outcomes with facilitating creative sessions can be tricky.





3 Comparative analysis and lessons learnt

In the concluding chapter, a summary of the results is given. First, the results are compared and similarities and differences from all four scenario building processes of the pilots are presented. Then conclusions are drawn about the method itself. The specific effects for the pilots are assessed and the integration of the scenario building process into the DIGNITY approach is critically considered.

3.1 Comparison of outcomes

Since the four pilots followed a specific scenario building framework and a moderation concept developed by IZT, the core elements of the scenario building approach were similar for all four pilots. Precisely, these are process steps of the situation analysis, the discussion of influential factors, the identification of key factors, the development of future projections based on the key factors, and finally the combination of projections to construct the basic mobility scenarios for the four regions.

Certain differences among pilots can be observed in the steps upstream and downstream of this core process. These include, on the one hand, the preparation for the situation analysis and, to a certain extent, the analysis itself. This is due to the fact that the individual pilots used or were able to use very different data and information bases for the situation analysis. Particularly in Barcelona and Tilburg, it is noticeable that this basis is very extensive and detailed. The Flanders region occupies a special position here, since mobility scenarios that had already been worked out were used as a basis for further processing. The list of key factors within the workshop groups shows some differences due to the different regional perspectives, but also some similarities with regard to the DIGNITY project focus (see table 10).

It is particularly interesting to take a look at how the individual pilots deal with the final step of the scenario process, the scenario creation. Here, a wide range can be observed, from a strongly narrative approach to a rather strategic implementation-oriented approach. This was handled very individually and reflects both the different focuses and perspectives of the individual regions and the individual creative working methods of the individual participants in the workshop groups. The way in which a formulation of policy recommendations and strategies was undertaken, or how concrete and specific these measures turned out to be, also differed greatly between pilots. A special role is also played here by the region of Flanders, which has placed a particularly strong working



focus on policy recommendations and strategies due to the scenarios already available from a previous process.

Based on the scenario question that was the same for all pilots and the reference to the mobility ecosystem, it was hypothesized that a high degree of agreement on the key factors was to be expected. Unfortunately, the comparison of key factors shows the opposite (table 11). Only one factor occurs in almost all processes (accessibility). Two reasons explain the difference and variance of the factors. The first reason is the bias that the pilots have developed from their specific challenges. The factors of the individual pilots are specific to the regional tasks. Another reason is methodological. The key factors are not always equally weighted and clearly defined or separated. Given the circumstances that the method was applied for the first time, this is a circumstance to be calculated.

Ancona	Barcelona	Flanders	Tilburg
Population size and density	User's participation on accessibility policies	Social value	Healthy and happy in Tilburg
Digitalization	Level of digital competence	Mobility needs	Sustainable means of transportation
Business Models	Economic context	Value model	Traveler centered user experience
Cost of Traveling	Pace of change of the digital transformation	Network organization	Organizational structure
Electrification network for e-cars	Public regulation of the digital transformation of public transport	Quality of life environment	Ownership of means of transportation
Smart Parking	Public transport use	Cooperation across borders	Health
Modal Split	Accessibility level	Accessibility	Accessibility
Private Vehicle		Importance of property	Income differences
Mobility Plan			Active mobility

Activity Centre			Payment system
			Public transport system

Table 10: List of all key factors

3.2 Methodical improvement

Neither the process evaluations nor the feedback from the pilots make a fundamental revision of the methodology as described in D2.3 necessary. Both the document (Kollosche and Florian 2021) in its comprehensibility and structure as well as the support and briefing of the pilots fulfilled their function very well. They supported the pilots in their own organization, implementation and evaluation of the scenario building processes.

The consistent implementation of the instructions on the composition of experts for the scenario process should be highlighted. All pilots have placed great emphasis on heterogeneous composition and tried to take all relevant stakeholders into account.

A key lesson learned from the implementation phase of the scenario building process independent of the Corona conditions is the need for professional facilitation of the workshops and the entire process. Almost all pilots have organized this support through an external agency and have thus been able to carry out their processes in an effective and goal-oriented manner.

3.3 Effects for the pilots

Based on the individual evaluation of the scenario building processes (Universitat Politècnica de Catalunya (2021 a-d), the process has supported the pilots in their activities within the DIGNITY approach.

The participants were satisfied with the learning results of the workshops. In all pilots, the central functions of scenario development were implemented and fulfilled. All participants were able to expand their knowledge and understanding (exploration function). The scenario building processes provided a better understanding of the mobility ecosystem and new perspectives on digital inclusion in mobility. The communication function was also realized. Open, critical and focused discussions were held in all workshops of the pilots. The strategy function was thereby also implemented and starting points for long-term strategies in the form of policy recommendations derived from the scenarios.

Table 11 summarizes all the positive aspects of the processes and those that need to be improved.

Positive aspects	Aspects to be improved
Climate: possibility of open dialogue	Greater in-depth study of the issues
Involvement: clarity, dynamism and collaboration	Greater stakeholder involvement
Great participation and good representation of the mobility ecosystem	Feedback: clarification of the further use of the results
Modern and creative management of the workshop	Documentation
The method guides you step by step towards concrete policy proposals	Presence and input of the final end user
Different perspectives and participants	Timing
	Scenarios need to be more forward-looking

Table 11: Positive aspects and aspects to be improved scenario building

The positive effects of the scenario building process beyond the immediate project context were also emphasized. The process itself has provided impetus for the entire administration and its work. In this respect, the scenario-building process will provide long-term orientation and support for other projects as well.

3.4 DIGNITY approach: project integration

The lessons learned for the DIGNITY approach as a whole, however, must be viewed critically in addition to all the positive effects. Three points are highlighted that will be revised and improved for future implementation of the approach.

(1) In the original planning and methodological design for the preparation of the scenario development it was intended that parts of the first part of DIGNITY (Framing phase) would be used for the situation analysis of the scenarios. For this purpose, indicators were worked out in the 'self-assessment' for the macro level, which unfortunately were not very well operationalized and were difficult for the pilots to interpret. In this respect, the data material was not always complete or the quality was not always high. These indicators need to be improved and possibly supplemented.

(2) One idea for methodological integration was the possible embedding of the Inclusive Design Wheel (IDW) process into the developed scenarios. The scenarios should represent the contexts for the integration of the results of the IDW. The idea could not be implemented due to the postponements in the schedule as a result of the consequences of Corona. Nevertheless, for reasons of method development and improvement, systemic consideration should be given to the interface between scenario building and IDW.



(3) The scenario-building process is the important prerequisite for developing long-term strategies for generating digitally inclusive mobility ecosystems. The third workshop in the process was designed to prepare for policy formation. The policy recommendations developed vary in quality and are not yet a strategy themselves. For the implementation of the next task in the DIGNITY approach (strategy formation and development of action plans), special attention must therefore be paid to strategy work with the scenarios.





4 References

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