DIGNITY

Digital transport in and for society

D. 2.3 Guidelines for scenario building process

Mapping the future

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Executive summary

The deliverable aims to explain the scenario building approach in the context of DIGNITY. The explanation of the procedure is presented in two steps.

In the beginning, the scenario method is explained in general and in an ideal-typical way. This step is contextualized by explanations about foresight and planning.

In the second step, the general procedure of scenario building is operationalized and developed in the form of concrete guidelines. In this way, the users in the pilot cases will be enabled to carry out the scenario processes on their own and with the professional support of the IZT. The guidelines will be used as a basis for guidance in the four DIGNITY pilots. According to the information and feedback collected from the pilot cities and regions, the methodology will be fine-tuned and standardized for exploitation in task 2.3.

The scenario building process consists of three main steps:

1) an assessment of the local/regional situation;

2) the development of scenario's; and

3) the development of programs, plans, and options for actions.

The most important goal of the document is to raise awareness for the specific way of scenario thinking. This requires openness, contingency consciousness, and complexity competence.

Another goal is to adapt the method to the problems and challenges in the pilots. The actors in the cities and regions have the task of developing strategies for digitally inclusive mobility systems. The scenario method should help them to do so.

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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 and involving end-users 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.

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Objectives of this deliverable

This deliverable has two key objectives:

(1) A plausibility check of the scenario development method and an explanation of its function within the DIGNITY project.

Recipients of the document should be able to understand the principles and premises of scenario thinking and procedure. Besides, they should be able to understand the benefits within the project and the pilot cases.

(2) Practically applicable guidelines for the implementation in the pilot cases.

Based on a basic understanding of the method, potential users of the method should receive all the necessary process steps and instructions they need for an autonomously executed scenario process.

The DIGNITY framework looks at the mobility gap from three separate perspectives, which are related to each other

The framework has three levels:

- The Micro-level: focuses on citizens in general and specifically on the vulnerable-to-exclusion user groups, focusing on their digital skills, potential mobility poverty, and the role that digitalization of mobility products and services plays in it.
- The Meso level: focuses on the market side of digital mobility products and services and involves mobility services providers, aiming to get a clear picture of the digital transportation technologies that best meet users' needs of vulnerable-to-exclusion groups. Methodologically, this dimension is addressed with the Inclusive Design Wheel (IDW) approach (see deliverable D2.2). This approach corresponds to the tasks and goals of the DIGNITY project with its focus on inclusive process design and product development.
- The Macro level: includes the perspective of national, regional, and local public authorities, specifically looking at the provision of inclusive and accessible mobility to all citizen groups.

The scenario process starts before the Inclusive Design Wheel process. The results of the scenario process will serve as framing and contextualization of the Design Wheel approach (Bradley and Deane 2021, deliverable D 2.2). The specific results of the design process can be tested and evaluated in the systemic contexts of the scenarios. The design wheel and the scenario-building process will be aimed at different target groups, who will be addressed separately but in parallel. Using the Inclusive Design Wheel, local stakeholders at the micro-level will be engaged to enhance products and services and reduce digital exclusion. Stakeholders at the macro policy level, meanwhile, will be

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encouraged to reduce the digital gap by adopting appropriate legislation and regulations by using forward-looking methods of analysis.

The output will be used to develop a robust regulatory framework and policy action plan (from the foresight study) in Work Package 3, coordinated by MOBIEL 21 (deliverable D3.5). In task 3.5 the pilots will be supported to implement the policy plans. Responsible delegates from the local pilots will be invited to draft their DIGNITY local pilot implementation plans (deliverable D3.2). These implementation plans build further on the local framing report (deliverable 3.1), and will specify a realistic planning of the different local DIGNITY pilot activities while giving an indication of the expected pilot output and impact (based on the input of WP4).

Outline of this deliverable

The guidelines outline a step-by-step framework for scenario planning. However, as there is no universal rule for scenario planning, it may be useful to perform the steps in a different order, omit some steps or even repeat some steps as part of an iterative process.

Formally, the text is organized in such a way that it begins in a general and comprehensive way and then becomes more and more concrete and practical. The method description (1.) starts with general statements about the understanding of modern foresight approaches in planning contexts. (1.1).

The Scenario method is one of the most important and valid methods in futures research. The next section is devoted to the basic premises and fundamental work steps (1.2).

Within the project, this approach supports the future analysis on the macro level. The third methodological part explains the specific objectives of the scenario process within the DIGNITY approach (1.3).

The guidelines for carrying out the practical scenario process are developed in the second part (2). The practical part is divided into three sub-steps as the following graphic illustrates.

Figure 1: Structure of scenario building process

Source: IZT

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The preparation phase includes all the necessary steps that need to be done before the process begins (2.1). In the main section, the three workshops of the implementation phase are described in detail. All necessary steps for the preparation and follow-up of the workshops are explained and each chapter is concluded with a checklist for the users. These can be used to work practically and to reproduce each step (2.2).

The last part of the document is focused on the evaluation of the overall process and the results (3). The comparison of scenarios and policy recommendations or strategies is discussed (3.1.). A process and result evaluation assess the formal quality (3.2) and finally, the results are placed in the overall process (3.3).

To avoid terminological confusion, the text is prefaced by a glossary of the most important terms. It is intended to support the comprehension process and provide orientation.

Glossary

Foresight: specific ways of thinking ahead (forethought) and anticipating future developments in practical manners

Futures research: the scientific approach to future developments on the basis of valid methods

Scenario: "An internally consistent view of what the future might turn out to be – not a forecast, but one possible future outcome." (Porter, 1985, p. 63)

Scenario planning: "Scenario planning is a disciplined methodology for imagining possible futures in which organizational decisions may be played out" (Schoemaker, 1995, p. 13).

Scenario building: methodical and technical implementation and procedure for the development of scenarios

Strategic planning: structured and goal-oriented reflection of changing social, economic, ecological, and technical conditions

Scenario team: People who organize, conduct, and evaluate the scenario process

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1. The DIGNITY scenario methodology

The DIGNITY approach integrates user perspectives, design dimensions, and the strategic options of policymakers. A future orientation must be integrated to inform policymakers about potential new challenges and changes and to develop robust strategic options. Starting from the central theme, the question is raised as to:

- Who will be potentially excluded in the future?
- Which governance structures are necessary?
- What strategic options do political administrations and urban planners have?

Practical manageable and easy-to-use guidelines need to be developed for implementation in the pilot cases. To apply these guidelines, the main principles and premises of scenario building must be understood (1.2). This method is one of the most important procedures in foresight processes and is based on certain principles. Some basic considerations on how to deal with futures and how to understand foresight are presented at the beginning of the chapter. But before going into the methodology, some contextual conditions of futures research, in general, need to be clarified (1.1).

1.1 *Foresight and Planning*

The future viability and development prospects of municipalities and regions are the focus of planning and politics due to external and internal change dynamics. But especially from the point of view of the population and their interests in the development of their home environment, the urgency for foresight, the anticipation of possible futures, and the active shaping of them. Such processes are always also political negotiation processes about the fundamental question: How do we want to live? And thus, also always negotiations about the reasons why a region should develop in this or that way (Kollosche, 2016).

A valid foresight concept complements the analysis of the present and implements a dynamic component. **Strategic planning**, for example, is a reflection of changing social, economic, ecological, and technical conditions. These conditions, combined with values, interests, and conflicting goals affect planning processes. In this respect, integrated transport planning has to consider infrastructural, political, and technical aspects as well as actor perspectives and their relationships. Foresight and planning have methodological and content-related similarities.

One of the essential premises of futures research is the statement that the task of foresight is to be prepared for the unpredictable (Bell, 2009). The paradoxical formulation is based, on the one hand, on another basic assumption according to which the future cannot be

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predicted and, on the other hand, on the claim that it is possible to prepare for it systematically after all.

The future is not predictable! The conditions of future thinking and strategy are characterized by complexity, contingency, choice, and construction, and therefore need to include ambiguity and uncertainty, and be adaptive, variable, and flexible. What scientifically oriented futures research can do is to point out **possible areas of alternative future developments based on scientific observations and methods**. To do this, it must be aware of the conditions in its environment and adjust its methodological arsenal accordingly. At the beginning of the 21st century, the inescapable environmental conditions include a high degree of uncertainty and complexity, acceleration and dynamization processes, and an awareness that what is given and what is to come must always be viewed within the horizon of possible otherness. For foresight, this means that the future cannot be described or known. It must therefore be assumed that the future is theoretically and empirically uncertain and closed in its interpretative openness to meaning.

Openness always means a variety of possible future developments. The object of investigation and the results of future projects can therefore only be alternative futures. Openness, complexity, and dynamics also mean continuous change. The **awareness of changing conditions** and constellations is particularly relevant in planning contexts with long time horizons. Modern futures research always speaks of a plural constitution of the future. Only alternative futures can be constructed from the present. In this respect, it is a matter of processes of thinking ahead and not of prediction. Future hypothetical realities can be represented cognitively only as constructions.

Future studies are structured communications. The future does not exist, it is open and plural. The subject areas of futures research are alternative futures or alternative visions of the future. The generated images of the future are expectation-driven, constructed, and complex. They are constructions of the possible from the reconstruction of the real. Under these conditions, the task of foresight is the methodically controlled production of meaningful knowledge under conditions of uncertainty. Initially, this can only be done based on present and past analyses and requires a high degree of communication. The communication function of futures research is sometimes underestimated. However, it plays an important role especially in scenarios, and is equally essential for municipal and regional development under the aspect of learning to plan.

Future narratives and images are temporal constructions. With a few exceptions (demographic modeling), future projects are not so many procedures for collecting and evaluating data, but rather forms of constructing images, narratives, or models of the future. Both the procedure and the contexts of use of the results are structured communicatively. The semantics of the future used in this process are constructions based

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on specific epistemological and methodological foundations. They are themselves the result of communicative processes and are handled communicatively to establish follow-up communications (actions, decisions, strategies). This also means that scenarios vary over time, for example, when new information or constellations arise. Thus, once generated, scenarios are only temporarily valid. In a monitoring process, they must be processed permanently to remain flexible and adaptive in planning and strategy development.

In the context of futures research, the focus is on long-term developments and images of the future with a **time horizon of between 10 and 30 years**. The focus of the efforts of futures analysis is the aspect of foresight. The central method for generating images of the future is the scenario technique. Based on scenarios, forward-looking perspectives can be developed that address the challenges of future developments in the various social systems and thus enable spaces of possibility, corridors of action, and strategic planning.

1.2 *The scenario building process*

Scenarios are the most important methodological tool in futures research, and "are of a crucial practical importance for public policy, management and strategic thinking in general" (Aligica, 2005, p. 815). The scenario building technique aims to analyze possible developments in the future and to present them coherently. One or more alternative future situations are outlined, and often the paths that lead to them are also described. In this respect, **scenarios serve to show possible options for future developments**. Scenarios help overcome thinking limitations by developing multiple futures. Scenario processes create possible, probable, and preferable visions of the future. They are focused on what might yet be. Scenario development increases the ability of organizations and institutions to deal with their uncertain environments.

What are scenarios? (Fink and Siebe, 2016; Kosow and Gaßner, 2008)

- Scenarios are representations of possible future situations including the development paths leading to these situations.
- Scenarios are not strategies but hypothetical constructs that support the development of strategies.
- Scenarios are developed in a methodologically controlled manner, but do not claim any objectivity or are subject to the criteria of scientific falsifiability or verifiability.
- Scenarios are to be used as thinking spaces and hypothetical environments that provide variable and alternative models for decision-making. Scenarios have three

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main functions: the explorative function, which focuses on possible developments based on existing information and provides a structured platform for discussion; the communication function, an inclusive procedure that addresses all affected actors and involves them in the process, enabling learning and coordination through networking and the integration of different perspectives; and the strategic function, which supports decision making processes. All three functions are like steps in the process: the explorative function involves system building and understanding of stakeholders; the communication function involves building and establishing a learning community; and the strategic function involves the design of programs, plans, and actions.

The **extension of mental maps** of involved persons is an important side effect of a scenario process. **Networking and integration** of different perspectives characterize this function. Motivation, emotion, experience, and different perspectives of the actors allow **common learning**. In this respect, the scenario method supports the process of the stakeholder community as a learning community. Scenarios establish and reduce complexity on the content level and in communication processes themselves. The scenario approach is not a way of anticipating the future, but rather provides a **foundation for strategic decision-making**, as it increases the ability of organizations and institutions to deal with their uncertain environments.

What are scenarios a solution for? First of all, they are a suitable tool for **dealing with complexity, unknowns, and uncertainty in turbulent times**. Like hardly any other methodological tool, scenario processes implement uncertainty in their approach. In this respect, they are solutions for problems of perception of future developments. Besides, they make important contributions concerning system understanding. Every scenario process is a process of system building and system analysis. For the participants, dynamics and impact structures thus become analyzable and visible, enabling different explorations into the future (Ward and Schriefer, 1998). The **understanding of systemic environments** is supported and at the same time, the adaptivity of changes is strengthened. Scenarios aim to influence and change the mental models of the actors. This refers on the one hand to the current understanding of a system (region, municipality) and on the other hand to expectations and imaginations of future system states. It is a transformation process that transforms facts (system analysis) into perceptions and ideas of future constellations.

„The scenario method is designed to produce the kind of mutual understanding that allows people to act toward common ends." (Schwartz, 1996, p. 227) Thinking and proceeding scenario-based means linking networked, future-open, and strategic action. The interactions of the various factors influencing planning systems become transparent

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to the actors and support a more intensive understanding and awareness of the corresponding consequences of decisions in the future. In this conceptualization, scenario processes can also be understood as early warning systems. By depicting development paths and images of the future, for example, **unintended consequences** of planning processes can be anticipated. Scenarios are, metaphorically speaking, tests of futures in the form of constructed and simulated worlds. The scenarios are not predictions of the future, but **perceptions of futures in the present**.

Scenarios support considerations of which planning future is desired and feasible from the various interests at stake. As a communicative process, scenario analysis provides support for planning discourse by helping to establish a shared understanding of a problem and the exchange and integration of different perspectives on a topic (Kosow and Gaßner, 2008).

Scenario processes can also be called strategic conversations (van der Heijden 2005). These are conversations that are set up for a long period and reflect the different perceptions of the situation or the treated system on the part of the involved actors. The motivations, emotionality, and experiences as well as different perspectives enable common learning.

Phases of scenario building

In the following, the steps of the scenario development are presented in an ideal-typical way. This basic outline is the basis for the operationalization of the project. Figure 2 summarizes the process graphically. This sketchy overview initially serves only to illustrate the method. How the individual steps are then operationalized and applied in the pilot cases is described in detail in the following sections.

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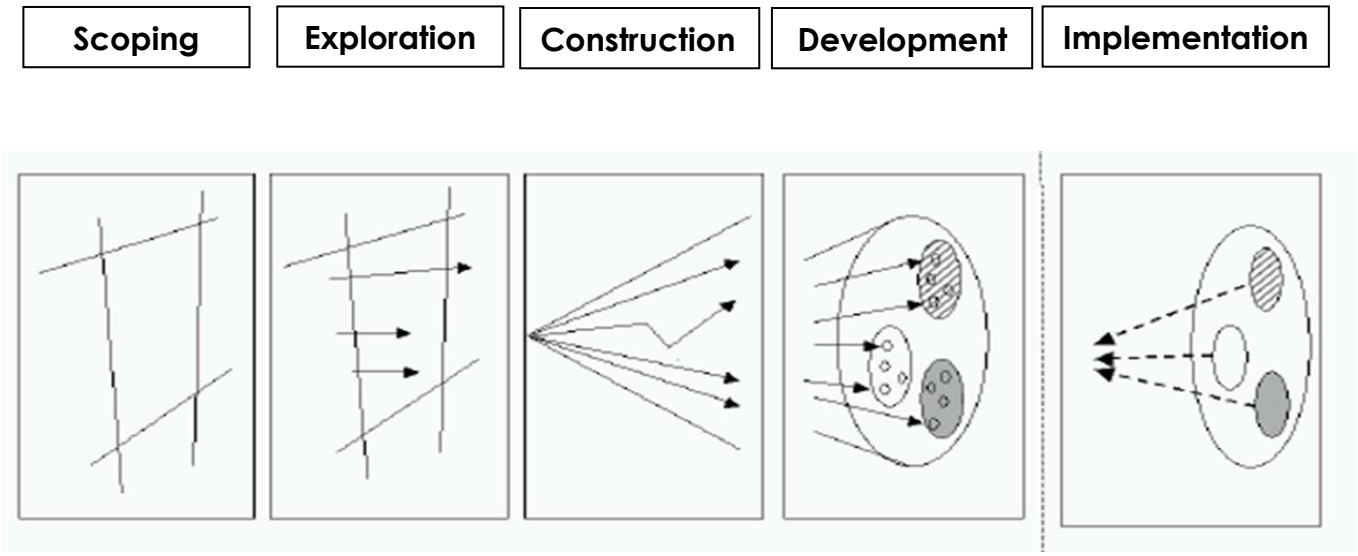
Figure 2: Scenario process



Source: IZT

Scoping: The scoping process includes not only the scenario field identification. The process step includes problem definition, resource planning, and the logistical organization of the scenario process. Project planning is just as integral to scoping as preparation in terms of content and methodology. Professional project management is part of it and the definition of the boundaries of the scenario design. The following tasks must be completed before scenario development can begin:

- project management: scale and detail the key planning elements
- problem definition: understanding the purpose and setting process goals
- scenario field definition: identification and definition of the field

Before the actual scenario process begins an effective project-management must be established and organizational matters and the need for a scenario process must be clarified. The very first step is to organize and assemble a scenario team. A scenario team consist of people who organize, conduct, and evaluate the scenario process. This means that a project manager (leader of the scenario team) has to be identified and corresponding roles in the team have to be defined according to the tasks.

Initial meetings with the scenario team, stakeholders, and experts provide needed insight for the common objectives. Responsibilities must be clarified, an agenda drafted, and participants in the process selected and recruited.

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Closely related to these tasks is the definition of the problem and the articulation of the purpose. What should the scenario development process support? What benefits should it bring to whom? Without a clear definition of objectives, the entire process would be chaotic and without a concrete goal orientation or expectation of results. All objective categories have in common the orientation towards the support of strategy formation processes in the present based on the scenarios. Nevertheless, it should be more precisely differentiated and defined what exactly as intended? According to the functions of scenarios, one can distinguish different focal points. Is it more about taking an explorative, methodically controlled look at possible futures? To ask, for example, what one's own local or regional mobility system might look like in 15 years? Or is the focus more on the learning and communication function of the stakeholders involved? Networking and exchange would then be the primary goal. Finally, it can also be about developing concrete strategies that are relevant for medium-term planning. The generally expected outcome should be defined.

After the organizational preparations and the problem definition, the scenario field will be defined. Depending on the problem definition or purpose of the process, specific items will be defined (Table 1). What time horizon is targeted? To what area do the analyses apply and who should be included?

Table 1: Defining the scope of the scenario process

Organizational Structure	a single organization with decision-making authority; a coalition of organizations
Spatial Extent	world, state; region; subarea,
Planning Horizon	5-10 years; 20-30 years; 50+ years
Targeted Audience	government agencies; private sector; experts in topical areas of interest
Tools & Methods	scenario approach and design

Source: US. Department of Transportation 2017: 39 ff.

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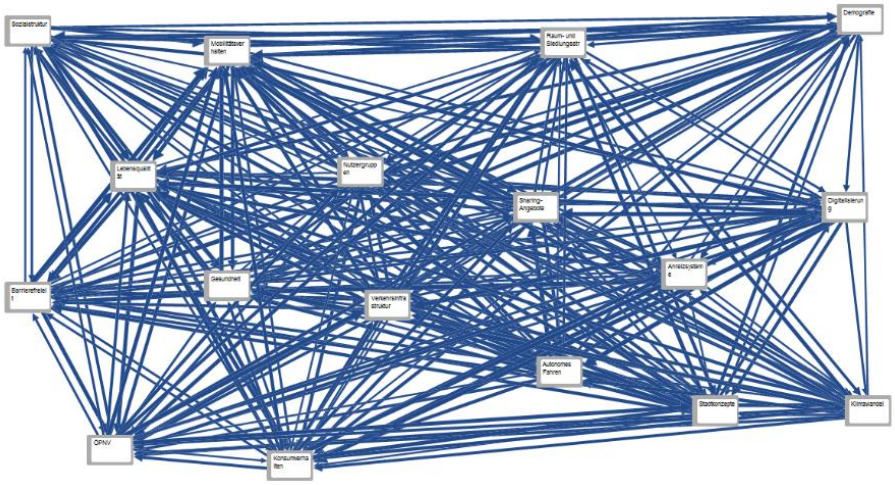
Exploration: In this phase, internal and external environments are analyzed and the system will be constructed. The basic tasks include:

- environmental scanning
- definition of system components
- defining and clustering driving forces: key factor identification

The environment analysis or scanning of the relevant fields is conducted with the help of the so-called STEEP heuristics (Grima et al. 2020). The external environment is divided into fields and in these fields, all relevant factors are collected that are related to the task and the topic of the scenario development. Ideally, the factors generated from the fields of Society, Technology, Economy, Ecology, and Politics (STEEP) are defined and backed up with current data and facts from the corresponding area. These are, for example, factors on population development, household income, traffic volume, or degree of urbanization. A documented, structured and qualified list of influencing factors is the result of this step.

The environment analysis is the first step to set up the system or to construct the later scenario framework. The identified system components must now be placed with each other. This is done either by an interrelationship analysis or a cross-impact analysis. The solution of this task supports predominantly software tools. With their help, the influence of each factor on all the others (and vice versa) is evaluated and scaled. In most cases, this results in a confusing system picture that can only be processed computationally. An example of this result is given below (Figure 3).

Figure 3: Result of an interrelationship analysis



Source: IZT

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Key factor identification: in this step, the central influencing factors of the system are defined. In addition to the function of system formation, the interrelationship analysis has another function. It is supposed to help to reduce the complexity of the influencing factors and to identify the central key factors of the system. Key factors are the components of the system that strongly influence the system itself but are also strongly influenced by the other system factors. They form the scenario framework.

Construction: This phase marks the beginning of the actual future analysis. Projecting the key factors into the future is the central step that determines possible scenarios and their quality. Based on the projections of the key factors consistent scenarios will be built. The phase is divided into the following sections:

- Key factor analysis
- making projections
- consistency analysis
- construction of the raw scenarios

The key factors identified in the previous phase can now be analyzed and documented. This can be done using various methods (literature analysis, empirical studies, surveys, and interviews). They must be prepared qualitatively in such a way that they provide a valid basis for future projections. On average, 8 - 12 key factors are selected. For each key factor ("U"), possible future states are now systematically determined. These states are described in the form of future projections ("P") (Fink and Siebe, 2016, p. 88). This step must be carried out particularly intensively and carefully because it is at this point the quality of the scenarios is determined. At least two projections must be determined for each factor.

The shape and quality of the projections can be different. One can determine the projections both qualitatively and quantitatively. As a rule, it is a description that is both qualitative and quantitative. For instance, for the modal split factor, one projection could be strongly dominated by private motorized transport or another could be a a very high share of cycling and sharing services. However, extreme values can also be selected that describe a particularly bad and good condition in the future (extremely negative emission values and environmental pollution vs. very good noise, air, and CO_2 values that do not harm the health of the population). In addition to a title, these projections must also have a description and explanation to be used for scenario building. It is important for the development of projections that the projections are clearly described and indicate possible development paths of the key factor. Table 2 graphically shows a list of key factors and their projections.

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Table 2: Key factors and projections

U_1	U_2	U_3	U_4	U_5	U_6	U_7	U_8
P_1	P_1	P_1	P_1	P_1	P_1	P_1	P_1
P_2	P_2	P_2	P_2	P_2	P_2	P_2	P_2
P_3		P_3	P_3		P_3	P_3	
		P_4					

Source: IZT

Mathematically, the scenarios can now be built from the combinations of the projections. But not every possible combination is logically consistent (e.g. the combination of an extremely high share of fossil fuels and low CO2 emissions). Therefore, the possible combinations have to be checked for consistency. Only consistent combinations are suitable for meaningful scenarios. Therefore, a consistency analysis shall be performed before the final construction of the raw scenarios. Mostly, this analysis is also performed with the help of software. This step also reduces the complexity of possible projection combinations.

After the consistency analysis, a reasonable number of raw scenarios can be built. Software-based analyses identify these raw scenarios using cluster analysis. Cluster analysis is a procedure for grouping cases (objects, scenarios) according to predefined criteria. The groups found in this way - also called clusters - then each contain cases (scenarios) that are similar to each other. The clusters, on the other hand, are more different. The simpler way is using the morphological analysis. The combinations are determined in the morphological box. Graphically, this is done by a connecting line of the attributes (Table 3). For pragmatic reasons of implementation, the morphological box is used in the DIGNITY approach.

Table 3: Morphological box

U_1	U_2	U_3	U_4	U_5	U_6	U_7	U_8
P_1	P_1	P_1	P_1	P_1	P_1	P_1	P_1
P_2	P_2	P_2	P_2	P_2	P_2	P_2	P_2
P_3		P_3	P_3		P_3	P_3	
		P_4					

Scenario A

Scenario B

Source: IZT

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However, the raw scenarios created are at first only a collection or combination of projections. These projection bundles are not yet functional and designed scenarios.

Development: In the scenario development phase, the scenarios are formulated and designed. Scenarios that are useful for further application are subject to some formal quality criteria. Their design, on the other hand, is an open and creative process. A final analytical step prepares the implementation of the scenarios. To test the robustness of the scenarios, all scenarios are subjected to a wild card analysis. This phase is then subdivided into the following steps:

- quality criteria of the scenarios
- scenario writing: design, story, and meaning
- wild card analysis

The design of the scenarios should be conducted according to certain criteria. "Scenarios must be relevant, challenging, and plausible …" (Chermack, 2011, p 159). Relevance results from the reference to the topic of the entire process and the benefit for the relevant stakeholders. The scenarios must provoke and challenge to change current mental maps in the minds of stakeholders or the public. But the scenarios should also not be fairy tales or science fiction stories either. Instead, they should describe plausible future constellations.

The following critical characteristics should make up good scenarios (Pink, 2006; Chermack, 2011, pp. 160-164):

- Design: title, easy to remember, aesthetic attractive and pleasing
- Story: content and convincing narrative, dramaturgy, and choreography
- Symphony: consistency, system characteristics, and meaningful patterns
- Empathy: ability to relate to other people's attitudes
- Play: experimentation with different ideas
- Meaning: room for ownership and forum for new thinking

The scenarios will be designed based on these criteria. Similar to a screenplay or utopian narrative, the scenario represents the coherent anticipation of a bundle of interrelated future events and states that may occur under explicitly stated initial conditions. The form of the scenarios is not defined. In most cases, it depends on the context of use. For a comprehensive scenario project, a scenario report will be written in any case according to the standards of scientific reporting. For presentations to the public or different reference groups, a wide range of design options is available. The spectrum of forms

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ranges from PowerPoint presentations, videos, collages, animations to life reports, theater performances, or other presentation formats.

Less formative than analytical is a final step before the scenarios go into the concrete context of use. Wild card analysis is an independent method of futures research. „A wild card is future development or event with a relatively low probability of occurrence but likely high impact on the conduct of business. "(BIPE Conseil et al., 1992, p. v) At the same time, it is a methodological step for testing the scenarios. The analysis tests the robustness of the scenarios.

A financial crisis, the attacks on the Twin Towers, nuclear fusion, and similar events constitute Wild Cards. During the scenario process, such events will come up in the discussion and will not be used as influencing factors. Therefore, at the end of the process, the scenarios are confronted with these and other wild cards. The disruptive potential of wild cards is being analyzed. The purpose of this experiment is to find out what happens to the scenarios under these extreme conditions. This can lead to different results. New scenarios can be derived or the wild cards can be evaluated in a differentiated way according to their positive and negative effects.

Implementation: This step is aimed at the inference of consequences and political strategies and completes the scenario-building process. Different levels and forms of utilization of the scenarios are possible:

- putting scenarios to use
- discussion and working with the scenarios
- policy development and strategic planning
- transfer and follow up communications

It is about the reference of the scenarios back to the question or problem. Before the beginning of the whole process, the goal definition was set, what should be achieved with the scenario process. According to this goal, the scenarios are evaluated and worked with. The returning to the central question is essential at this point. That's why implementation workshops have to be organized. The implementation workshops deal not only with the initial question but also with the possibilities, opportunities, and risks that the scenarios entail. There are various methods for this, such as the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. In all discussions and methods, the reference to the stakeholder should always be clarified. Their role in the scenarios will also be made a topic. In general, interpretation patterns and options for action are evaluated that are available to the actors in the different scenarios. Specific strategies or functionalities can also be tested. In this way, transport planning measures can be run through in the various scenarios and systemic effects can be simulated.

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Specific forms of consequence analysis consist of assessing opportunities and threats and evaluating options for action. Thus, specific steering areas in planning or a company can be mapped in a matrix and evaluated for each scenario. The summary evaluation of this matrix results in a portfolio of challenges that can be operationalized into concrete chance processes or projects. The scenarios can also be analyzed to determine which issues are of the greatest relevance. For example, in scenarios dealing with the design of digitally inclusive mobility systems, regulatory issues and institutional equity aspects are of particular relevance.

In a stakeholder analysis, the developments of specific groups of actors can be examined. This analysis can also be used to generate options for action in the future.

At the beginning of the method description, the three central functions of scenario processes were discussed. At this point, the strategy building function comes into focus. Strategies are important elements for planning processes and strategic planning in the field of mobility and transport is becoming increasingly important again. Political planning processes increasingly use foresight and scenario approaches. In the domain of policy formulation, foresight processes fulfill various functions such as: informing policy, facilitating policy implementation, embedding participation in policy-making, supporting policy definition, and reconfiguring the policy system (da Costa et al., 2008). Strategy building is an adequate form of implementing these functions.

The main goal of strategy development with scenarios is to develop possibilities for the future and to show systematic alternatives for action. From a methodological point of view, it should be pointed out once again that the scenarios do not represent strategies, but only spaces for action in which strategies are developed.

This step is concluded with considerations on suitable communication formats for the further use of the scenarios and the derivations and results from the discussions of the scenarios. Again, the spectrum ranges from presentations to new projects.

1.3 *Objectives of the DIGNITY scenario planning*

Digitally based mobility is an immense challenge for city and transport planners, as public administrations must consider the implementation of new mobility services at an early stage. The scenario process is inclusive and participatory, as all affected actors participate in the scenario design and think about strategic consequences. In this way, the process contributes to the establishment of learning communities and contributes to the knowledge acceleration process. Because of its inclusive and participatory nature, the scenario analysis applied within the DIGNITY approach will strengthen the political capacity of metropolitan cities and regions to act.

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Scenarios and scenario processes integrate the phases and process steps of regional foresight projects in an almost exemplary manner. In their systematic-structured approach, they make essential contributions to a shared knowledge building based on the inclusion principle of the relevant actors. Scenario processes ensure participation, network stakeholders, systematically anticipate future developments and generate both visions and recommendations for action. Scenario planning in the DIGNITY project has a special dimension. The focus of scenario development is on urban spaces and mobility systems. "Urban planners pursue the public good, must implement policies, and must reconcile diverse and often conflicting goals and ideas." (Goodspeed, 2020, p. 53)

They have the potential to ensure flexibility in strategy and planning in the face of turbulent and uncertain environmental conditions and - in contrast to classical planning approaches - to make unintended consequences of action visible and to change those mental maps. Scenarios are fundamentally integrated into a communicative-interactionist approach to planning. Accordingly, the communication function of scenario processes is of particular importance. Collective learning processes are an essential result of regional scenario processes.

Scenario planning allows a community to look long-term and envision the future it wants, rather than accept the trend line embodied in most existing plans. It encourages policymakers, stakeholders, and the public to consider a wider range of opportunities, challenges, and possible futures.

The scenario planning process described here will empower the pilot regions to assess the existing policy plans taking into account new trends and expected future conditions. The scenario process will generate ownership for common challenges and create legitimacy for political action recommendations.

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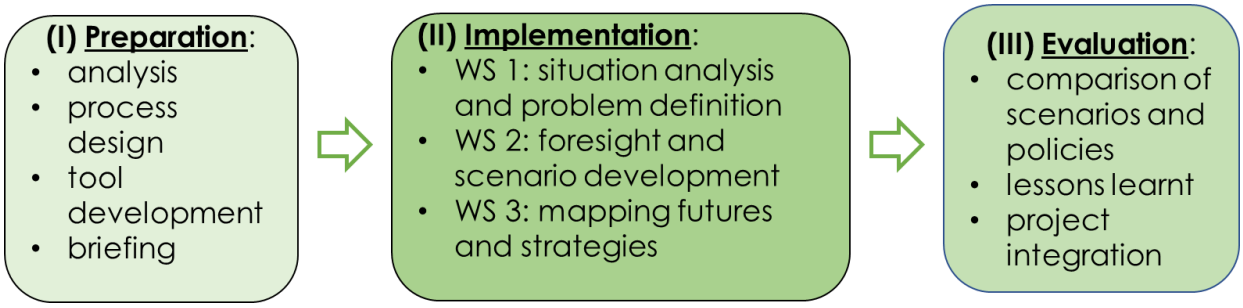
2. DIGNITY: planning and implementation of the scenario process

The scenario process is part of WP2 "Building the DIGNITY approach" and will be tested by the pilots in WP3 "Pilot Demonstrations". It builds on the results of the first working package and uses the results of the digital gap self-assessment process (deliverable D2.1 – Guidelines for a digital gap self-assessment; deliverable D3.1- Report on 'framing the gap' at local level). It is located in the project logic on the macro level. It does not focus primarily on actors or technical applications. Strategies for an inclusive design of digital mobility systems in the pilots are the subject of this step. In addition to the concrete results at the policy level, the process also supports the networking of stakeholders in the regions.

The process is divided into three phases and consists of a core phase (implementation) and a pre-and post-processing phase (Figure 4). The resources are also planned accordingly. In the pre-and evaluation phase, the research team is primarily active. In the implementation phase, the representatives and actuators of the pilots are responsible.

Figure 4: Scenario process DIGNITY



Source: IZT

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Each work step is explained in turn and the relevant handling instructions are summarized in a checklist at the end of the chapters. The users of the guideline can take this as input for the preparation of the particular working steps.

In addition to these guidelines, a collective and individual briefing of the pilots takes place before the start of the scenario process. During the entire scenario process, the IZT supports the implementation and provides advice.

Specific templates are developed and made available to the pilots for their work in the workshops. Although the workshops were originally planned as live events, digital alternatives have been considered and developed due to the current COVID-19 pandemic. This poses additional challenges for the implementation of the overall process.

2.1 *Preparation: Briefing, Introduction, and Manuals*

In the scenario preparation phase, the task or problem is analyzed in detail. Precise formulation and focusing of the task are of decisive importance. It must be understood by all participants and the content must be formulated clearly and comprehensibly. The following questions must be clarified in this step: What problems, tasks, questions are to be solved and answered with the scenarios?

In this context, the object for which helpful insights are to be gained is to be defined as the so-called design field (the direct decision-making field). This field includes the context of the use of the scenarios (organization, corporate sector, municipality), the purpose of use (vision formation, strategy development, orientation), and the group of people in the target group of the scenarios (Fink and Siebe 2006, p. S37 f.). Besides, the current situation of the design field or the individual components must be described precisely. Typical design fields are, for example, companies, products, or technologies, but also cities, regions, states, or the entire earth.

Subsequently, the area under consideration, whose future is to be described by the scenarios, the so-called scenario field, must be limited and defined. The scenario field determines the form of the scenario to be used. However, it also determines the concrete area of consideration in terms of time, space, and subject matter.

The preparatory phase determines the quality of the entire process. In addition to organizational and logistical issues, topics relating to content must also be clarified.

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In detail, the following steps are part of the preparation for the implementation phase:

- Project planning: resources, team, and agenda
- Scoping: Preliminary methodological considerations
- Target groups and participants
- Situation analysis

Briefing

About 4 to 8 weeks before the first workshop, preparatory meetings will be held with the scenario team. The contents of the preparatory meeting are to present the concept of the scenarios and the scenario workshop, to give an overview of the workshop procedure, to present the preparatory materials, and to clarify open questions. Furthermore, the scenarios will be placed in the context of Dignity.

Two preparatory meetings will be held. The first one with all participating pilots. The method, the process design, and its implementation are presented and discussed. The pilots will have the opportunity to exchange information about the scenario process. The second preparatory meeting will be held individually with each pilot. In this way, the specific content-related references can be clarified, and also specific organizational questions can be clarified.

Parallel to these meetings, project preparations in the pilots must already begin (see the following step). The organizational run-up is very time-consuming and must therefore start early. Therefore, it should be pointed out once again that, ideally, preparations for the implementation of the process must begin at least two to three months in advance.

Project planning: resources, team, and agenda

The planning, monitoring, and control of the project must be prepared first. The first prerequisite for efficient project management is the definition of the **scenario team**. In addition to the selection of staff, the relevant role definitions must be made. There is a need for a project manager as well as office management. In addition, one person from the group for whom the scenario development is being carried out must always be present. A local person in charge is critical (like a so-called gatekeeper) in ensuring that all relevant stakeholders are engaged throughout the scenario planning process. To guarantee the success of this process, it is important to define formal rules of collaboration as well as the roles and tasks of the actors involved.

Making a **plan** and the preparation of schedules is important within the working plan (Scenario process workbook). The development and elaboration of a project proposal

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are necessary for the form of a documented schedule with resources and time planning. The infrastructure planning involves the workshop preparation, the schedules for the meetings, room booking, and catering (when they happen live). The workshops must be scheduled and prepared. It must be checked to what extent the technical equipment and presentation material are available. The template design for standardized documentation of all workshops and the briefing instructions (letter of invitation) must be designed and edited.

For the **workshop** facilitation, the following staff is needed:(Meyer, et al., 2009):

- moderator: overall discussion leadership at the event, facilitation of plenary discussions
- moderator assistant: assisting the moderator in collecting requests to speak; recording the factors and expressions mentioned in writing and attaching the index cards to the pin boards; organizing and carrying out the voting processes;
- supervisor: for working groups

First considerations should be given to the selection and identification of experts for the process.

Furthermore, the scenario process aims at the inclusion of people with special physical or mental challenges. Therefore, it is particularly important to ask for potential needs, e.g. a barrier-free workshop location, special dietary requirements for lunch.

Scoping and preliminary methodological considerations

Together with the project management, the central question or purpose of the scenario process must be defined. For which **challenges** should the process be carried out and which results are expected?

The central question within the DIGNITY project is: How must digitally inclusive mobility ecosystems be designed? Specific nuances and refinements from the specific problems of the pilots sharpen the relevant questions. Inclusive mobility system: what does this mean in detail for pilots? An answer to this question must be found before the workshops start.

However, the result expectations are the same for all pilot cases. It is about:

- develop policies and strategies
- learning experience
- scenarios as a planning tool

The definition of the planning area and timeline is a further planning step. The **planning area** means the space and area in the pilots in question (e.g., Barcelona metropolitan area). Determining the geography of the planning area is a necessary starting point in

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the scenario process. It defines both the likely participants in the process and sets parameters for data collection and analysis.

In addition to scoping, the scenario team must be clear about the methodological approach chosen for the task. In the DIGNITY project, a scenario planning approach is pursued based on morphology. The nature and **objective of the scenarios** have to be defined. The scenario planning approach is about the development of system scenarios. In this type of scenarios is operated with factors that can also be influenced and changed by the participants or target groups. So-called environmental scenarios, for example, operate with influences that cannot be influenced by the actuators (world trade, oil price development, international agreements). In some pilot regions, it may not be clear to differentiate if they should be exploratory system scenarios or normative scenarios. If concrete objectives already exist as to how the mobility system should be designed, then normative scenarios can be created that allow different solutions to be developed for implementing the desired perspective.

Target groups and participants

It should also be considered in advance for which **reference group** the scenarios will be developed. To whom should they be communicated later? In the context of DIGNITY and the pilot regions, the target groups are almost identical to the participant groups. Of course, other sub-publics will be added later. Again, the context of use and the nature of the scenarios define the target groups.

The scenario process is organized by the scenario team. The participants of the workshops are experts from different fields of the mobility system, stakeholders, relevant target groups or otherwise involved persons. This group of experts should remain constant over all workshops and must be determined and addressed in advance. The selection of participants is of crucial importance. An important criterion for a creative and productive discussion in the workshops is the heterogeneous composition of the participants. The target groups must be defined according to the problem, the context of use, and the topic. Stakeholder mapping is recommended to select a sufficient number of relevant participants. Along the relevant dimension of the topic and the reference region, the mapping has to be structured. However, formal categories (cf. STEEP analysis) may also be chosen.

In addition to the content context of the participants, the amount of people who are invited should be wisely determined. In order not to push the complexity of the work too high and remain as representative as possible for the reference system, around 10 - 15 participants are recommended. Please ensure a gender-balanced distribution among the participants.

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Based on the question of digitally inclusive mobility systems, representatives from the following fields are recommended:

- public administration:
  - transport planning and urban development
  - municipal utility
- mobility service providers
- municipal transport providers
- organizations for affected parties (vulnerable groups)
- IT experts
- civil society
- transport interest groups
- business representatives

Potential participants must be informed about a planned scenario workshop. As participation in the workshop is voluntary and thus the interest of potential stakeholders must be gained, the preparation of information materials is important.

Possible information materials for the workshop announcement can be an info sheet, a mail, or an internet announcement. The info material should introduce the dignity project and state the phase dignity is currently in.

These identified stakeholders are invited in writing to participate in the scenario workshop. This may initially be, based on the information material, a save-the-date invitation asking for participation and some personal details. A balanced gender distribution among the participants must be ensured. Based on the expressions of interest and socio-demographic criteria, the final invitation to the workshop is issued. This process requires some time and organizational effort.

Preparing situation analysis

This preparatory step has organizational and content-related aspects. On the one hand, all relevant and necessary information on the topic is collected and processed, and on the other hand, a qualified working basis for the scenario process is created.

The scenario team has several information sources on the initial situation resulting from previous steps in the DIGNITY project (D 2.1 Guidelines for digital gap self-assessment, Nesterova et al. 2020). The results of the digital gap self-assessment process and the customer journey mapping (D3.1 Report on the 'framing the gap' at local level) serve as the basis for the situation analysis.

The situation analysis includes the following tasks:

- analysis of the socio-demographic context
- analysis of current transport and mobility context

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- screening of relevant policy documents at local, regional, national, and EU levels
- an overall analysis of digitalization in the pilot region

For solving the tasks, the following information and materials should be collected in advance:

- specification of regional and local challenges
- history and the current situation: draw current-situation map and clarify underlying conditions
- mapping the system and groups of players (deliverable D3.1)
- results of WP 3.1 self-assessment analysis (deliverable D3.1)
- results of the customer learning journey (deliverable D3.1)
- first provisional list of Influencing factors (optional)

In the following, relevant dimensions, sources of information, and forms of presentation are suggested on how to best prepare the situation analysis (Table 4).

Table 4: Summary of the dimension of the situation analysis and possible sources

No	Demands	How to achieve the requirements	Deliverable
1	Specification of regional and local challenges	• Informal and semi-structured interviews	Description of the problem
2	Mapping of all policy domains and policy actors relevant for designing a digital transport eco-system (politicians, administrations, on the local, regional and national level)	• Model and template of a mobility ecosystem • Definition of the relevant actors	Stakeholder Map
3	Regulatory frameworks in place on the local, regional, and national level regarding inclusion, transportation, data sharing, etc. that are supporting or hindering an inclusive (digital) transportation system	• Definition of relevant sources • Data collection in cooperation with regional actors	Document collection online accessible for involved actors
4	Geographical/spatial and socio-demographical context describing the needs and challenges for a digital transport system	• Data collection in cooperation with regional actors • Expert interviews	Document collection online accessible for involved actors

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5	Overall portrait on the digitalization of life in the pilot region/city	• Expert interviews • Definition of a level of digitalization based on concrete indicators	Infographics digitalization
6	A description of the current transport and mobility context, information on the current mode use split up by different user groups, especially age is important and information on social inclusion	• Data collection in cooperation with regional actors	Context Map
7	Screening of relevant policy and planning documents regarding technological developments and smart cities, social inclusion, transport, sharing economy, etc.	• Definition of relevant issues • Data collection in cooperation with regional actors	Extended context Map
8	Assessment and readiness level	• SWOT Analysis based on all previous indicators	

To ensure a good **preparation** of the participants, it is recommended to provide the summarized material to all participants before the first workshop. A more sophisticated method of preparation is to conduct qualitative interviews with all participants before the first workshop. In this way, the participants can be prepared and initial influencing factors for the situation analysis can be collected. A series of in-depth interviews with stakeholders and a review of existing plans help to get a comprehensive picture of the region's key issues. The interviews may allow identifying key planning issues in the pilot regions and the first set of evaluation criteria for the digital mobility ecosystems. The aim is to use the collected criteria as parameters to analyze and evaluate the situation in the pilot regions and will be used later to assess and compare scenarios.

The **evaluation criteria** are linked with goals and values that the pilot regions compiled. They can help community members and stakeholders to understand the benefits or trade-offs of a scenario as they relate to their wishes for the community.

The evaluation criteria will serve as a touchstone throughout the project in all circumstances, irrespective of changes in goals, strategies, type of work, or management. Together with the evaluation criteria set up by the "Inclusive Design Wheel", this step constitutes the building of the DIGNITY Approach (deliverable D4.1 Evaluation Guidelines Report; deliverable D4.3 DIGNITY framework validation report).

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A successful scenario planning process needs local **leadership** to carry out the process. Having local leaders involved, who support the process and show enthusiasm, gives the process credibility and will help to maintain momentum during the process. An important step is to reflect local and regional culture and assess the regional values.

Key questions to be answered during this step:

- What is the aim for the pilot regions?
- What are the common values that the goals are based on?
- What concerns are present that must be addressed?
- Who will be regionally responsible for the scenario planning and analysis?
- How will the process ensure broad participation?
- Who will be responsible for the financial and logistic aspects?
- What follow-up organizational structure should be employed?
- What are the next steps?

Table 5: Checklist Preparation

Attention: Please ensure in advance that active participation in the workshop is also possible with visual, auditory, and physical impairments.

Goal	Checklist question	Checkbox
Project Management		
Scenario project proposal	**Is there a valid and structured project or work plan?**	☐
Scenario team and roles	**Is the team defined and briefed with names and responsibilities?**	☐
Measurements	**Have all costs that will be incurred been calculated?** • **Personal** • **Materials** • **Travel** • **Travel and catering** • **Total project cost estimate**	☐
Materials	**Are all necessary materials and documents for the team and the participants prepared?** • **Invitations and briefings** • **Templates** • **Workshop materials**	☐

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	• technical equipment and presentation material	
Scoping and Method		
Purpose	**Are the objective, the problem, and the focus of the scenario process clearly defined?**	☐
Results	**What concrete results are to be achieved with the scenario process?** • **Visions** • **Strategies** • **Policy recommendations** • **Projects** • **Institutions**	☐
Scope and time frame	**Is the scope of the process defined?** • **What is the time frame?** • **Spatial range: What area are we looking at?** • **Reference system**	☐
Scenario approach	**Has the appropriate scenario process approach been selected and defined?**	☐
Target groups and participants		
Target groups	**For which reference group should the scenarios be developed?** **To whom are the scenarios presented?**	☐ ☐
Participants scenario process	**Are all relevant stakeholders included as participants in the process?** **Is an adequate gender balance ensured?**	☐ ☐
Situation Analysis		
Information and materials	**Have all the necessary materials for the workshops been prepared?** **Has the briefing material been sent to the participants?** **Are additional measures necessary for the preparation of the session analysis?**	☐ ☐ ☐
Other tasks		

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2.2 *Implementation*

The **implementation** phase is qualitatively and quantitatively the main part of the scenario development process. It is also the part in which the pilot regions are intensively involved and have to carry out the process.

The implementation phase consists of **three workshops**. In the first, the current state analysis is carried out based on the available material and the system is built up. The relevant influencing factors are collected and correlated to identify the so-called key factors. The second workshop starts with the actual future work. The key factors are projected into the future and the raw scenarios are built from the projections. The last workshop has the elaborated scenarios as a basis for developing the strategic implications for the future digital-inclusive mobility system.

In the following, each of the workshops is described in detail in terms of its objectives, process steps, results, and instructions for action. These descriptions are again completed with a checklist for practical application. The preparation and follow-up phases are also described in detail.

The following instructions shall apply to all workshops:

- The results of the workshop are requested to be documented and a summary in English is to forward to the IZT.
- The IZT is available at any time to support the individual work steps.
- Always ensure an early supply of the relevant materials and the time and location of the workshops for the participants.
- Make sure that the workshop atmosphere and location are as pleasant as possible.
- Use experienced and trained moderators who can mediate conflict situations.
- Remember, this method is at odds with familiar procedures. The most important thing in this process is the joint, constructive, and creative work. The entire process is a strategic process to focus on generating valid and sustainable solutions and results.
- Keep your minds open!

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2.2.1 **Workshop 1: Situation analysis and problem definition objectives and results**

Objectives of the workshop:

- explorative goal: analysis of the object of study: inclusive digitally based mobility system
- communicative goal: networking of actors and stakeholders, the opening of discourse, involvement of participants
- commonly shared understanding of the problem situation and the frame of reference
- strategic goal: problem, outcome, and target setting
- collecting influencing factors: collecting, weighing and identifying central factors affecting the system or the objective of the study
- evaluation and correlation of the factors
- **output**: list of 10-12 weighted and evaluated key factors

Leading questions:

- Where are we now?
- "How is your region developing?
- What are the major issues or drivers influencing growth and development?
- What are the most promising opportunities that will shape development in years to come? What major issues may be affecting equity in the community; assessed with a community profile, including the identification of populations and their characteristics, and identifying data sources?" (U.S. Department of Transportation 2016, p. 63)

For this workshop, all selected participants were invited in time and ensured to participate. The information/preparation material has been sent to. The workshop room is prepared with the necessary equipment and moderation material. For the digital variant, the technical know-how must be available and tested. For this and all following workshops, six hours are to be calculated. This is the minimum for an optimal result.

The workshop is divided into five sections:

- Introduction and networking
- Method and procedure
- Situation analysis

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- Collection of influencing factors
- Determination of key factors

The workshop must also be prepared on-site. At least one hour should be planned for this preparation and for welcoming the first guests. The preparatory steps on-site include:

- Set up a poster board and have index cards, pins, and pens ready
- Possibly have moderation materials ready
- Setting up the information table, distributing name badges and conference folders
- Get to know the location to be in the position to inform participants
- If necessary, set up a tape recorder and microphones to record the plenary session (then you will, of course, have to inform the participants about it)

Introduction and networking: After the welcome, the presentation of the agenda, and the description of the task of the scenario process, a round of introductions of all participants takes place. This introduction should be coupled with an alignment and a questioning of the expectations for the entire process. The warm-up phase of the workshops aims to make it easier for participants to get started and to encourage broad and active participation. It often lowers the inhibition threshold for participants to actively participate during the workshop if the introduction round is followed by an ice breaker question. The questions may or may not be related to the topic of mobility.

Examples for ice breakers with relation to mobility:

- Please name the one bus/metro line or station that you dislike most using and explain why.
- When was the last time you took the bus/metro and what ran particularly smoothly?
- Imagine a public transport bus in the year 2035. What characteristics do you think this bus should have?

It is important to make sure that all participants have understood the task and that there is a feeling of working together. The questioning of expectations and the personal view of the problem is already a source of possible influencing factors. Therefore, corresponding keywords should be written down on the flipchart.

Method and procedure: A detailed and comprehensive introduction to the scenario method is necessary and a lot of time should be taken for the discussion. If the participants do not understand and accept the method, there will be big problems in the implementation. Besides the methodical introduction, the implementation process should be presented immediately. This will present the other workshops and their goals and explain the overall process.

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A variety of outcome formats are possible: strategies, policy recommendations, visions, or independent projects. Already at this point, clarity about the expected results should be established. In the context of the DIGNITY approach, the goal is to develop strategies for the design of a digitally inclusive mobility system.

Situation analysis: A presentation based on the step "Preparing situation analysis" opens the discussion about the current situation in the region referring to the problem definition. The entire prepared material is used at this point. It is presented and the participants have had the opportunity to study it in detail before the workshop. Thus, a qualified discussion can take place. A look at the overall system and the interrelationships, challenges, and problems that can be observed up to this point is good preparation for the collection of influencing factors.

Collection of influencing factors: The scenario field, which has so far only been roughly defined, is divided into various subsystems so that separate spheres of influence can be identified. Influencing factors are then identified that can be used to describe the status and development opportunities of the individual spheres of influence as far as possible. Sufficient time should be allowed for the selection and description of the factors. The quality of the influencing factors must meet the criteria of scientific research. The terms used must be defined and transparent, data must be valid, and trends must be documented. If work is done superficially and too quickly at this point, rework and additional communication processes will be necessary for the further course of the scenario process.

The STEEP search fields can be used as an orientation grid and search field navigator. The STEEP technique supports the identification of driving forces in the external environment of organizations, for example. The acronym STEEP stands for the main thematic clusters (society, technology, economics, ecology, politics) in which these forces are searched for. Here, they serve to systematize the fields of application.

Society: values, lifestyles, demographic influences, income distribution, education, health, population growth, migration, security

Technology: research, new technologies, technology assessment

Economics: economic growth, exchange rates, taxation, unemployment, business cycles, resource availability

Ecology: climate change, emission regulations, pollution levels, quality of life

Politics: legislation, political stability, taxation, safety regulations, and subsidies

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Classic influencing factors of mobility systems are:

- Spatial and residential structure
- Modal split
- Traffic volume
- Mobility preferences
- Urban Development Policy
- Social structure
- Emissions
- Transport policy
- …

The results from the self-assessment process, in particular, can be used to collect the influencing factors. Various factors are already listed there at the micro, meso and macro level and even documented with data.

Participants are divided into **groups** and work on their chosen topics in separate rooms. The task is: "Collect all relevant influencing factors in your topic area that are important for the issue of digital-inclusive mobility systems in your region. The grouping should be done by the scenario team before the workshop. This saves time and ensures that the right experts are in the groups.

The working groups must work in a self-directed manner. They must appoint their moderator and ensure that the results are documented (flipchart or boards). It is recommended that brainstorming is carried out first and then the factors are collected and sorted.

After the group phase, all factors are presented and clustered in the plenum to generate a first system picture of the relevant components.

Determination of key factors: The number of influencing factors exceeds the complexity with which further work can be done. There are too many and must therefore be reduced and evaluated according to their relevance for the respective mobility system. For pragmatic reasons, no elaborate cross-impact analysis is performed here, but participants are asked to distribute points. They are to evaluate the factors according to the following criteria:

Which of the factors have the highest relevance concerning the design of a digitally inclusive mobility system in this region? The relevance can be evaluated according to how strongly the factor influences the overall system (e.g., digital mobility services) and how the factor is in turn influenced by other factors. Another criterion of relevance is the uncertainty of the factor's development in the future (political regulations).

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After the participants have distributed their points the moderator summarizes the list. There should be no more than 10 to 12 factors. The list is documented and finalized together with all participants.

The workshop is completed with this list. The scenario team then has the task of defining the content of these key factors and sending them to the participants in preparation for the next workshop.

Table 6: Moderation Guide Workshop 1

Goal	Tasks	Tools & Result	Time (recommendations)
Welcome, Warm-Up & Agenda	• Welcome by the moderator • Introduction of participants and getting to know each other through activating questions, e.g. "What is particularly important to you personally for an inclusive mobility system? • Presentation of the objectives of the 1st workshop and agenda	• Generally double moderation: speaker and documentation • Moderator writes down important keywords from the introductory round on the pinboard. • Awareness-raising influencing factors (IF): • The first collection of possible IF as loose collection of keywords	20 mins
The objective of the scenario process	Presentation of the method, implementation road map, and possible result formats (strategy, policy recommendation, projects)	Determination of results: vision, strategy, policy recommendations ...	20 mins
Situation analysis - Problem definition	• Input from the scenario team: presentation based on "Preparing situation analysis". • Facilitated discussion with a handout with summary for working groups	• Awareness influential factors • the first collection of possible IF • Keywords or topics on a flipchart or as a loose collection of keywords on the whiteboard	30 – 45 mins
Collecting the influencing factors	• in working groups and thematically according to the STEEP method • with handout and briefing (time, task, organization, documentation)	• Explanation of the heuristic principle (STEEP) • Grouping (beforehand) according to the STEEP approach • 2 topics per group - group size 3-4	90 mins

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	• Open and individual brainstorming • Securing results Brainstorming on pinboard + order + condensation and documentation	• Question: What do I have to consider from the field of technology/economy/politics etc. when thinking about inclusive mobility?	
Lunch Break			45-60 mins
Collecting and listing Ifs	Collection on flipchart Relating the factors	• in plenary • each group presents results/IF • Questions of understanding are discussed	60 mins
Coffee Break	Scenario Team arranges and clarifies the pinboard in terms of preparation for the assessment		10-15 mins
Evaluating influencing factors	• Relating the factors and weighting them • Identify the 10-12 key factors according to the following criteria: - Effect on the system - Effect through the system - Uncertainty	Moderator explains key drivers Participants rate with the help of 10 adhesive dots, 1-2 points per SF in the plenum	30 mins
Determination of key drivers	• Presentation of the voting result • Selection of the undisputed SF • Discussion of the others • Determination of the final list SF	Develop a final list of key drivers on a flipchart	45 mins
Conclusion and outlook	• Acknowledgment for commitment • What has been achieved = results secured • Explanation of further steps (elaboration of key factors + documentation + distribution to participants) and next workshop	Homework = writing down the key drivers by scenario team (collection of influencing factors, the definition of key drivers and expression for the pilot)	15 mins

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Table 7: Checklist Workshop 1

Goal	Checklist question	Checkbox
Workshop preparation		
Invitations and information participants	Are all relevant participants invited? Do the participants have all the necessary information and materials?	☐ ☐
Operational preparation	Are the rooms prepared and equipped? Is the catering organized?	☐ ☐
Methodical preparation	Are the workshop agenda, presentations, and supporting materials ready?	☐
Implementation		
Opening	Did everyone get to know each other? Has the task been understood? Are the expectations adequately clarified?	☐ ☐ ☐
Method and results	Could a common understanding of the method be reached? Has an agreement been reached on the results format?	☐ ☐
Situation analysis	Is the scope of the process defined?	☐
Influential factors	Were the groups formed according to topics? Have all the factors been clarified? Are there any factors missing?	☐ ☐ ☐
Key factors	Is the list of key factors sufficient and appropriate to the problem? Are the key factors clearly defined?	☐ ☐
Post-processing		
Documentation	Are all results of the workshop documented so that the next steps can be organized on this basis?	☐
Other tasks		

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Between the workshops

Workshop follow-up: All notes and documentation from the workshop must be in writing. This includes the expectations, the list of influencing factors, and, above all, the list of key factors. Any relevant comments beyond these should also be documented. For the digital variant, session has to be recorded and the comments from the chat have to be saved.

The central **outcome** of the first workshop is a list of 10 to12 weighted and evaluated key drivers. These must be documented properly. The aim is to compile a list of key drivers that are described as concretely as possible. In addition to a detailed description of the key factors, the preconditions for the individual key factors as well as relations with other key factors should be defined. IZT will provide a template for a Power-Point-Presentation to enable comparability between the pilots.

For the project's internal communication towards the European Commission, we need this list in English. For the communication with the participants of the workshop as well as possible dissemination to other stakeholders, a version in the native language of the pilots is recommended.

This template can then be sent to the participants together with the invitation to the next workshop.

Common evaluation of the workshop: The scenario team and the IZT team will discuss and evaluate the workshop afterward. The evaluation will inquire about how the workshop went in general – e.g. concerning the preparation by the IZT or the content, process, outcome of the workshop - and what problems may have arisen during the workshop.

These questions have yet to be determined. Once the first workshop is over, the IZT will contact the scenario team on an individual basis, as this evaluation task happens pilot-specific.

Elaboration and backing up of the key factors: The list of key factors is only a collection of titles and keywords. For further use, the factors must be backed up with definitions and region-specific data. This is the task of the scenario team. This does not mean that the team has to do it alone, but it has to organize this process. In the end, there should be one to two pages or slides per key factor. The compilation of the elaborations is the preparation for the next workshop and the document must be sent with the invitation to the participants.

Preparation of workshop 2: For the preparation of a scenario workshop, a distinction can be made between content-related and organizational preparation tasks. The content objectives as well as the description of the tasks and outcomes are included in these

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guidelines. Concerning the content, any open questions should be discussed with the IZT at an early stage. Furthermore, the workshop must be thoroughly prepared by the scenario team.

Set place and time: The place and time of the workshop must be selected and fixed at an early stage. Requirements for the location are:

- good accessibility of the venue,
- accessibility
- sufficient room size for the workshop,
- if necessary, additional rooms for working groups,
- catering with a snack and drinks should be possible on site.

Prepare a presentation: The central tool during the workshop will be a PowerPoint presentation. This should first contain an overview of the workshop agenda and describe the central tasks so that they can be easily seen during the group work. For the second workshop, the presentation should also include content information on the following items:

- Agenda and objectives of the workshop
- Presentation of key drivers
- Task description on how to develop the projections
- Optionally an example for the morphological box (better directly on the pinboard)
- Task description on how to merge the projections
- Task description on how to develop the raw scenarios
- Outlook and next steps

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Table 8: Checklist Post- and Pre-Processing Workshop 1and 2

Goal	Checklist question	Checkbox
Workshop follow-up	**Did we prepare the follow-up of the workshop (one version in English, one in the native language)?**	☐
Workshop evaluation	**Did we evaluate the workshop?**	☐
Key factors	**Are all key factors defined and qualified and has the material been sent to the participants?**	☐
Preparation of workshop 2	**Did we set the time for the workshop?**	☐
	Did we book a room?	☐
	Did we prepare info material for the invitation?	☐
	Did we send an invitation with the agenda?	☐
	Did we prepare the presentation?	☐

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2.2.2 Workshop 2: Identification of key drivers and scenario development

Objectives of the workshop:

- explorative goal: analysis of the future developments for an inclusive digitally based mobility system
- communicative goal: deepening of discourse and involvement of participants
- strategic goal: development of future scenarios
- Projection development
- Definition raw scenarios

Leading questions:

- What future system states can the key factors assume?
- Which possible scenarios are thinkable?

In the first workshop, the central challenges of the mobility ecosystems concerning inclusivity were discussed. At the end of the workshop, these 10 to 12 key drivers were identified, clearly defined, and compiled in a list. The aim of this workshop is now to develop different projections for the future of mobility systems based on these influencing factors. At least two different developments are to be derived for each key driver. These developments represent the conceivable different specifications of the key factors in the period under consideration and must be differentiated from each other.

In a second step, the different developments will be compiled into coherent **raw scenarios**. The raw scenarios form the basis for the scenarios. The central result and tool for the compilation is a morphological box in which the developments are connected via lines.

Projection of key factors

Welcome, warm-up & objective, and agenda: The workshop begins with a welcome to the participants and the introduction of the scenario team. This step aims to make it easier for participants to get started and to encourage broad and active participation. If new participants have joined the second workshop, all participants introduce themselves again. It often lowers the inhibition threshold for participants to actively participate during

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the workshop if the introduction round is followed by an ice breaker question (look for examples in chapter 2.2.1).

Another aim of this step is to set the expectation for today's workshop day by stating the objectives and key tasks for today. The aim is to create a relaxed atmosphere, to get the participants used to the moderation, and to provide a relaxed introduction to the joint work. The tool for this step is a presentation.

Presentation of key drivers: From the first phase of the workshop we can move smoothly into the second phase. Now, the key drivers from the last workshop will be presented again. The key drivers are the starting point for today's workshop and the next steps because the projections will be developed based on them. As the first workshop probably took place a few weeks ago, it is important to reactivate the memory of all key drivers and to keep them visually present as a basis for the next step.

There is no need for extra work, as the base for this step is the output of the last workshop, the list with the clearly defined key drivers. After the presentation of the key drivers, the participants are invited to share their reflections about the chosen key drivers and to add supplementary points that came to their mind during the workshops. The aim is to reactivate the memory. The tool for this step is a presentation. There is no need for a whole new presentation, but the presentation for the welcome and the description of the agenda can be supplemented by 1 or 2 additional slides.

Develop projections in small groups (3-4 persons):

In this step, different future specifications are identified for the key factors. For this step, the participants are divided into small groups. Each group should work on 3 key drivers and develop at least 2 characteristics for each key driver. The guiding question for the group work is:

- What different developments can the selected key factors take?

It is pointed out by the moderation that not the most probable developments but the whole spectrum of possible developments should be discussed.

Simple pairs of opposites such as positive or negative change - law or no law - are obvious for the characteristics. The facilitator should suggest that intermediate levels and concretizations are also worked out, which could lie between these two poles. Blanket statements such as "more" or "less", "large" and "small" should be avoided. To obtain good scenarios later, we need a broad and aspect-specific spectrum of possible developments of the key factors (see Meyer et al. 2009)

The moderator explains that each suggestion for development should be recorded on a card with a keyword. In the next step, the cards should be presented to the plenary and pinned to the respective key factor on the whiteboard.

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The task can be illustrated by an example that is worked on together in the group. A prepared blackboard contains the selected key factors in a left-hand column. The specifications should be inserted in the rows that are therefore still empty.

To start with, the moderator could select a key factor and ask the participants in the plenary session how the key factor could develop. Based on the answer, the moderator highlights again and makes sure that the specifications are already formulated in a very concrete and action-oriented way to develop good scenarios. Optionally, other participants name and write down further information that underpins this keyword (reason, conclusion, etc.).

The example that has already been discussed in the plenary can still be used in group work. It can be supplemented with the indication that the participants may think of further points or the points already mentioned can be specified.

Example for qualified projections:

Exemplary key driver: Design of the regulatory framework Development 1: One possible development could be the design of a strictly economically oriented set of rules that enables service providers to offer their services extensively. regardless of the needs of the different population groups Development 2: Another possible future path for the legal framework is the design of a political roadmap which provides the step-by-step alignment of the regulatory framework with the criteria of sustainable mobility, with special consideration of social inclusivity, over the next 15 years. The regulations are also designed to be integrative. Different administrative units and regulatory offices are oriented towards a common goal.

Before the group work starts, the participants receive a handout on which the individual factors are listed in the columns, just like on the wall. The facilitator divides the group into small groups and assigns 3 key factors to each small group or lets every group chooses its preferred key drivers. He or she asks the small groups to write the respective characteristics in the lines of the handout.

The moderator also asks the participants to start the group work with an individual brainstorming phase of 5-10 minutes and to note every idea on an index card. The moderator explains that during the brainstorming phase, people have the time to take a coffee or relax for a couple of minutes. This helps the participants to relax and clear their minds for the brainstorming. He or she then distributes enough index cards for individual brainstorming and the collection of ideas. The group members begin the group work with

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individual brainstorming and note their ideas on cards. After the brainstorming, the group members explain their ideas to the rest of the small group and then collaboratively develop a set of coherent specifications.

The collection of specifications is mentally challenging and needs a lot of cognitive resources. It is therefore advisory, to have a lunch break after this step, where the participants have enough time to recreate.

This step aims to describe several specifications for each key driver in small groups. The moderator should explain the exact process of the group work and create a slide within the presentation, which outlines each step of the group work and remains visible to all during the group work. For the group work, index cards and pens, as well as a handout with the key drivers in the columns and enough spare spaces in the lines, are also necessary.

The next step is to present the specifications to the rest of the group in the plenary and to collect them on the pinboard to form a morphological box. At first, the small groups or a representative of the small group presents the characteristics of the key drivers in plenary and adds them to the pinboard in the corresponding lines. If participants from other small groups have alternative ideas or additions, they are invited to mention them.

This step aims to build a morphological box that combines the developments to a coherent set or several sets of key drivers. The collection of different developments of the key drivers will take place in the plenary. For the presentation of the specifications, a pinboard and pins are needed.

This task will also take some time and energy; therefore, a small coffee break is advisory before the next task will be followed. If needed, the moderation can use the coffee break before this step to arrange the index cards neatly and orderly on the pin board. A spare space next to the morphological box can be used to pin the specifications that will not be used any further.

Building raw scenarios

This step aims to combine the specifications to a set or several sets of coherent projections that form the basic structure for the scenarios. Therefore, the specifications that have been collected on the pin board, will be divided into coherent groups of characteristics in this step. In sum, **2 to 3 raw basic scenarios** should be developed.

Participants have a completed morphological box in front of them with the key factors and projections (see Table 4). The task now is to combine reasonable and consistent combinations from the projections into raw scenarios. This requires skill and a structured approach from the moderator. A discussion about possible combinations will arise. Questions about consistency will arise. Since a consistency analysis cannot be performed

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here due to time constraints, the combinations of projections must be validated communicatively.

Another goal for this step is to describe the effects of the characteristics concerning the mobility system and inclusivity. This means questioning the conditions and consequences of the respective characteristics and looking at the connections between the characteristics of different key factors. At the end of the group discussion, titles for the respective raw scenarios can be determined together.

These steps are discussed in the plenary. The guiding questions to the participants are:

- Which characteristics of the projections belong together or make sense together?
- Are there dependencies between the specifications of different key factors and their projections?
- How do these connections affect the inclusivity of the mobility system?

Matching specifications are connected by the moderation with a line in the morphological box on the pin board. Not all specifications may fit into already developed clusters. These characteristics are put aside and not considered further.

This step aims to combine coherently matching characteristics of the key factors into raw scenarios. The most important tool for this step is the pin board. The moderation will need a pen to connect the specifications with a line.

Conclusion and outlook: The last step is to summarize the workshop, highlight the results, and give an outlook for the next steps and the next workshop. The moderation should review the day in a few points and summarize the most important steps. The most important output of the workshop is the basic scenarios that have been developed during the day. The 2 to 3 scenarios should therefore be reproduced as well in a few words.

The scenario team can then give an outlook over the work that will happen between the workshops by the scenario team and the IZT. If already agreed on, the scenario team can announce or recall the date for the next workshop and explain, in a nutshell, what the third workshop aims to achieve.

The following agenda is an example of a preferable workshop agenda and describes the tasks and results of each step, as well as the tools that are needed for each phase. The workshop is divided into 6 different steps. The different phases and the corresponding tasks will be explained after this table.

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Table 9: Moderation Guide Workshop 2

Goal	Tasks	Tools & Result	Time
Welcome, warm-up & objective and agenda	Introduction of the workshops targets' and encourage a broad and active participation Introduce participants to the agenda and objectives of the workshop	• Presentation • Result: Participants know the schedule and the objectives of the day.	10 mins
Presentation of key drivers	• reactivate memory • add new points	Presentation	30 mins
Develop projections	• Explain how to develop projections • Explain with an example in the plenary • Form small groups of 3-4 people • Explain task: work on 3 key drivers per group and develop at least 2 specifications per key drivers	• Presentation • Handout with morphological box • Result: participants understood the task and can start the group work	10 – 15 mins
Group work	• Brainstorming individually • Developing at least 2 specifications per key driver	• Presentation: slide with task description • Index cards for collecting the ideas on the specifications and to secure documentation • Result: specifications on index cards	90 min
Lunch Break			45-60 mins
Merge projections	Building a morphological box by assigning the projections to the key drivers	• Moderated discussion in the plenary • Pinboard with key drivers in columns • Result: morphological box with at least 2 specifications per key drivers and coherent combination of specifications	60-90 mins
Coffee Break			10 mins
Scenario development	Development of 2-3 basic scenarios by combining the specifications in the morphological box	• Moderated discussion in the plenary • Result: 2-3 basic scenarios	45 – 60 mins

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Conclusion and outlook	• Provide a summary of the day • Summarize and highlight results • Outlook over the next steps (documentation of the workshop and next workshop)		10 mins

Table 10: Checklist Workshop 2

Goal	Checklist question	Checkbox
Welcome, warm-up & objective and agenda	**Did we welcome everyone?** **Did we tell you about the objective of today's workshop?** **Did we present the agenda for today?**	☐ ☐ ☐
Presentation of key drivers	**Did we present the key drivers that we gathered in the last workshop?**	☐
Develop projections in small groups (3-4 persons)	**Did the small groups develop projections?**	☐
Merging projections & building a morphological box	**Did we manage to merge the projections and build a morphological box?**	☐
Scenario development	**Did we combine the specifications to a set or several sets of coherent key drivers that form the basic structure for the scenarios?**	☐
Conclusion and outlook	**Did we summarise the workshop and highlighted the results?** **Did we give an outlook over the next workshop?** **Did we give an outlook over the work that will happen between the workshops?**	☐ ☐ ☐

Between the workshops

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Workshop follow-up: The workshop must be followed up by the scenario team. The central result is the morphological box with at least 2 specifications per key factor and at least 2 different combinations of coherently matching specifications. These results need to be must be properly summarized and processed. No extra work is needed, but the results that may have been recorded on index cards and the pin board during the workshop need to be digitized. Furthermore, the discussion about the specifications has to be aggregated. That means to insert the information about the relations, dependencies, prerequisites, and consequences between the specifications.

The follow-up documentation of the workshop serves two purposes:

- Summary of central results for the participants
- Documentation for the research team (IZT)

On the one hand, these documents can be sent to the participants after the workshop. They summarize the main content of the workshop and can be used as a memory aid to look up the special contents of the workshop. The participants are also free to use the documentation to foster internal processes in their organizations to engage in an inclusive mobility system, and they serve as a preparation for the 3rd workshop. It is probably helpful, to provide the participants a documentation version in your native language.

On the other hand, this documentation serves as the project documentation for the research team of DIGNITY. This documentation has to be in English.

Elaboration of the scenarios: After the basis for the scenarios was laid in the last workshop with the connection of coherent expressions, the scenarios must now be **formulated**. The scenarios will be created in a co-creative process between the pilot and the IZT according to the defined design criteria (Chapter 1.2).

The scenarios must be adapted in their concrete design to the regional challenges.

Here are some design notes:

- starting point: projection bundle and the backgrounds from the key factors and projections.
- include in the description also the influencing factors that are not used as key factors
- be simple, dramatic, and bold
- creatively open-ended, but comprehensible to third parties and reflective of the relevant projections
- present impacts on the regional mobility system

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- include aesthetic and affective elements
- consider iconography: future aesthetics
- directions on the timeline:
    - How does this scenario come about?
    - What steps, actions, and decisions lead to this scenario?

At the end of that effort, Illustrative and narrative stories describing different futures should be elaborated. When the scenarios are completed, they are sent to the workshop participants at least one week before the third workshop. The scenarios serve as a preparation and as a prelude to the final workshop, the derivation of policy action plans.

Preparation of Workshop 3: To prepare for the third workshop, the usual invitations and mailing of materials must be made. The scenarios that have been prepared are to be summarized in a handout with a blank slide for thoughts and notes. In addition to the presentation, the scenario team needs to come up with a clear approach on how to moderate the strategy finding and development process. In addition to the procedure, creative techniques must be found that support an open and collaborative strategy finding process.

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Table 11: Checklist: Post- and Pre-Processing Workshop 2 and 3

Goal	Checklist question	Checkbox
Workshop follow-up	Did we prepare the follow-up of the workshop (one version in English, one in my native language)?	☐
Workshop evaluation	Did we evaluate the workshop?	☐
Scenario development	Are the scenarios processed according to the quality criteria so that they serve as input for the 3rd workshop?	☐
Preparation of workshop 2	Did we set the time for the workshop? Did we book a room? Did we prepare info material for the invitation? Did we send an invitation with the agenda? Do we have an appropriate and smart plan for strategizing? Which creative techniques should be used? Did we prepare the presentation?	☐ ☐ ☐ ☐ ☐

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2.2.3 **Workshop 3: Mapping the future**

Objectives of the workshop:

- Derivation of action consequences
- Strategy development
- Process evaluation

Leading questions:

- What new insights were gained through the entire scenario process?
- What appropriate strategies can be developed in the context of the scenarios for the concrete problem of digitally inclusive mobility systems?
- What specific policy updates, priority initiatives, or other next steps result from the strategies?
- What are the learning results in the scenario project?

At this stage, the current regional challenges, as well as the key drivers and possible specifications for an inclusive mobility system in the future have been identified and the scenarios, which outline specific future paths have been developed and formulated.

This workshop aims to use the knowledge gathered throughout the process and derive **plans for policy action**. It is up to the scenario team to decide how concrete one would like to formulate the policy recommendation. Therefore, the team should now recall the target groups that want to address the scenarios. This helps to choose the right medium of communication for the target groups.

The team can decide whether one wants to create a vision, a strategy, a policy plan, or a roadmap. The vision is the least concrete whereas the roadmap is the most concrete medium. In the context of the DIGNITY project and the corresponding research agenda, the focus is on strategy development. At the end of the workshop, responsibilities, and homework should be defined. Because the third workshop is not the end of the process but is intended to initiate change at the policy level and pave the way towards an inclusive mobility system.

As before, the agenda is an example of a preferable workshop agenda and describes the tasks and results for each step, as well as the tools that are needed for each phase. The workshop is divided into 6 different steps. The different phases and the corresponding tasks will be explained after this table.

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Welcome, warm-Up & objective, and agenda: As in the previous workshop, the workshop begins with a welcome to the participants. The agenda and the objectives of the workshop are clarified and the special quality of the event is pointed out. As this is the last of the three workshops for scenario building, the scenario team should emphasize that the scenario process does not end with this workshop, but only heralds the beginning of the implementation phase. Further project involvement (e.g. upcoming workshops) can already be mentioned at the beginning of the introduction. It should also be pointed out that the next steps will be explained in more detail at the end of the day (conclusion and outlook). This point already leads on to the next task of the warm-up: explaining to the participants what tasks they can expect during the day and that the objective of today's workshop is at least to develop a vision or better to formulate policy recommendations.

This step aims to make it easier for participants to get started and to encourage broad and active participation. Another aim of this step is to set the expectation for today's workshop day by stating the objectives and key tasks for today. The tool for this step is a presentation.

Explanation of the output format: Since this workshop is the last of the three scenario building workshops, the scenario team should pick up on what has been done so far in the last two workshops. Present the initial situation of the pilot region and list the key challenges that have been identified. From the starting point, the transition can then be made to today's target point, the recommendations for action.

In preparation for this workshop, the scenario team has already formulated the exact format in which they want to develop the recommendations for action. The aim of the workshop can be to develop a strategy, a policy plan, or a roadmap. From left to right, the complexity and the degree of precision increase.

The tool for this step is again the presentation. If it is needed one can add some slides, presenting the results of the previous workshops (e.g. list of key drivers or the morphological box). Add a slide, explaining the method of choice for the output format of today's workshop and why and how you think to reach the target groups best.

Scenario presentation and discussion: The scenarios that the scenario team developed between the second and the third workshop will now be presented. The style of presentation can depend on how the scenarios are designed (e.g. story, picture, PowerPoint presentation). It should be secured that everyone understood the scenarios since they are the starting point for today's work. If you wrote a story, it could be advisable to record the most important points as embroidery points on a slide. If you designed a picture, people will easily remember the most important points, if the picture is visible during the whole workshop day. The tool depends on how one designed the scenarios. Everyone should have understood the scenarios, as they are the starting point for the policy recommendations.

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Develop an imagination of strategic implementations of the scenarios: Based on the previously presented scenarios the first round of ideas about strategic implementation should be collected. The scenario team should think about methods that can be used to stimulate the creativity of the participants.

This exercise can be contextualized and structured by using a vision of a digitally inclusive mobility system. What is a vision? A vision describes the guiding idea of desirable long-term development. Creating a vision supports long-term planning and helps to make the appropriate decisions today, which are missing from this vision. A vision enables more efficient use of resources and motivates stakeholders.

In a first step, these can be used to break away from the initial situation and develop a desirable picture of a mobility system of the future that offers access to all people. At this point, it should be explicitly worked out which vulnerable groups you would like to include and how this can be achieved. To ensure that the presentation does not remain on an abstract level, it is useful to develop partial visions for the individual areas of the STEEP scheme: politics, economy, society, technology, ecology, and legislation.

In a second step, you can brainstorm together how this vision is linked to the initial situation in the pilot region and its specific challenges. This second step does not have to be very detailed yet, only first thoughts about it should be exchanged here. The detailed elaboration of the steps necessary to implement the vision will be done in the next step.

The vision should be documented in sketch points for each factor of the STEEP analysis. You can think about suitable creative methods in preparation for the workshop. Accordingly, the result of this step may include a drawing or similar in addition to the bullet points.

Strategy development: Based on the previous steps, the knowledge gained is now consolidated into strategic considerations. It cannot be expected in this workshop that formulated and consistent strategies will be developed. But the foundation stone can be laid in the workshop. A *strategy* entails creating an idea about concrete goals and roadmaps to achieve the goals. Therefore, the discussion must return to the familiar questions and issues. What is a goal? Which steps do you think are necessary to build an inclusive mobility system.

Strategies are not rigid instruments but have to be flexible and constantly tested for robustness. Their future and environment orientation always include uncertainty and changing conditions. At the same time, they should be action-oriented and, above all, motivate members. Strategies should not be supported by a select group at a higher level of the hierarchy, but by as many members of a company as possible. Ultimately,

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strategies have an expectation-structuring effect. They enable options for action and responsiveness by having a binding effect.

Formally, strategies consist of the following elements (Mintzberg, 1992):

- Plan - Targeted path - According to the goal, a concrete guideline of action must be established. This guideline must be controlled and also define liabilities and responsibilities. A possible operationalization is a roadmap that contains milestones and directional instructions.
- Position - Positioning in the environment - Strategies are structurally coupled with various environments and contexts. Therefore, they have to position themselves thematically and procedurally in these. From a simplified marketing perspective, we can also speak of a Unique Selling Proposition (USP).
- Perspective - Perspective of the actors and institutions - The perspective refers to the perception patterns of the actors and institutions involved. At this point, scenarios can intervene and alternatively vary the patterns of perception, thus providing the actors with a broader field of vision.
- Pattern - Patterns of action - In addition to the structured and planned approach, the how of the approach must also be determined. Patterns of action are recognizable and attributable. A pattern can be integrative, collaborative, or competitive. A deliberative pattern is recommended concerning the issue at hand.
- Ploy - Tactical trick - This element may not come into play as strongly here. Strategy as a move. This notion of strategy is used when competing against rivals and the tactical manoeuvres involved.

Once again, the scenarios themselves are not strategies but possible future constellations of systems. The central guiding question of the procedure is: What strategic consequences can be derived from the scenarios? For this purpose, the scenarios can be processed sequentially, i.e. individually, or altogether. The scenarios allow for the integration of different perspectives and thus support the strengthening of the robustness of strategies. Practically, this multi-perspectivity can be developed by mapping the above-mentioned elements (5Ps) in their qualified form in a matrix with the scenarios (Figure 5). For each scenario, you can then play through how the individual elements perform and interact in that scenario. At the end of this process, a relative estimate can be made of how the strategy elements must be to hold up in the scenarios. Then we can speak of robust strategies. Robustness is a relevant criterion for evaluating alternative decision options.

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Figure 5: Strategy matrix

Elements of strategy	Scenario 1	Scenario 2	Scenario 3
Plan			
Position			
Perspective			
Pattern			
Ploy			

Source: IZT

However, a backward analysis can also be performed: Strategy elements and decisions go through test runs with corresponding plans in different scenarios.

In any case, the strategic insights, elements, or components gained from the group discussion must be documented and displayed in the room in a way that is visible to all participants. They will always be the subject of discussion.

Once again, the scenarios can be used together or individually as a discussion space of the future. Participants must try to put themselves in the scenarios and work out challenges, opportunities, and risks.

Develop recommendations for action: Having developed strategy implications of a desirable mobility system in the previous step, the aim now is to work out what is needed to achieve this step. There are various options that you can pursue. Depending on the target group of your scenarios, you can decide whether at this point you want to:

a) formulate policy recommendations;
b) define further projects and implementation steps;
c) develop a roadmap that specifies the steps to be taken and by when

Policy recommendations can either describe an additional law or work on the existing legal text with proposed amendments to individual paragraphs. They may also include the establishment of an institution or the appointment of a responsible person in policy departments.

Examples for follow-up steps in option b are: creating a campaign or a project, building an institution or a working group, developing a mission statement, or a voluntary self-commitment for institutions. The next step would be to define how exactly this step is to be designed to reach the target group.

Option c, developing a *roadmap*, contains both a strategy and concrete steps, e.g. by when which laws should be passed or institutions established. Developing a roadmap is

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also the most time-consuming and complex, as it requires a good understanding of the initial situation in the individual STEEP areas.

In any case, all three options should be recorded in writing. Depending on which of the three variants you decide on in advance, you can also prepare the workshop in more detail and, if necessary, make sure that the legal text is available to everyone or something similar.

Conclusion and outlook: The goal of this step is to summarize the workshop, highlight the results, and give an outlook for the next steps. The moderation should review the day in a few points and summarize the most important steps. The most important output of the workshop is the policy recommendations that have been developed during the day.

If already agreed on, the scenario team can announce the date for the follow-up workshops. These are additional and voluntary workshops that can also extend beyond the project's initial duration. To place the scenario workshops in the project context, the scenario team can also emphasize that the developed scenarios and policy recommendations at the macro level provide the framework for the upcoming inclusive design wheel workshops.

The scenario process does not end with this workshop. It may still be necessary to finalize the scenarios or to complete the documentation. But in any case, the strategies need to be further developed and documented. Steps need to be defined on how to bring the strategies to life and how to make them effective institutionally and among stakeholders. On the one hand, this will be ensured by the subsequent steps in the DIGNITY project, but also beyond that, steps need to be agreed upon to drive the process forward.

Time should also be taken to evaluate the overall process. The instructions from 3.2 can be used for this purpose. For this step, the documented expectations from the first workshop can be shown again and compared. It is important to maintain the involvement and commitment for the next steps.

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Tabel 12: Moderation Guide Workshop 3

Goal	Tasks	Tools & Result	Time
Welcome, warm-Up & objective, and agenda	• Introduction of the workshops targets' and encourage a broad and active participation • Introduce participants to the agenda and objectives	• Presentation by the scenario team • Result: Participants know the schedule and the objectives of the day.	10 mins
Explanation of the output format	• Recapitulation of the scenario process • Specify and explain your result format (strategy, policy plan, roadmap) and how and why you can best reach your target group with it	• Presentation by the scenario team • Optionally, a slide with results of the 1st or 2nd workshop • Slide with an explanation of your method of choice • Result: Participants understand the output format	35 mins
Scenario presentation and discussion	Securing and assessing understanding	• Presentation • Result: Participants understand the scenarios	45 mins
Lunch Break			45-60 mins
Strategic implementations of the scenarios	Develop a vision of an inclusive mobility ecosystem with temporality, target image + link back to initial problem	• in the plenary • at a round table • Brainstorming with the scenarios • Result: develop a draft with key points	30 mins
Coffee break			
Strategy development	• Elaboration of strategic elements for the development of a digitally inclusive mobility system.	• optional in the whole group or working group and subsequent plenary session	60 mins
Develop Recommendations for action	• What has to be done according to the starting point and problem situation? • Develop concrete product ideas (campaign, project, institution, working group, mission statement, roadmap ...)	• Open discussion in the plenary to set homework and define responsibilities • Result: develop and document recommendations for action	60 mins

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Conclusion and outlook	• Overall Résumé of the process • Feedback Process • Next steps in the DIGNITY project and Pilots	• Openly moderated discussion, which is documented • Evaluation	15-20 mins

Table 13: Checklist Workshop 3

Goal	Checklist question	Checkbox
Welcome, warm-Up & objective, and agenda	**Did we welcome everyone?**	☐
	Did we tell everyone about the objective of today's workshop?	☐
	Did we present the agenda for today?	☐
Explanation of the output format	**Did we recapitulate the scenario process?**	☐
	Did we specify and explain our result format (strategy, policy plan, roadmap) and how and why we can best reach your target group with it?	☐
Scenario presentation and discussion	**Did we present the scenarios?**	☐
	Did everyone understand the scenarios?	☐
	Did we develop and formulate a common goal for an inclusive mobility system?	☐
Strategy development	**Has it been made sufficiently transparent what a strategy is? (Elements)**	☐
	Has a relevant selection of creative methods been chosen?	☐
Develop Recommendations for action	**Did we develop recommendations for action?**	☐
	What is our concrete product idea?	☐
Conclusion and outlook	**Did we summarise the workshop and highlighted the results?**	☐
	Did we gather feedback from the participants?	☐
	Did we give an outlook over the work that will happen after the workshop?	☐
	Have further steps and responsibilities been defined?	☐

After the last workshop

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Workshop follow-up

The results of the workshop have to be properly summarized and processed. The central results are the policy recommendations, the strategy, or the roadmap. Again, it is important to have an English document for the internal project evaluation and one in the native language that you can hand out as a workshop follow-up to the participants and the target groups.

The result should be presented clearly and concisely and should also show homework and responsibilities.

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3. Evaluation

The evaluation of the scenario development is divided into three steps. (1) All scenarios will be compared. The comparative step aims at similarities and differences between the scenarios. Regardless of the specific problems in the pilot regions, they all have a common goal that the scenario process should support: digitally inclusive mobility ecosystems. (2) The scenarios and the scenario process will be evaluated according to scientific quality criteria. (3) The evaluation will be integrated into the process of DIGNITY and specified independence of other process steps and methods.

3.1 *Comparison of scenarios and policies*

According to a comparative design (Ragin, 1989), the individual process steps of the scenario processes (influencing factors, key factors, and projections) are systematically compared and evaluated concerning similarities and differences. This step aims to derive recommendations that can be generalized to other users of the method. The analytical goal is to identify components and factors that are relevant for a digitally inclusive mobility system in Europe.

3.2 *Process and result evaluation*

The evaluation of the results and the process of scenario development is organized in two steps and levels: the outcome and the process evaluation. The outcome or result evaluation refers to the quality and form of the scenarios. For this purpose, - verified criteria for the evaluation of the scenarios are being used.

The objective of the process evaluation is the quality and effects of the overall scenario development, including guidance and support. The process evaluation can be conducted during the entire process or after the scenario development has been completed. The focus is not on controlling the process or the time and budget plan. The degree to which the functions of the scenarios are fulfilled is evaluated.

Outcome evaluation: scenario evaluation

The degree of complexity of the assessment varies at this level. A basic assessment only focuses on the final scenarios. An extended assessment includes the key factors and the projections in the evaluation. We recommend the basic variant for pragmatic reasons.

Scenarios can be evaluated according to the following criteria (basic evaluation)(Chermack 2011, Lindgren/Bandold 2009):

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- Operationalization - scenario quality assessment (evaluation of every single scenario):
    - Design: title and memorability
    - Story: relevance and plausibility of the story
    - Empathy: Does the scenario affect target groups?
    - Play: How well is the scenario designed for further creative activities?
    - Meaning: Does the content of the scenario allow for strategic variations and possibilities?
- Alternativeness: The scenarios must be different (mutually exclusive). Their differences must not only be gradual in some aspects but must be clearly distinguished from each other.
- Consistency: The scenarios must be without logical contradictions.
- Plausibility: This is not about probabilities but about the scenarios being plausible, understandable, convincing, possible, and reasonable.
- Transparency: Besides the presentation of all assumptions and variables, the aspect of understanding by others who did not participate in the process is meant.
- Challenge: The criterion denotes the degree of challenge for organizations and actors in terms of future perspectives and possibilities.

The evaluation based on these criteria can be carried out with the help of scaled checklists and by those involved in the process as well as the target audience.

Process evaluation:

The concrete outputs of the scenario process are evaluated in the first step. The process evaluation is dedicated to the effects of the entire development process and examines the implementation of the communicative and strategic scenario functions. Specifically, the actors involved are asked to what extent the process has helped them in their strategic orientation.

The following questions are relevant and the basis for a questionnaire:

- Did the scenario process help you to get a deeper and better understanding of the own mobility ecosystem?
- Has the process sharpened the understanding of the problem?
- Has the process led to the emergence of previously less relevant variables and relations as well as new perspectives on the topic?
- Did you learn anything from other actors or stakeholders through the process? If so, what?

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- To what extent has the process led to the development of relevant tools, policy recommendations or strategies for a digitally inclusive mobility system?
- To what extent do you feel empowered by the process to manage future planning challenges and tasks.
- How satisfied were you with the quality of assistance and support provided by the research team?

The answers can be scaled as well as give space for qualitative comments.

3.3 *Project integration: processing the results and DIGNITY follow-up steps*

The integration of the results into the overall DIGNITY process and the concrete connections to other process steps and methodologies only emerge in the course of the DIGNITY process. In any case, the scenarios can be used as contexts for the design wheel process. The systemic representation of the specific mobility systems can support the development and design of specific applications.

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