YRAM Monitoring Guidance user manual

For the planners who dare to care

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1. Introduction

1.1 Purpose and objective of the toolkit component

The YRAM Monitoring Guidance is designed to assist public authorities in effectively monitoring active mobility and evaluating the impact of various interventions. This guidance focuses on identifying the necessary data required to estimate key performance indicators (KPIs) and methodologies for assessing these KPIs. KPIs are quantifiable metrics used to track progress towards specific active mobility objectives. They provide data-driven insights into the effectiveness of various interventions, enabling evidence-based decision-making. The data and methods are essential for tracking progress, facilitating evidence-based decision-making regarding future strategies, and fostering support from external stakeholders, including policymakers, in selecting effective solutions. Additionally, the Monitoring Guidance includes recommendations for monitoring urban experiments aimed at enhancing year-round active mobility.

The YRAM Monitoring Guidance aligns directly with the goals and structure of the BATS toolkit as follows:

- The Monitoring Guidance directly supports the BATS toolkit's aim to aid in the diagnostics of challenges preventing higher levels of YRAM and the development of intervention packages. The guidance provides the crucial monitoring aspect, allowing for evaluation of intervention effectiveness, which directly informs the development and selection of future interventions.

- The Monitoring Guidance emphasize the use of KPIs for evaluating interventions. The Guidance details KPI selection and assessment methodologies, a key component that would inform and be informed by the BATS toolkit's intervention evaluation module.

- Document strongly advocate for evidence-based decision-making. The Monitoring Guidance provides the framework for collecting and analysing data to support this, thus directly feeding into the decision-support aspect inherent in the BATS toolkit.

- The Monitoring Guidance explicitly targets city officials responsible for planning and implementing YRAM initiatives. This is the same primary user group identified in the BATS toolkit,.

- The mentioned use of multi-criteria methods and tools in the Guidance echoes the need for comprehensive evaluation present in the BATS toolkit’s intervention evaluation and packaging modules. Both aim to provide a structured approach for comparing the effectiveness of various solutions.

In essence, the YRAM Monitoring Guidance can be viewed as a crucial complementary document to the BATS toolkit. It provides the practical, data-driven methodology needed to assess the effectiveness of the interventions identified and developed using the BATS framework, closing the loop on diagnostics, intervention, and outcome evaluation. The combination enhances the overall impact of the BATS toolkit by providing a clear path for data-driven improvement and refinement of YRAM strategies.

The Diagnostics-Interventions Toolkit focuses on planning and implementing interventions to promote YRAM. It provides tools and frameworks for:

- Identifying challenges to YRAM.
- Designing and selecting appropriate interventions.
- Evaluating the effectiveness of those interventions.

The YRAM Monitoring Guidance focuses on measuring the impact of those interventions. It provides guidance on:

- Defining key performance indicators (KPIs).
- Collecting and managing relevant data.
- Analyzing the data to assess the success of interventions.
- Adapting strategies based on monitoring results.

In essence: The toolkit helps decide what to do, and the monitoring guidance helps measure whether it worked. They are two distinct but interconnected phases of a continuous improvement cycle for promoting year-round active mobility.

The YRAM Monitoring Guidance assists the BATS Citizen Activation Guide (CAG) by providing a structured framework for evaluating the effectiveness of YRAM initiatives:

- The Monitoring Guidance emphasizes data-driven decision-making, providing methods for selecting Key Performance Indicators (KPIs), collecting relevant data, and analysing results. This complements the CAG by offering a way to measure the success of citizen engagement strategies and the overall impact of YRAM initiatives. The CAG focuses on how to engage citizens, while the Monitoring Guidance focuses on measuring the results of that engagement.

- The Monitoring Guidance directly addresses common challenges in collecting active mobility data, such as resource limitations, inconsistent data collection methods, and the influence of weather and lighting. It provides practical recommendations for overcoming these challenges, ensuring that the data collected for evaluating the CAG's effectiveness is reliable and useful.

- Both documents employ a multi-phased approach, with the Monitoring Guidance outlining a process that includes planning, implementation, evaluation, and ongoing monitoring. This phased approach allows for continuous improvement and adaptation of strategies based on real-world data and feedback. The CAG lays the groundwork for the implementation phase, and the Monitoring Guidance provides the structure for evaluating its long-term impacts.

- The Monitoring Guidance provides guidance on combining data from various sources (city databases, surveys, sensor networks) for comprehensive analysis. This is important for evaluating the effectiveness of YRAM initiatives supported by the CAG, as it allows for a more holistic understanding of their impact.

- The Monitoring Guidance supports iterative refinement of YRAM initiatives through continuous monitoring and data analysis. This allows for ongoing adaptation and improvement of strategies based on real-world results and feedback, ensuring the effectiveness of the interventions supported by the CAG.

In short, the Monitoring Guidance provides the essential evaluation and measurement component to the CAG's citizen engagement strategies, making the overall YRAM initiative more effective and data-driven. The CAG outlines what to do (engage citizens), and the Monitoring Guidance outlines how to measure the impact of those actions.

Monitoring active mobility under various weather and lighting conditions will help identify key areas of interest and specific urban locations that require intervention. For this purpose, KPIs and their assessment methods described in the Monitoring Guidance can be used. This information is vital for developing strategies, plans, and action programs aimed at increasing the share of active mobility in daily travel within the modal split. The guidelines will also simplify the decision-making process for selecting appropriate interventions by providing multi-criteria methods, tools, and indicators for performance evaluation based on expected and comparable key performance indicators. Ultimately, the primary goal of monitoring should be to support informed decision-making at the local level by linking various community objectives to the measurable outcomes of active mobility initiatives.

The Monitoring Guidance provides a detailed account of the process to support city officials responsible for planning measures, experiments, and interventions aimed at enhancing the role of active mobility in the daily lives of residents. The document offers essential tools and strategies that assist in identifying the most effective variants of these experiments.

Specifically, the Monitoring Guidance focuses on assessing the effectiveness of such measures, which is crucial to their success. This process includes the selection of appropriate research methods and data sources that facilitate the collection and analysis of information regarding the effectiveness of interventions. Additionally, an important aspect is the definition of relevant performance indicators (KPIs) that allow for the evaluation of progress and the impacts of implemented measures.

By supporting city officials in this regard, the Monitoring Guidance contributes to more informed and evidence-based decision-making, ultimately leading to improved planning and coordination of initiatives promoting active mobility in urban areas. This, in turn, enhances resident engagement in urban processes and increases their acceptance of the changes being introduced.

1.2 The role of Monitoring Guidance in supporting YRAM objectives

The Monitoring Guidance directly addresses YRAM (year-round active mobility) objectives by providing a framework for comprehensive monitoring that accounts for the influence of varying weather and lighting conditions. This is crucial for understanding the true impact of active mobility interventions throughout the year, not just during optimal conditions.

The indicator selection tool, as demonstrated in the provided Excel table (**Appendix 1**), plays a key role in this process. It explicitly guides the identification of KPIs sensitive to weather and lighting, ensuring that the monitoring program captures the full range of operational conditions. This targeted approach allows for a more nuanced and accurate assessment of active mobility initiatives, leading to more effective strategies for enhancing year-round usage. The guidance further outlines a tailored monitoring process, detailing how data collection and analysis should be adapted to accommodate these variable conditions. This ensures that any observed effects are not merely artefacts of favourable weather but reflect the genuine effectiveness of the interventions under diverse real-world scenarios. The methodology outlined ensures that the evaluation of active mobility isn't limited to idealized circumstances, contributing significantly to the creation of truly year-round sustainable and effective active mobility solutions.

1.3 Relevance for the target groups

The Monitoring Guidance offers significant relevance to various professionals within local public authorities, primarily **planners and mobility managers**, by providing a practical framework for improving active mobility initiatives. The following sections detail the advantages for each target group:

1. **Decision-Makers**: The guidelines equip decision-makers with the necessary data-driven insights to make informed choices regarding active mobility investments. The structured approach to KPI selection and data collection ensures that decisions are based on concrete evidence of the effectiveness of various interventions, rather than intuition or anecdotal information. This leads to more effective allocation of resources and a greater return on investment in active mobility projects.

2. **Traffic Managers & Mobility Managers**: The guidelines provide traffic managers with the tools to develop effective infrastructure and traffic control programs that prioritize active mobility. The detailed process for identifying suitable intervention locations and modes, grounded in KPI analysis, allows for more targeted and efficient interventions. Mobility managers benefit from the clear framework for evaluating the impact of different strategies, enabling optimized resource allocation and the selection of the most promising active mobility interventions.

3. **IT Specialists**: The guidelines outline the data requirements for establishing robust databases to support active mobility monitoring. This provides IT specialists with

specifications for database design and data management, ensuring that the collected data is readily available and suitable for analysis. This streamlined data management approach improves the efficiency of data analysis and reporting.

4. **Traffic and Mobility Planners**: The guidelines offer a practical framework for incorporating active mobility considerations into traffic modelling. By specifying the relevant KPIs and data sources, the guidelines simplify the task of developing traffic models that accurately reflect the impact of active mobility interventions on overall traffic flow and network performance. This ensures that planning decisions are informed by accurate predictions of active mobility impacts.

5. **Lighting Engineers**: The guidelines directly involve lighting engineers by highlighting the importance of considering lighting conditions in the assessment of active mobility interventions. The emphasis on lighting-dependent KPIs guides the selection of appropriate locations for improved lighting, ensuring that these investments are prioritized based on demonstrable needs related to pedestrian and cyclist safety and the effectiveness of active mobility initiatives in low-light conditions.

6. **Mobility Strategy Developers** (SUMPs etc.): The guidelines provide a structured approach to integrating KPIs into active mobility strategies and Sustainable Urban Mobility Plans (SUMPs). The detailed selection process, consideration of environmental variables, and suggested data sources contribute to the development of data-driven strategies. This results in plans that are more likely to achieve their objectives and are easier to justify based on the collected data.

In conclusion, the Monitoring Guidance's relevance extends across diverse roles within local public authorities. By providing a comprehensive, practical, and data-driven framework, it empowers professionals to collaborate effectively, make informed decisions, and ultimately achieve more successful and sustainable active mobility initiatives.

1.4 Application of the Monitoring Guidance: how, by whom, and when

The Monitoring Guidance should be used as a comprehensive framework for planning, implementing, and evaluating active mobility interventions throughout the entire project lifecycle. Its application spans various stages and involves multiple stakeholders within local public authorities.

Who should use it?

The Monitoring Guidance is designed for a multidisciplinary team, including:

Decision-makers: To inform strategic decisions on resource allocation and project prioritization based on evidence-driven insights.

Traffic and mobility managers: To develop and implement effective infrastructure improvements and traffic management strategies.
IT specialists: To establish and maintain the necessary databases and information systems.
Traffic and mobility planners: To integrate active mobility considerations into traffic models and projections.
Lighting engineers: To guide the placement and design of lighting infrastructure to support active mobility, particularly in low-light conditions.
Mobility strategy developers: To incorporate KPIs and data-driven insights into the development and refinement of SUMPs (Sustainable Urban Mobility Plans) and other strategic initiatives.

When should it be used?

The Monitoring Guidance's application is iterative and spans the entire project lifecycle:

Planning Phase: To identify relevant KPIs, define data collection methods, and establish baseline data.
Implementation Phase: To monitor progress against set targets, adapt strategies as needed, and address unforeseen challenges.
Evaluation Phase: To rigorously assess the impact of interventions, demonstrating the effectiveness of implemented measures and identifying areas for future improvement.
Ongoing Monitoring: To continuously track performance, identify emerging trends, and inform long-term decision-making.

In what situation should it be used?

The Monitoring Guidance is particularly valuable in situations where:

Evidence-based decision-making is crucial: The structured approach ensures objective evaluation and justification of active mobility investments, particularly important given the often-limited economic resources available to cities.
Year-round active mobility is a key objective: The framework addresses the challenges of variable weather and lighting conditions.
Collaboration among multiple stakeholders is necessary: The guidelines facilitate effective communication and coordination among various professionals, crucial for efficient use of limited resources.
Long-term sustainability of active mobility initiatives is desired: Continuous monitoring supports ongoing evaluation and adaptation, helping to ensure the long-term viability of projects within budgetary constraints.
Demonstrating impact to external stakeholders is important: The data-driven approach supports effective communication of achievements and future needs, which can help secure additional funding for sustainable active mobility initiatives.
Economic resources are limited: The guidance helps prioritize interventions and optimize resource allocation, maximizing impact within budgetary constraints.

In essence, the Monitoring Guidance should be a living document, consulted and utilized throughout the entire process of planning, implementing, and evaluating active mobility interventions within a local authority. Its consistent application ensures that efforts are data-driven, efficient, and contribute to the creation of truly sustainable active mobility solutions.

1.5 Monitoring Guidance development methodology

The methodology for developing the BATS Monitoring Guidance is a multi-phased approach combining expert knowledge, data analysis, and iterative feedback. The Monitoring Guidance outlines a comprehensive monitoring process (**Appendix 3**).

Phase 1: Defining Scope and Objectives:

This initial phase focused on clearly defining the purpose and objectives of the Monitoring Guidance, ensuring its relevance to the Year-Round Active Mobility (YRAM) goals of the BATS project. The intended users (mainly planners and mobility managers at local public authorities) were identified, and their needs were considered in defining the scope of the guidelines.

Phase 2: KPI and Data Identification:

A key phase in the process involved the identification of key performance indicators (KPIs) and requisite data sources, along with the establishment of methodologies for the estimation of KPIs based on available data. A two-step process was employed:

KPI Selection: KPIs were carefully selected based on their relevance to active mobility, their suitability for various weather and lighting conditions, and their data availability. This document highlights the need to consider the varying capabilities of different cities in terms of data access and analytical resources. This is reflected in the structured KPI table (**Appendix 1**) , which specifies the required data, calculations, data sources, and whether the KPI is weather or lighting-dependent. In **Appendices 1A and 1B**, a summary of the indicators and data sources is presented. The content of the table was developed based on a review of scientific literature (articles and research reports) and reports from other EU projects.

Identification of gaps and resource limitations: The methodology emphasized leveraging existing city data sources to minimize the need for extensive new data collection. Surveys were conducted among partner cities; the results are included as **Appendix 2**. Existing city databases, GIS data, and transport models were identified as primary data sources. Based on survey findings, a data audit template was proposed to help cities identify gaps and resource limitations in their monitoring processes, thereby establishing efficient and effective procedures. Furthermore, the Monitoring Guidance outlines a comprehensive monitoring process (**Appendix 3**).

Phase 3: Recommendations development:

This phase offered recommendations for data acquisition, collection, and utilization, informed by survey findings (**Appendix 2**). These recommendations encompassed:

Data Collection Methodologies: Guidance on effective techniques, including survey design, sensor placement, and database structuring.
Leveraging Existing Data: A focus on maximizing the use of readily available data within cities to improve efficiency and minimize new data collection efforts. This included strategies for accessing and integrating data from various city departments and external sources. Specific recommendations covered:

- Identifying and accessing alternative data sources already available within the city.
- Combining diverse datasets for analysing current situations, tracking progress, and establishing targets.

Phase 4: Iterative Refinement Through Case Studies – local experiments:

The methodology highlights the use of practical case studies to refine and validate the Monitoring Guidance. The example from Gdynia (Section 4) demonstrates how the guidelines should be used in real-world scenarios, testing the practical application of the selected KPIs and data collection methods (***a detailed analysis of the local experiments will be undertaken during the subsequent reporting period as a component of Work Package 2. The initial phase of this analysis will focus on the development of experiment-specific monitoring recommendations for each participating partner city***). The iterative testing of the approach through a case study allowed for the refinement of recommendations and adjustments to the overall structure and content of the guidelines. The feedback from case studies and analysis informed the final recommendations within the Monitoring Guidance.

In summary, the BATS Monitoring Guidance methodology is a structured and iterative process. It combines theoretical planning with practical application, data-driven decision-making, and continuous feedback to ensure that the resulting guidelines are practical, relevant, and effective for enhancing year-round active mobility initiatives.

2. Monitoring process description

The monitoring process employs a structured, iterative approach designed to evaluate the effectiveness of active mobility interventions. The process is tailored to accommodate diverse city contexts and resource limitations, and it emphasizes the use of existing data whenever possible. The Monitoring Guidance outlines a comprehensive monitoring process (Fig. 1 and **Appendix 3**).

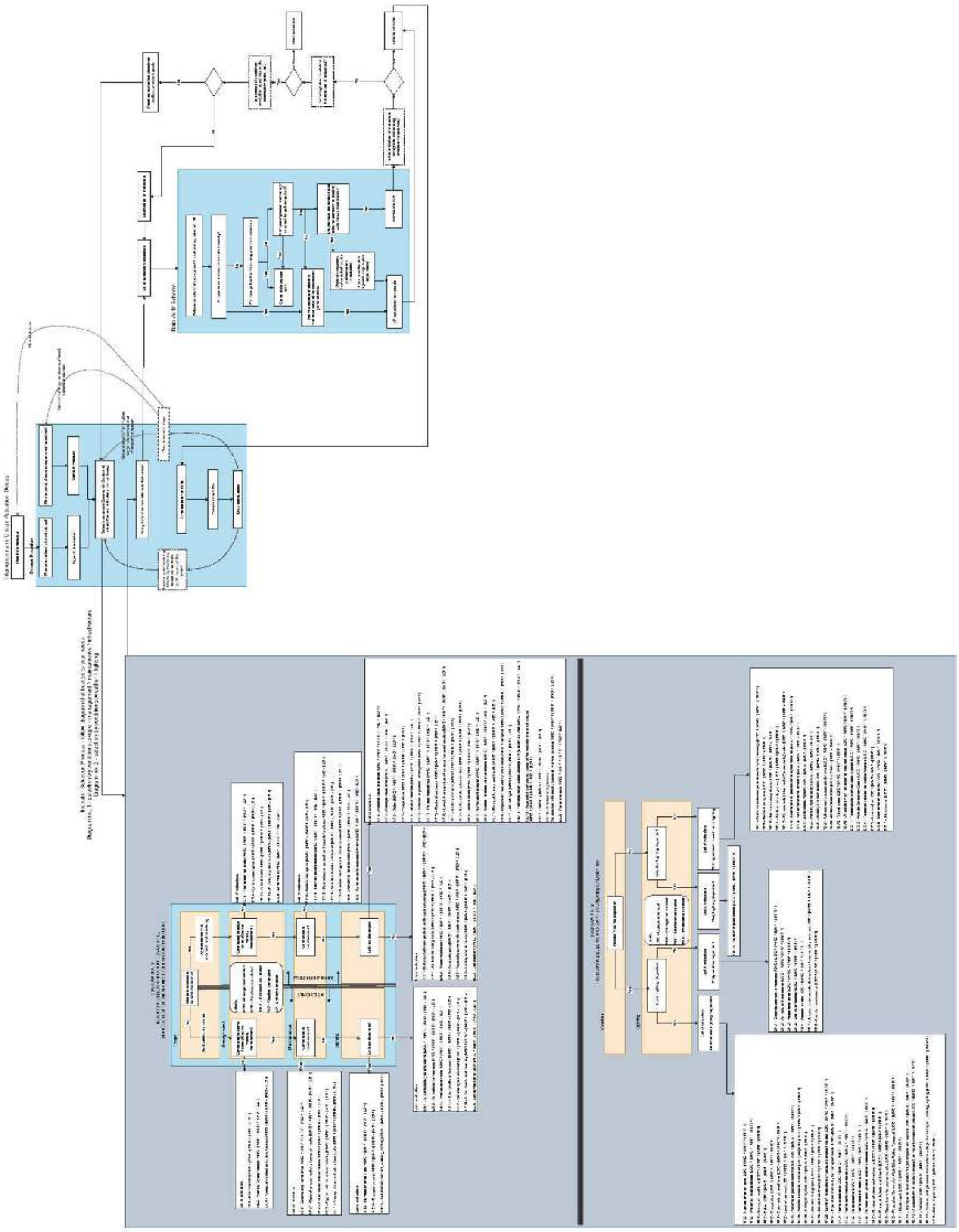

Fig. 1 Monitoring process diagram (included in Appendix 3)

A simplified approach to the process of proceeding KPIs is illustrated in Figure 2.

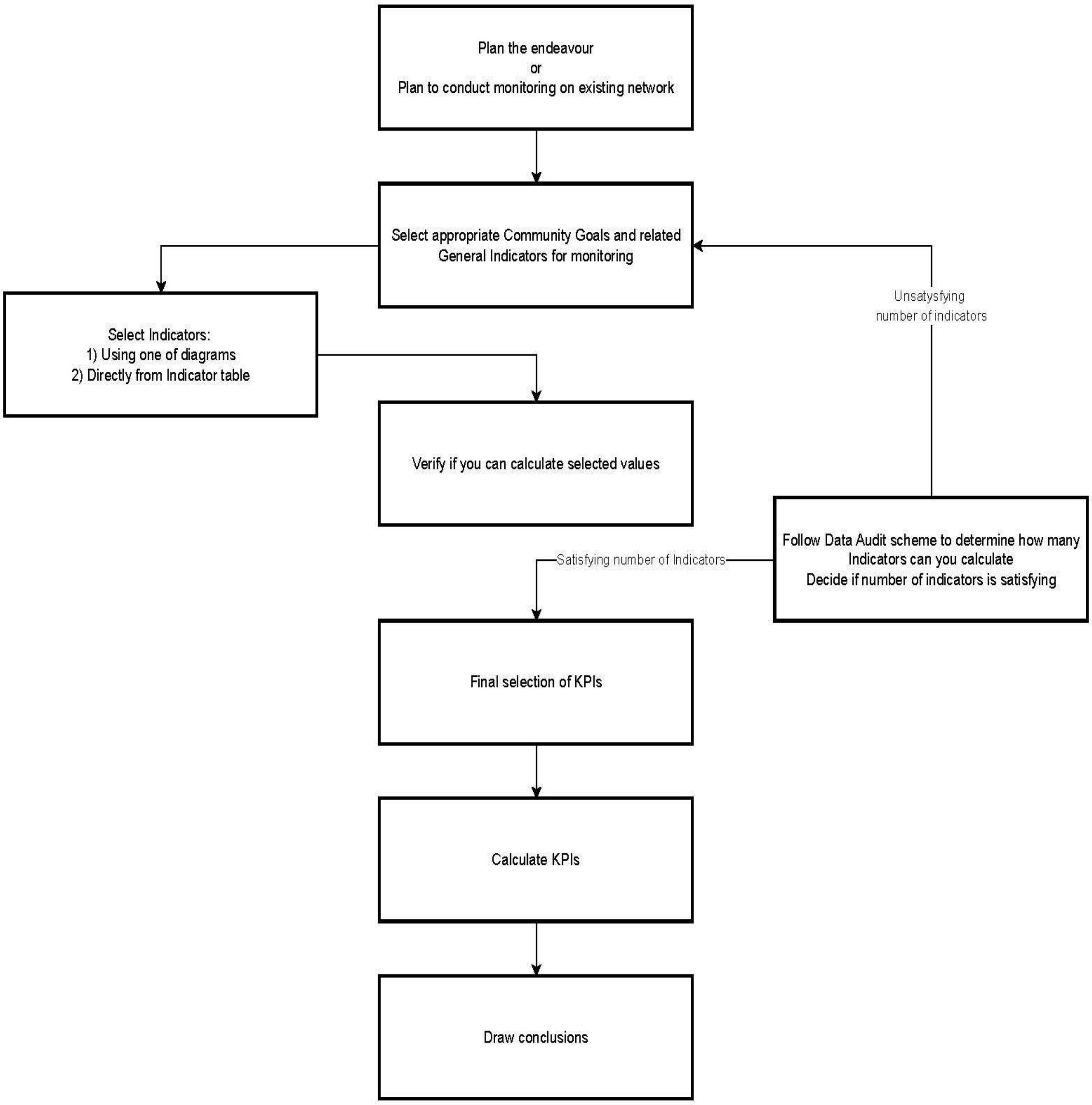

Fig. 2 Monitoring process diagram – simplified

The process can be broken down into four key phases:

- Phase 1: Defining the Intervention and selecting KPIs (Planning phase and **preliminary** KPIs selection)
- Phase 2: Data acquisition and management (Data Audit Scheme)
- Phase 3: KPI calculation and analysis
- Phase 4: Monitoring Schedule and Iterative Refinement

This multi-phased monitoring process ensures a comprehensive evaluation of active mobility interventions, allowing for data-driven decision-making and continuous improvement towards achieving year-round active mobility goals. The flexibility of the methodology accounts for the varying contexts and resources of different cities, promoting the implementation of sustainable and effective active mobility projects.

2.1 Defining the intervention and selecting KPIs

This initial phase involves a two-pronged approach. First, the type of intervention (infrastructure changes, policy updates, community programs) is clearly defined. This step includes specifying the geographic scope and specific aspects of mobility to be measured. Second, appropriate Key Performance Indicators (KPIs) are selected using a structured process. This process uses a series of decision points which consider the Community Goals, the intervention type, the availability of existing data and resources, and the influence of weather and lighting conditions on the indicators. A data audit template is then employed to identify potential gaps in data availability and to assess whether the necessary resources (technical capacity, funding) are available to conduct the proposed data gathering, processing and analysis.

The analysis uses the indicator table as its foundation(**Appendix 1**). The Excel table acts as a crucial tool within the Monitoring Guidance by offering a structured approach to KPI (Key Performance Indicator) selection for evaluating active mobility initiatives. Its importance stems from its ability to:

- **Identify relevant KPIs:** The table systematically lists various KPIs categorized by Community Goal (Travel Performance, Safety, Environment, etc.). This ensures that the monitoring process comprehensively addresses multiple aspects of active mobility, going beyond simply measuring usage numbers.
- **Assess weather and lighting impacts:** Crucially, the table includes columns explicitly addressing the influence of weather and lighting conditions on each KPI. This directs the selection of KPIs that are robust to these variables or, conversely, allows for the analysis of how weather and lighting specifically affect active mobility usage. For instance, KPIs related to bicycle or pedestrian volumes might be analysed differently for varying weather conditions.
- **Guide data collection and calculation:** The table specifies appropriate data collection methods (e.g., surveys, GIS data, traffic counts) and calculation methods for each KPI. This standardized approach ensures data consistency and facilitates comparison across different locations and time periods. It also aids in managing the complexities inherent in collecting data across different weather and lighting situations.
- **Facilitate evidence-based decision-making:** By systematically evaluating these factors, the table ultimately supports evidence-based decision-making. Data gathered using the KPIs identified in the table can be used to assess the effectiveness of active mobility interventions in improving safety, reducing environmental impacts, enhancing accessibility, and encouraging more year-round active travel, regardless of weather or time of day. This leads to more effective and targeted future strategies.

The Excel table (**Appendix 1**) isn't merely a dataset; it's an integral part of the Monitoring Guidance's methodology. It ensures that the monitoring process is comprehensive, robust, and directly addresses the challenges of achieving year-round active mobility, by specifically accounting for the impact of variable environmental conditions.

The process for selecting Key Performance Indicators (KPIs) to monitor year-round active mobility uses a two-stage approach: a general planning phase followed by indicator selection. Two distinct methods for indicator selection are then offered to provide flexibility based on project needs.

Phase 1, Step 1: Planning the Intervention and Monitoring

This phase lays the groundwork for effective KPI selection. It involves:

Defining the intervention: Clearly define the type of active mobility intervention (infrastructure, policy, or community program). Consider how this intervention aligns with existing urban plans and the resources needed.

Developing a Monitoring Plan: Create a robust plan for monitoring the existing mobility network before and after the intervention. This includes specifying data collection methods (surveys, sensors), frequency, and the aspects of mobility to be measured (geographic scope and thematic focus).

Intervention type & scope: Clearly categorize the intervention type to inform the monitoring approach, as different interventions will have different impacts and data requirements. Define the geographic and thematic scope of the monitoring.

Phase 1, Step 2: Indicator selection
Method 1: Multi-faceted approach (Fig. 3)

This method offers a comprehensive approach to KPI selection, considering various aspects of urban mobility:

Scope assessment: Determine the indicator's applicability to local conditions. Indicators suitable for both area-wide and localized monitoring are preferred.

Management categorization: Categorize indicators based on their relevance to active transport management, safety, or infrastructure needs. This helps tailor indicators to specific management goals.

Maintenance consideration: Include indicators that track infrastructure maintenance to ensure operational continuity over time.

Lighting and weather dependency: Identify indicators specifically affected by lighting conditions (nighttime visibility and safety) and by weather conditions (heat, rain, snow, ice, wind, low visibility).

Indicator lists: The framework provides lists of specific indicators relevant to each category and their combinations. This ensures a comprehensive selection process.

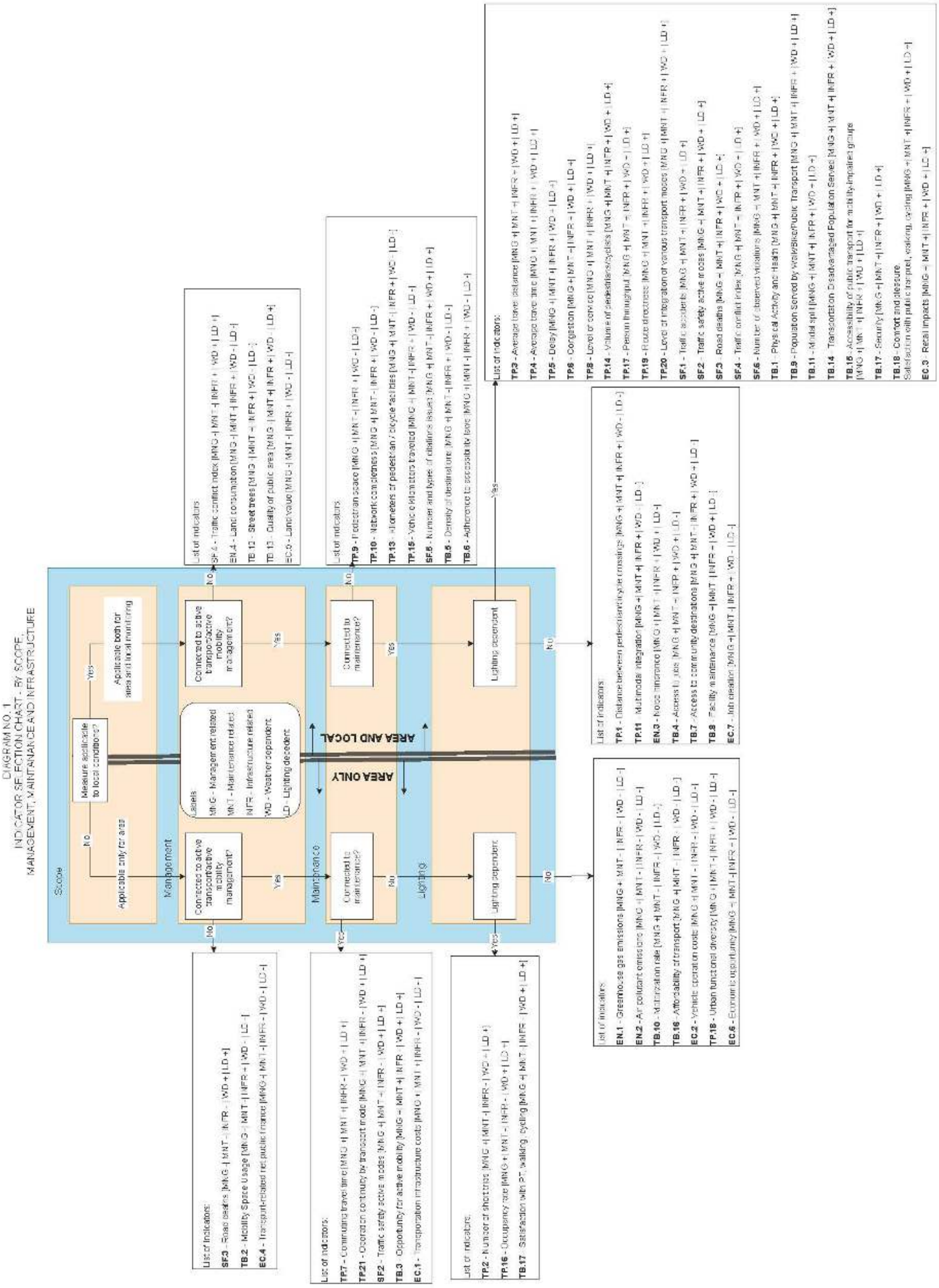

Fig. 3 Indicator selection - Method 1: Multi-faceted approach (included in Appendix 3)

Phase 1, Step 2: Indicator selection
Method 2: Weather/lighting focused approach (Fig. 4)

This simplified method prioritizes environmental factors:

Weather dependency: Determine whether indicators are affected by weather conditions. Consider weather's influence on active mobility patterns (heat, rain, snow, ice, wind, low visibility).

Lighting dependency: Further categorize indicators based on their dependence on lighting conditions (time of day and season).

Indicator categorization: Indicators are grouped into four categories based on weather and lighting dependence (both, weather only, lighting only, neither).

Simplified selection: This method reduces complexity by focusing on weather and lighting, ensuring relevant KPIs are selected based on prevailing conditions.

Flexibility: This approach allows easy adaptation across different climates and seasons with varying weather conditions impacting urban transport differently across regions.

Both methods offer valuable approaches. The multi-faceted approach provides a comprehensive analysis, while the weather/lighting focused approach simplifies KPI selection, focusing on environmental influences. The choice depends on specific project needs.

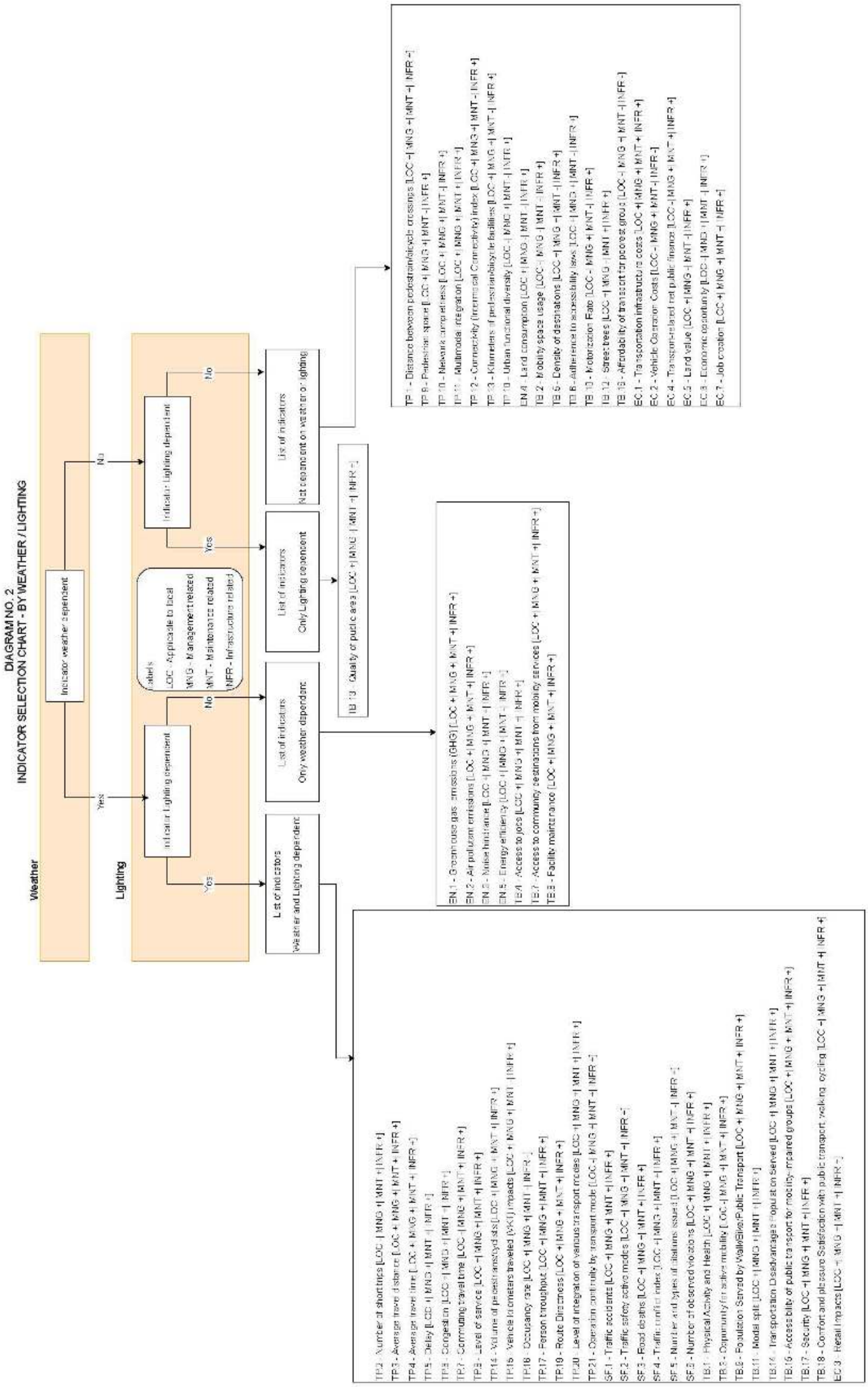

Fig. 4 Indicator selection - Method 2: Weather/lighting focused approach (included in Appendix 3)

2.2 Data acquisition and management

Once KPIs are identified, the required data for their calculation is determined. The process emphasizes utilizing existing data sources within the city (databases, GIS data, transport models), supplementing these with survey data where needed. A critical step involves determining data accessibility. If necessary data isn't readily available, alternative sources are explored. The flowchart (Fig. 5 and **Appendix 3**) illustrates the decision-making process, including considerations for outsourcing data collection if internal resources are insufficient. The process incorporates a thorough data quality assessment to ensure accuracy and reliability.

The Data Audit Scheme is a crucial part of KPI selection, ensuring the availability, accuracy, and sufficiency of data for indicator calculations. It comprises four key stages:

Phase 2, Step 1. Defining data requirements:

Begin by specifying the data needed for each KPI. This includes identifying the data type, format, and collection frequency. Clearly defined requirements create a roadmap for data acquisition, ensuring alignment with evaluation objectives.

Phase 2, Step 2. Data access and collection:

Assess data accessibility. If data isn't readily available, determine whether it can be gathered internally or requires external sources (databases, other departments, external partnerships). This stage involves:

Access check: Verify data accessibility within existing systems.
Resource Evaluation: If data is unavailable internally, determine the feasibility of internal data collection or the need for external assistance.

Phase 2, Step 3. Data evaluation:

After data collection, evaluate its quality and completeness. Ensure the data meets the standards required for accurate KPI calculations. This involves:

Quality assessment: Verify data accuracy and consistency.
Completeness check: Confirm that all necessary data points are present and that there are no significant gaps.

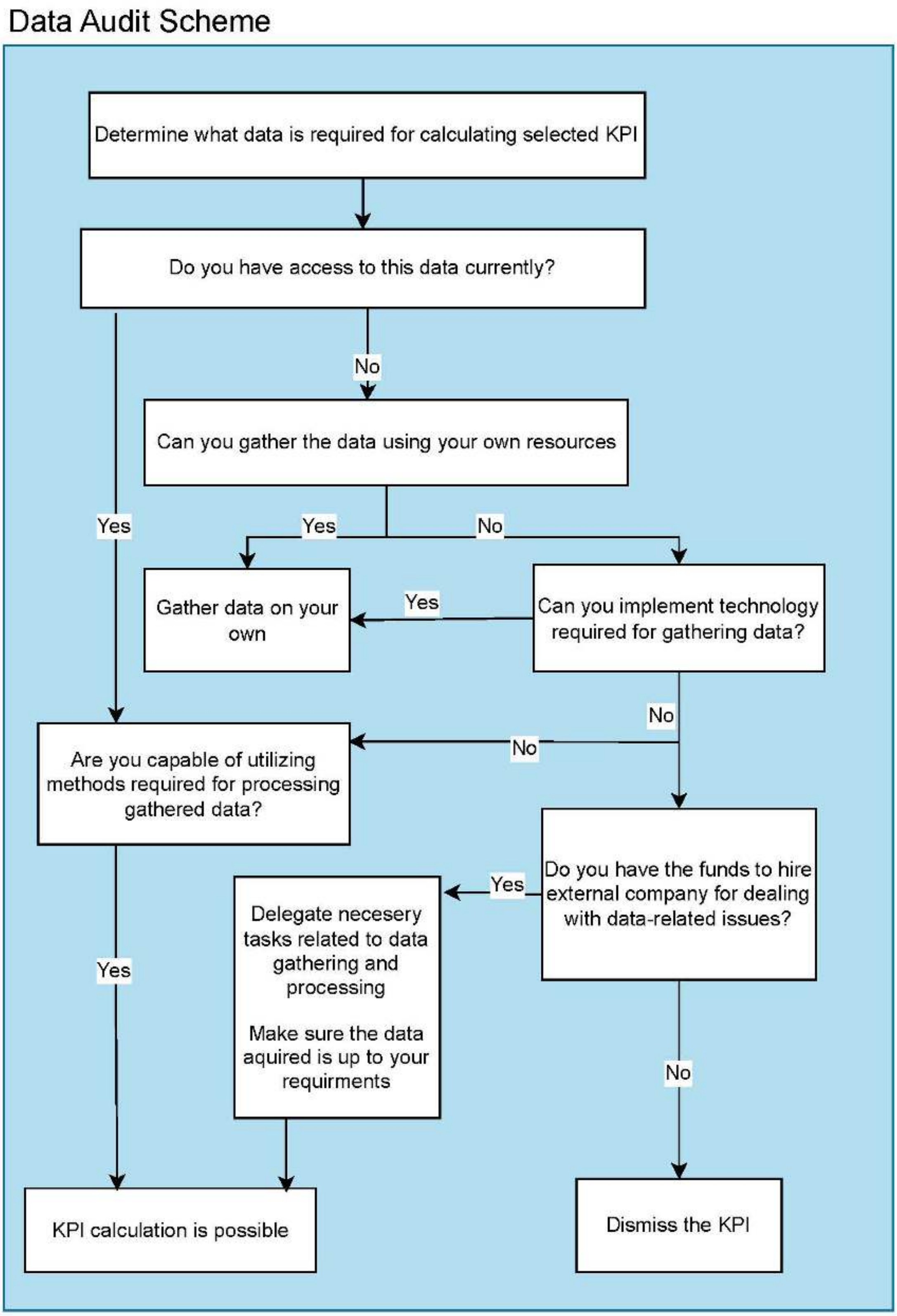

Fig. 5 Data audit template diagram

Phase 2, Step 4 Decision points and KPI finalization:

This stage involves several key decision points:

KPI feasibility: If sufficient data exists for KPI calculation, include it in the final set. Otherwise, dismiss the KPI.
Sufficiency of KPIs: Review the remaining KPIs to ensure they comprehensively measure the intervention's effectiveness. If not, revisit earlier stages to explore alternative indicators.
Data Challenges: If data acquisition or usage presents significant challenges: Redefine objectives/goals. Consider modifying objectives or community goals based on data limitations or adjust Indicators by evaluating the feasibility of adjusting the initial indicator set to align with available data. If neither of these options is feasible and significant data gaps remain, consider abandoning the evaluation for specific KPIs.

Phase 2, Step 5 Final selection of KPIs
The final step is to finalize the set of KPIs based on this rigorous verification process, ensuring they provide a comprehensive overview of the intervention's success in meeting objectives.

2.3 KPI calculation and analysis

The KPI Calculation and Analysis phase is crucial for evaluating the success of active mobility interventions. This phase involves two key steps: KPI calculation and subsequent analysis to inform decision-making and strategy refinement.

Phase 3, Step 1 KPI Calculation:

This step involves using the collected and validated data to compute the finalized KPIs. This process requires careful attention to detail, ensuring accuracy and reliability. The calculations should be performed using appropriate methods and tools, and all data sources should be clearly documented. The goal is to generate meaningful insights into active mobility trends. For example, if the KPI is related to pedestrian volumes, the calculation should consider factors such as time of day, day of the week, weather conditions and possibly even demographics.

Phase 3, Step 2 Analysis and interpretation:

The calculated KPIs provide quantitative data; however, their significance must be interpreted within the context of the intervention's objectives. This interpretative stage is crucial. The analysis should assess whether the intervention is achieving its intended goals. This assessment may involve comparing the results to baseline data or established targets, and it should also account for any external factors that might have influenced the results. For example, if the KPI is the proportion of trips made by bicycle, a sudden increase in fuel prices might artificially inflate the bicycle usage figure.

Phase 3, Step 3 Drawing conclusions and informing strategy:

Based on the analysis, conclusions are drawn regarding the intervention's effectiveness. These conclusions should be supported by evidence from the KPI calculations and the broader context in which the intervention operated. If the intervention is not meeting its objectives, the analysis should identify the areas requiring attention. This might involve re-evaluating the intervention strategy, adjusting its implementation, or even considering alternative approaches. The aim is to use the insights gained from the KPI analysis to inform ongoing improvements and enhance the effectiveness of active mobility initiatives. The iterative nature of this analysis ensures continuous refinement and improvement in active mobility planning and implementation.

2.4 Monitoring schedule and iterative refinement

The monitoring process for Year-Round Active Mobility (YRAM) initiatives utilizes a phased approach with iterative data collection and analysis to ensure continuous improvement and inform strategic decision-making. The schedule, while acknowledging the inherent unpredictability of weather, is designed to capture data across a range of conditions and timeframes.

Phase 4 Step 1 Baseline data collection (pre-Intervention)

Before implementing any active mobility intervention, baseline data is collected to establish a benchmark against which post-intervention changes can be measured. This initial data gathering considers various factors that may influence active mobility, including:

Weather Conditions: Data is collected across a spectrum of weather conditions relevant to the specific location and climate, such as extreme heat and intense sun, normal conditions, moderate and heavy rain, snowfall (including accumulated snow on pavements and cycle paths), icy surfaces, strong winds, and low visibility. Data may be collected at both an area-wide (general conditions) and local (site-specific conditions) level.
Lighting Conditions: Data is collected during both daytime and nighttime, distinguishing between areas with varying levels of artificial lighting (well-lit, poorly lit, and unlit areas). Again, both area-wide and local conditions are considered.

Phase 4 Step 2 Post-intervention monitoring and immediate impact assessment

Following intervention implementation, data collection continues to evaluate the immediate impacts. This phase captures data across the same range of weather and lighting conditions as the baseline data collection to allow for a direct comparison and to assess the intervention's efficacy under various real-world scenarios.

Phase 4 Step 3 Long-term monitoring and behavioural change assessment

After a sufficient time has passed to allow for behavioural changes to occur (for example, one to two years after the post-intervention monitoring period), data collection is repeated. This assessment evaluates the long-term effects of the intervention and identifies any changes in travel patterns or behaviours amongst the community. This data gathering again considers various weather and lighting conditions.

Phase 4 Step 4 Ongoing Monitoring and Integration with City Plans

To ensure continuous improvement, data collection continues on an ongoing basis at regular intervals (e.g., seasonal measurements, at least three times a year). This simplified approach, whilst acknowledging the scientific preference for more granular data collection, aims to balance practicality with the necessity of capturing data under varying conditions (weather, lighting). The collected data informs the ongoing refinement of the intervention strategy and supports its integration into broader city planning initiatives, such as the Sustainable Urban Mobility Plan (SUMP). Key monitoring indicators are incorporated into the SUMP to ensure ongoing evaluation and continuous improvement of active mobility initiatives.

This cyclical approach, visually represented by a flowchart, underscores the iterative and adaptive nature of the monitoring process. Continuous data collection and analysis allow for adjustments to strategies and provide ongoing feedback for creating and maintaining effective and sustainable active mobility solutions.

3. Recommendations for data acquisition, collection, and use

3.1 Survey analysis

An analysis of the survey data is presented in **Appendix 2**. Recommendations, based on the analysis of the survey responses, are presented below..

1. Diverse approaches to active mobility:
Cities demonstrate varied approaches to achieving active mobility objectives. While most prioritize increasing the combined modal share of public transport, walking, and cycling, the specific strategies and targets differ significantly. Some cities set quantitative targets, while others focus on infrastructure development, soft incentives, or public awareness campaigns. This highlights the need for flexible and adaptable monitoring strategies capable of capturing diverse implementation approaches.

2. Challenges in data collection and accessibility:
The document reveals significant challenges in consistently collecting and accessing reliable data for active mobility monitoring. Several cities cite resource limitations as a major barrier, hindering the ability to conduct regular and comprehensive data collection, especially for seasonal comparisons. Inconsistent data collection methods and timeframes across different municipalities further complicate the analysis and cross-city comparisons. This underscores the need for standardized data collection methodologies and the importance of addressing resource limitations in promoting effective active mobility monitoring.

3. Limitations in monitoring specific aspects of active mobility:
The survey reveals limitations in monitoring specific aspects of active mobility, including transport emissions in specific areas and the reporting of active mobility-related accidents. Many cities lack the necessary infrastructure or data collection methods to monitor these aspects effectively. The lack of consistent reporting of active mobility related incidents in accident databases is a significant issue. The inconsistent data collection across different cities makes comprehensive analysis and meaningful comparison difficult. This suggests that significant investments in data infrastructure and improved data sharing practices are necessary for robust monitoring.

4. Varied data sources and analytical tools:
Cities employ a range of data sources (internal city departments, ITS/Smart City systems, external services, national surveys) and analytical tools (QGIS, MS Power Query, R Studio, traffic simulation models, etc.) for calculating active mobility indicators. This lack of standardization highlights the need for the development and implementation of standardized data collection and analysis procedures.

5. Barriers to open data sharing:
While some cities utilize and share open data, several express hesitations or limitations regarding data sharing due to issues such as lack of resources, expertise, or data ownership and control. This emphasizes the importance of addressing such barriers to facilitate data sharing and promote a more collaborative and data-rich approach to active mobility planning and monitoring.

In summary, the survey results highlights the need for a standardized and comprehensive approach to active mobility monitoring to address the considerable challenges in data collection, access, analysis, and sharing. A robust monitoring framework capable of capturing various implementation approaches, while accommodating differences in city context and resources, is vital for effective planning, evaluation, and continuous improvement of active mobility initiatives.

Based on the responses in the survey, categorizing the cities into "more advanced" and "less advanced" regarding active mobility monitoring is challenging due to the diverse approaches and varying levels of detail in the responses.

However, based on the available information, a tentative grouping can be suggested, acknowledging that this is a subjective interpretation and further data would be needed for a more robust classification. This assessment considers the availability of data, sophistication of monitoring methods, and the degree to which cities actively address challenges in data collection and analysis:

- Lahti: Provides a detailed overview of 18 indicators with data at various levels (city, neighbourhood, street). Conducts full-year surveys every two years.
- Umea: Uses municipal travel surveys, including seasonal comparisons (summer and winter). Shows awareness of limitations and makes an effort to address them.
- Gdynia: Shares open data, has a dedicated active mobility planning unit, and actively monitors the impact of interventions (though details on their methodology may not be fully complete).
- Hamburg: While expressing concerns about data dispersion between departments, indicating a sophisticated understanding of the challenges in data management and integration. This highlights a potential for advanced monitoring if these organizational issues are addressed.
- Porvoo: Relies on the National Travel Survey (done every 4 years), limiting the availability of seasonal data. Highlights challenges with data availability and reporting of active mobility-related incidents.
- Kalundborg: Uses external (national) data sources, lacking a fully established internal monitoring system, or at least not fully articulated in the survey responses.
- Klaipeda: Relies on aggregated data from air quality monitoring stations. Details on data collection methods and analysis are limited in the responses.
- Kiili: Data is mostly at the national level, with limited local-level data for active mobility.

The analysis of the information resulting from the surveys will be deepened during the interviews with representatives of the twinned cities that are planned as part of the testing of the Monitoring Guidance in WP2..

3.2 Recommendations on data acquisition and collection methods for KPIs estimation

Based on the survey results and considering the need for robust data acquisition and collection methods for active mobility monitoring, the following recommendations are proposed:

Data acquisition strategy:

The data acquisition strategy should be designed to collect comprehensive data reflecting the various aspects of active mobility within the city. The strategy must carefully consider the influence of environmental factors (weather and lighting conditions) on data collection.

It should also account for the availability of existing data sources within the city and the capabilities of the city's IT infrastructure. The strategy should clearly define:

- **KPIs to be monitored:** A clear list of KPIs needs to be established, specifying the data required to calculate each indicator. This should include indicators that are sensitive to variations in weather and lighting conditions.
- **Data Sources:** Identify all relevant data sources (city databases, GIS data, transport models, surveys, sensor networks). Prioritize existing data sources to minimize the need for new data collection.
- **Data Collection Methods:** Specify detailed data collection methods for each KPI, including surveys (with sampling strategies), automated sensor networks, manual counts, etc.
- **Data Quality Control:** Procedures for data validation, cleaning, and quality checks need to be clearly defined and should include methods for dealing with missing data.

Sensor network configuration:

For automated data collection, a sensor network should be strategically deployed across the city. Consider:

- **Sensor type:** Select appropriate sensors to collect data on various aspects of active mobility (e.g., pedestrian and bicycle counts, speed, traffic volume, environmental conditions).
- **Sensor placement:** Strategically position sensors to capture a representative sample of active mobility patterns, accounting for different traffic conditions, road types, and geographic areas. Consider the location of key destinations and transport interchanges.
- **Sensor density:** Determine the optimal density of the sensor network. Higher density may be required in areas with high active mobility usage or near key locations of interest.
- **Data transmission**: Establish a reliable system for transmitting data from sensors to a central database. Consider using wireless technologies for remote data transmission.

Survey design and implementation:

If surveys are used to collect data, they should be carefully designed:

- **Sampling strategy:** Define the sampling strategy for selecting survey respondents, ensuring a representative sample of the population.
- **Questionnaire design:** Develop clear, concise, and unambiguous survey questions. Pilot test the questionnaire before wide-scale deployment.
- **Data entry:** Establish a secure and efficient system for entering survey data into the database, minimizing data entry errors.

- **Data analysis:** Define the methods for analysing survey data, accounting for potential biases and limitations.

Database structure and management:

A robust database structure is essential for storing and managing collected data:

- **Database design:** Design the database to effectively store and manage all collected data. This should include appropriate data types, validation rules, and indexing strategies.
- **Data security:** Implement appropriate measures to protect the security and confidentiality of collected data.
- **Data access:** Establish procedures for accessing and using data from the database, restricting access as needed.
- **Data backup and recovery**: Implement a reliable backup and recovery system to prevent data loss.

Weather and lighting considerations:

Data collection should account for the influence of weather and lighting:

- **Weather Data:** Integrate comprehensive weather data (temperature, precipitation, wind speed, humidity) into the database. This data can help analyse how adverse weather conditions affect the choice and safety of active mobility, particularly regarding when people are more likely to walk or cycle.
- **Lighting Data:** Collect data on lighting levels (lux, luminance, and the presence of street lights) at various locations and times. Analyzing how different lighting conditions interact with weather patterns, especially during dusk and dawn or in poor weather, can help evaluate their effect on active mobility safety and usage.
- **Road Safety:** Collect data on traffic incidents and accidents, particularly how these correlate with various weather and lighting conditions. Identifying trends can highlight critical times when active mobility users face greater risks and inform protective measures.
- **Vandalism Rate:** Track incidents of vandalism in areas frequented by pedestrians and cyclists. Analysing this in relation to weather and lighting conditions can provide insights into how these factors influence community safety perceptions and the likelihood of active mobility usage.
- **Traffic Volume:** Monitor vehicular traffic volume and its relationship to weather and lighting conditions. Understanding how increased traffic during adverse weather or at night impacts the safety and comfort of active mobility can inform infrastructure planning.
- **Public Transport Accessibility:** Evaluate how weather and lighting conditions affect access to and usage of public transport options. This can provide insights into when and how active mobility can be promoted in conjunction with public transport.

- **Community Feedback:** Collect qualitative feedback from the community about their experiences with active mobility in various weather and lighting conditions. Understanding their concerns and preferences can guide improvements in infrastructure and safety measures.

By following these recommendations, cities can ensure the acquisition and collection of high-quality data, leading to more accurate and reliable KPI calculations and a more thorough understanding of the effects of active mobility interventions. The resultant data will better inform decision-making and allow for the development of effective and sustainable active mobility solutions.

3.3 Recommendation on how to identify and access alternative data sources already available in the city

Based on the survey, several strategies can be employed to identify and access alternative data sources already available within a city for active mobility monitoring. The recommendations below consider the limitations and challenges identified in the survey results, such as resource constraints, data dispersion across departments, and inconsistencies in data collection methods.

Internal data audit:

Conduct a thorough audit of existing data sources within the municipality. This audit should cover various departments (transport, planning, environment, etc.) and consider both structured (databases, GIS systems) and unstructured data sources. The audit should identify:

- **Relevant databases:** Identify databases containing potentially relevant data on active mobility (e.g., traffic counts, public transport usage, accident records, parking data, bike-sharing usage).
- **GIS data:** Determine the availability of GIS data layers relevant to active mobility (e.g., road networks, pedestrian infrastructure, cycle paths, land use).
- **Smart City data:** Explore data collected from smart city sensors and technologies (e.g., traffic cameras, air quality monitors). Investigate which departments manage this data and how it can be accessed.
- **Other data sources:** Identify other departments with relevant data (e.g., police records for accident data, health departments for health impacts, urban planning departments for policy information).

Inter-Departmental collaboration:

Establish strong collaboration channels with various departments holding potentially relevant data. This may involve:

- **Joint meetings:** Conduct meetings with relevant departments to identify and discuss available datasets and their potential for active mobility monitoring.

- **Data sharing agreements:** Formalize data-sharing agreements to ensure secure and consistent data access.
- **Data mapping:** Create a map documenting the location and format of various datasets to streamline data discovery.
- **Dedicated Data Manager:** Appoint a data manager responsible for coordinating data collection, access, and sharing across departments.

Leveraging existing surveys and reporting:

Review existing city surveys and reports to identify relevant data:

- **Household Travel Surveys:** Identify household travel surveys that might contain information on active mobility choices and trips.
- **Community Surveys:** Review the results of past surveys involving public opinion on active mobility infrastructure, or use surveys which capture information on user experiences.
- **Annual reports:** Analyse annual reports from relevant departments to find data on infrastructure development, maintenance, and usage statistics.

External Data Sources:

Explore the use of publicly available external data sources:

- **National Travel Surveys:** Consider using national travel surveys, while acknowledging their limitations regarding local specifics and frequency.
- **Open Data Portals:** Investigate data from local or national open data portals, such as data on traffic counts, public transport usage, and air quality.
- **Third-Party Data Providers:** Evaluate the potential for obtaining data from commercial providers (e.g., car-sharing and bike-sharing companies, mapping services). Such third-party data is likely to incur a cost.

Data integration and harmonization:

Once potential data sources are identified, develop a strategy to integrate and harmonize data from various sources. Consider:

- **Data standards:** Ensure consistent data formats and standards across various datasets.
- **Data transformation:** Implement methods to transform data into a usable format for analysis.
- **Data quality control:** Establish procedures to ensure the quality and consistency of integrated data.

By following these recommendations, cities can successfully identify and access a wide range of alternative data sources already available, enhancing the comprehensiveness and reliability of active mobility monitoring efforts and thereby promoting evidence-based decision-making. Remember to always respect data privacy regulations and secure necessary approvals before accessing and utilizing any data.

3.4 Recommendations on how to combine different data for analysing current situations, monitor progress and set targets

Based on the survey results, which highlights inconsistencies in data collection methods and the availability of data across different cities, the following recommendations are proposed for combining different data sources to analyse current situations, monitor progress, and set targets for active mobility initiatives:

Data integration framework:

Develop a comprehensive data integration framework that outlines the procedures for combining data from various sources. This framework should address data standardization, transformation, and quality control issues. Consider using a common data model to ensure consistency and facilitate analysis.

Data harmonization:

Given the inconsistencies in data collection methods and timeframes identified in the document, data harmonization is crucial. This involves:

- **Standardizing data definitions**: Establish clear and consistent definitions for key variables (e.g., active mobility modes, trip distances, accident types) across all data sources.
- **Data transformation:** Develop procedures to transform data from different sources into a common format, ensuring compatibility and facilitating analysis.
- **Data cleaning:** Implement thorough data cleaning procedures to address inconsistencies, missing values, and errors in the data.

Data analysis techniques:

Employ appropriate data analysis techniques to integrate and analyse data from different sources:

- **Descriptive statistics:** Use descriptive statistics (e.g., means, standard deviations, frequencies) to summarize and describe the data.
- **Trend analysis:** Analyse data over time to identify trends in active mobility patterns (e.g., increasing or decreasing usage of different modes).
- **Regression analysis:** Use regression analysis to identify relationships between different variables (e.g., weather conditions and active mobility usage).
- **Spatial analysis:** If geographic data is available, use spatial analysis techniques (e.g., mapping, spatial autocorrelation) to explore spatial patterns in active mobility.

Benchmarking and target setting:

Use data to establish benchmarks and set targets for active mobility initiatives:

- **Benchmarking:** Compare the city's performance on various active mobility indicators to other cities or regions.
- **Target setting:** Establish specific, measurable, achievable, relevant, and time-bound (SMART) targets for active mobility indicators based on the analysis of existing data and benchmarks.

Monitoring and evaluation:

Regularly monitor progress toward established targets, making use of the combined data sources.

- **Progress tracking:** Track progress toward the targets at regular intervals, using a mix of qualitative and quantitative data.
- **Adaptive management:** Use the results of monitoring to make adaptive management decisions, adjusting the intervention strategy as needed.
- **Reporting:** Prepare regular reports on the progress toward achieving active mobility targets, based on the analysis of combined data sources.

Addressing Data Gaps:

Acknowledge and address data gaps. The survey results notes that several cities lack sufficient data for comprehensive analysis. Develop strategies to fill these gaps, such as:

- **Targeted data collection**: Conduct additional targeted data collection where necessary.
- **Data estimation techniques:** Employ appropriate data estimation techniques where data is missing.
- **Data sharing:** Collaborate with other cities or organizations to share data and insights.

By following these recommendations, cities can effectively combine various data sources to gain a comprehensive understanding of current active mobility patterns, track progress toward established targets, and develop more effective strategies for promoting sustainable active mobility. This data-driven approach leads to improved decision-making and continuous improvement.

4. Application of the guidance in local experiments

A detailed analysis of each local experiment in the partner cities will be conducted following the analysis of the survey results and during the testing of the Monitoring Guidance in WP2. A preliminary analysis of a selected local experiment is presented below as an example.

4.1 Gdynia – local experiment 1

In Gdynia, a stimulation campaign targeting kindergarteners ("Odprowadzam sam") aims to encourage alternative travel modes to school for children and their parents. While the initial focus was on a single kindergarten, the broader scope encompassed multiple kindergartens across a wider area. The campaign, running during autumn and winter, aims to reduce car use for school commutes.

The scope of this experiment is local when considering a single kindergarten, however multiple kindergartens are spread over wider area.

The goal of this experiment is to increase the amount of kids travelling to kindergarten by means of transport other than car, and it will be conducted during the autumn and winter season.

Indicator most suitable for monitoring the success of the campaign must be related to number of trips made by children with different transportation modes. On top of that it is preferred that the indicator falls under transport management category, can be applied to local conditions and can be used to include both weather and lighting conditions.

To assess campaign success, a key indicator is the modal split (TB.11), reflecting the proportion of trips made by various transportation modes. A decrease in car trips would signify success; additional targets could include increasing bicycle use. This indicator is relatively straightforward to calculate using data on children's transportation choices. However, data collection is essential. Surveys of students are recommended, capturing their travel modes to school.

To effectively evaluate the campaign, a multi-phased survey approach is necessary:

Pre-Campaign Survey: Conduct a survey before the campaign begins, ideally under weather conditions similar to those expected during the campaign (no precipitation, rain, and snow).

During/Post-Campaign Survey: Conduct surveys toward the end and immediately after the campaign concludes, again covering various weather conditions.

Long-Term Follow-up Survey: Conduct a survey at least one year after the campaign ends, ideally during the same season(s) as the campaign, and under varying weather conditions. More frequent data collection (autumn, winter, spring, summer) would further enhance understanding.

This multi-phased approach allows for the calculation of the modal split KPI at different stages:

Pre-campaign: Establishes baseline travel behaviour and how weather influences mode choice.
Post-campaign: Measures the immediate impact of the campaign.
Long-term: Assesses the lasting effects and behavioural changes resulting from the campaign.

This comprehensive data collection allows for a thorough evaluation of the campaign's success and its long-term impact on travel patterns.

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Community Goal	Scope	General indicator	ID	Example KPI	Transport/Active mobility management	Infrastructure	Maintenance	Measure applicable to local conditions?	Weather dependent	Lighting-dependent	Data collection method
Travel Performance/ Traffic Performance/ Connectivity	Travel distance related	Distance between pedestrian/bicycle crossings	TP.1	Average or actual distance between two crossing opportunities / "crossing opportunity density"	+	+	+	+	-	-	E
		Number of short trips	TP.2	Portion/Number of trips under *3* kilometers	+	+	+	-	+	+	B,C,D
		Average travel distance	TP.3	Average trip distance Average commute distance	+	+	+	+	+	+	B,C,D
	Travel time related	Average travel time	TP.4	average travel time/speed and variations (by mode)	+	+	+	+	+	+	A2,B,C,D
		Delay	TP.5	average delay and variations (by mode)	+	+	+	+	+	+	A, C, D
		Congestion	TP.6	Weighted average per trip of peak period travel times relative to free-flow travel times taking into account traffic rules on the main corridors for both modes.	+	+	+	+	+	+	A,C,D
		Commuting travel time	TP.7	average commuting travel time/speed and variations (by mode)	+	+	+	-	+	+	A2,B,C,D
	Level of Service related	Level of service	TP.8	level of service for pedestrians and cyclists	+	+	+	+	+	+	A, C, D, I
	Network completness related	Pedestrian space	TP.9	proportion of public right-of-way dedicated to pedestrian activities	+	+	-	+	-	-	E, I
		Network completness	TP.10	Percentage of completeness of network/facilities for pedestrians and cyclists in relation to target plans	+	+	-	+	-	-	E, I
		Multimodal integration	TP.11	An interchange is any place where a traveller can switch from one mode of travel to another, with a minimum/ reasonable amount of walking or waiting. The more modes available at an interchange, the higher the level of multimodal integration.	+	+	+	+	-	-	E, I
		Connectivity (Intermodal Connectivity) index	TP.12	Intersection Density Network Density Connected Node Ratio Link-To-Node Ratio Polygon Density	+	+	-	+	-	-	E, I
	Lenght/scope of Pedestrian/Bicycle Facilities related	Kilometers of pedestrian/bicycle facilities	TP.13	lenght or/and number of active mobility facilities	+	+	-	+	-	-	E, I
	Number of Trips related	Volume of pedestrians/cyclists	TP.14	The measured (i.e., counted) number of pedestrians and bicyclists in a specified area for a designated period of time.	+	+	+	+	+	+	A1, A2, C, D
		Vehicle kilometers traveled (VKT) impacts	TP.15	VKT	+	+	-	+	+	+	A1, A2, D, E
	Person Throughput/Capacity related	Occupancy rate	TP.16	Public Transport Occupancy rate	+	-	-	+	+	+	A1, A2, B2, D
		Person throughput	TP.17	Maximum number of persons that can move along a road corridor, through an intersection etc., capacity utilisation rate	+	+	+	+	+	+	A, B1, B2, D, I
	Route Directness/Different modes integration	Urban functional diversity	TP.18	Functional diversity refers to a mix of spatial functions in an area, creating proximity of mutual interrelated activities	+	+	-	-	-	-	E, F
		Route Directness	TP.19	the ratio of the shortest path route distance to straight-line distance for pairs of selected points	+	+	+	+	+	+	C2, C5, C8, D, E

Community Goal	Scope	General indicator	ID	Example KPI	Transport/Active mobility management	Infrastructure	Maintenance	Measure applicable to local conditions?	Weather dependent	Lighting-dependent	Data collection method
Travel Performance/ Traffic Performance/ Connectivity	Route Directness/Different modes integration	Level of integration of various transport modes	TP.20	Number and frequency of the connections between the different transport modes and the reported good	+	+	+	+	+	+	B2,E, F, I
	Resilience for disaster/ecologic/social disruptions	Operation continuity by transport mode	TP.21	Number of connections provided under different types of disruptions by traffic mode	+	+	+	-	+	+	D, E, I
Safety	Incidents/Accidents/Collisions related	Traffic accidents	SF.1	Number and severity of traffic accidents/collisions	+	+	+	+	+	+	A1, A2, F,H, I
		Traffic safety active modes	SF.2	Fatalities of active modes users in traffic accidents in the city in relation to their exposure to traffic.	+	+	+	+	+	+	F, H, I
		Road deaths	SF.3	Road deaths by all transport accidents in the urban area or at intersection/crossing/road section on a yearly basis.	+	+	+	+	+	+	F, H, I
		Traffic conflict index	SF.4	Number and severity of traffic conflicts by type	+	+	+	+	+	+	A1, A2, D, H
	Adherence to Traffic Laws related	Number and types of citations issued	SF.5	Number of citations/fines depend on the type of violation	+	+	-	+	+	+	A1, A2, H
		Number of observed violations	SF.6	Number of actually observed violations over certain period of time / Number of violations extracted from	+	+	+	+	+	+	A1, A2, H
Environment	GHG Emission & Local Air Pollution Related	Greenhouse gas emissions (GHG)	EN.1	Tonne CO2 equivalent well-to-wheel emissions by urban transport per annum per capita	+	+	+	+	+	-	D,F,J
		Air pollutant emissions	EN.2	Air pollutant emissions of all passenger and freight transport modes (exhaust and non-exhaust for PM2.5) in the urban area.	+	+	+	+	+	-	D,F,J
	Noise pollution	Noise hindrance	EN.3	Hindrance of population by noise generated through urban transport.	+	+	+	+	+	-	D,F,J
	Land Consumption related	Land consumption	EN.4	the percentage of land consumed by a development scenario, comparison of land consumption to population growth	-	+	-	+	-	-	E, F
	Energy Consumption	Energy efficiency	EN.5	Total energy use by urban transport per passenger km and tonne km (annual average over all modes).	+	+	-	+	+	-	B,D
Society/ Travel Behaviour/ Quality of Life	Physical Activity and Health related	Physical Activity and Health	TB.1	Physical activity level per capita, the portion of the population that is physically active, health attributes	+	+	+	+	+	+	B, C6, D, J
	Accessibility related	Mobility space usage	TB.2	Proportion of land use, taken by all city transport modes, including direct and indirect uses.	-	+	-	-	-	-	E, F
		Opportunity for active mobility	TB.3	Infrastructure for active mobility, namely walking and cycling. The length of roads and streets with side walks and bike lanes and 30 km/h (20 km/h) zones and pedestrian zones related to total length of city road network (excluding motorways).	+	+	+	-	+	+	B1, B2, D, E, I
		Access to jobs	TB.4	total number of jobs that can be accesed in given perion of time ratio of jobs accesed by automobile to those accesed by walk/bike/transit	+	+	+	+	+	-	E, F, G
		Density of destinations	TB.5	density, travel demand	+	+	-	+	-	-	D,E,F
		Adherence to accessibility laws	TB.6	Proportion of infrastructure adhering to accesibility laws	+	+	-	+	-	-	I
		Access to community destinations from mobility services	TB.7	Proportion of habitants (residences) within walking or biking distance of specific key destinations	+	+	+	+	+	-	E, F

Community Goal	Scope	General indicator	ID	Example KPI	Transport/Active mobility management	Infrastructure	Maintenance	Measure applicable to local conditions?	Weather dependent	Lighting-dependent	Data collection method
Society/ Travel Behaviour/ Quality of Life	Facility Maintenance	Facility maintenance	TB.8	eg. Infrastructure Condition Index, % of facilities accessible to the disabled taking into account weather conditions (snow, puddles, ice)	+	+	+	+	+	-	I
	Modal Split/Population Served by Walk/Bike/Public Transport	Population Served by Walk/Bike/Public Transport	TB.9	Percent of population with defined access to public transport via AM modes	+	+	+	+	+	+	B, D, E, F
		Motorization Rate	TB.10	Number of vehicles per 1000 habitants	+	+	-	-	-	-	F
	Modal Split/Population Served by Walk/Bike/Public	Modal split	TB.11	The proportion of total trips by transportation mode	+	+	+	+	+	+	A2,B,C,D, E, F
	Livability related	Street trees	TB.12	The number of trees on a street or other area	-	+	+	+	-	-	E
		Quality of public area	TB.13	The perceived satisfaction of public spaces.	-	+	+	+	-	+	A, B
	Transportation-Disadvantaged Population Served	Transportation-Disadvantaged Population Served	TB.14	The proportion of low income, minority, senior, and disabled populations with access to pedestrian, bicycle, and public transport infrastructure and services	+	+	+	+	+	+	B1, B2, E, F, I
	Equity related	Accessibility of public transport for mobility-impaired groups	TB.15	This indicator determines the accessibility of public transport services to persons with reduced mobility. Such vulnerability groups include those with visual and audial impairments and those with physical restrictions, such as pregnant women, users of wheelchairs and mobility devices, the elderly, parents and caregivers using buggies, and people with temporary injuries.	+	+	+	+	+	+	B1, B2, E, F, I
		Affordability of transport for poorest group	TB.16	Share of the poorest quartile of the population's household budget required to hold public transport (PT) passes (unlimited monthly travel or equivalent) in the urban area of residence.	+	-	-	-	-	-	F, G
	User Perceptions related	Security	TB.17	Security perception, volume/speed values, Reported perception about crime-related security in the city transport system (including freight and public transport, public domain, bike lanes and roads for car traffic and other facilities such as car or bike parking)	+	+	+	+	+	+	A1, A2, B1, B2, B3, I
		Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB.18	Average reported satisfaction about comfort of city transport and of pleasure of moving in the city area.	+	+	+	+	+	+	B2
Economic	Costs of (new) infrastructure development and maintenance	Transportation infrastructure costs	EC.1	Spending on transportation/Total spending Spending on PT/Increase of passangers Spending on	+	+	+	+	-	-	B, D, F, G
	Vehicle operating costs related	Vehicle Operation Costs	EC.2	Cost of PT operation (total / per passenger / per kilometer / per passengerkm)	+	-	-	-	-	-	B, D, G
	Monetary attractiveness related (e.g. land value, Retail Impacts)	Retail Impacts	EC.3	The commercial impacts (e.g., change in revenue, spending habits) and the ability to access retail establishments (e.g., the mode used to access the establishment) by pedestrians and bicyclists as a result of transportation investment	+	+	+	+	+	+	B
		Transport-related net public finance	EC.4	Net government and other public authorities' revenues from transport-related taxes and charges minus operational and other costs per GDP; investments are excluded from the parameter calculation.	+	+	+	-	-	-	F
		Land value	EC.5	the change (or expected change) in unimproved property value, development impacts through changes in improved property value and investments	-	+	-	+	-	-	E, F, I
	Economic opportunity	Economic opportunity	EC.6	Citizens' perception of potential difficulties in accessing the job market and/or education system due to mobility network.	+	+	-	-	-	-	D,E,F,I
	Job creation	Job creation	EC.7	Number of jobs created, Retail sales tax findings	+	+	+	+	-	-	F

Data sources			
A1	Counting - manual	D	Transport models (demand models, network models, simulation models - maroscopic, mesoscopic, microscopic)
A2	Counting - automated (counters or city ITS services)		
B1	Travel survey - travel diary	E	GIS data (on schools, parks, healthcare centers, and other daily destinations, data on transportation network
B2	Travel survey - interview	F	Census data, local city data (population, employment etc)
B3	Travel survey - web-based		
B4	Travel survey - GPS-equipped	G	Local transportation costs (e.g., fuel prices, Public Transport fares).
C1	Mode unspecified (Cell tower mobile phone positioning)	H	Police statistics, Police data bases
C2	Mode unspecified (App location-based service)	I	City inventory data for infrastructure: • Roadways • Sidewalks • Signals • Curb Ramps • Share Use Paths • On-street parking • Bus stops • Bicycle facilities
C3	Mode unspecified (Wi-Fi/Bluetooth)		
C4	Mode specified (Wi-Fi/Bluetooth + identification algorithms)		
C5	Mode specified (personalised tracking app)		
C6	Mode specified (fitness tracking app)		
C7	Mode specified (bike-share system, car-share system)		
C8	Mode specified (GPS- eqipped)	J	Health indicators, health rankings

APPENDIX 2

Analysis of the Monitoring Guidance survey

Introduction

The Monitoring Guidance Survey was created with the purpose to:

- Evaluate of the use of data, indicators, and indicator estimation methods in the decision-making process for intervention selection (planning and selection process) and in monitoring the effects of interventions/experiments by cities.
- Develop a data audit template (for cities to identify gaps in strategies, data collection methods, and data analysis to monitor the progress of experiments, activities, and interventions) to be part of the Monitoring Guidance.

An analysis of the survey is divided into two parts:

1. Summary of findings based on closed-ended questions, which were intended to frame the problem in a quantitative way and to provide a detailed overview of the current situation regarding indicators and data sources used by cities.
2. Summary of findings based on open-ended questions, designed to provide cities more space to share their opinions and problems related to monitoring active mobility and to provide an insight into challenges in monitoring pilot measures to be implemented during the BATS project.

The analysis is supplemented with a synthetic overview of survey results to give a detailed insight into the baseline material which was used to prepare a summary.

Summary of findings based on closed-ended questions

1. The majority (7 out of 8) municipalities adopt policy objectives to increase active mobility and half of them conduct studies or surveys to assess the perception of transport users.
2. Most cities (5 out of 8) use performance indicators in the planning process of mobility-related activities, which are supported by surveys and studies on travel behaviour (6 out of 8 cities).
3. Although they have set policy objectives for active mobility (AM) and conducted studies on travel behaviour, half of municipalities formal process of selecting indicators for AM, which can hinder the planning process efficiency. Still, most cities (5/8) have seasonal data on modal split, which is a solid starting point for the development of more comprehensive monitoring system. <u>It is important to note that six out of eight municipalities have data on travel-related accidents, which supports well-informed decisions regarding travel safety measures</u>.
4. The review of indicators that are currently used by the municipalities surveyed shows a connection to the information from the previous section. The indicators used most frequently were the monitoring of traffic accidents, road deaths, and the

motorisation rate (6 cities). The second most common group of indicators (5 cities) included modal split, vehicle operation costs and number of roadside trees. Both the modal split and the motorisation rate could be linked to seasonal modal split, highlighting concern about the commuting patterns in these cities.
More detailed indicators of active mobility such as length of pedestrian / bicycle infrastructure, the volumes of pedestrians / cyclists or the public transport occupancy rate were used in half of the municipalities.
Problem-orientated indicators such as the number of short trips, network coherence, or air/noise pollution were less common, selected only by three cities.
In summary, currently used indicators allow for a low to moderate level of detail regarding active mobility planning when all BATS cities are concerned.

5. Summary of indicators currently used by cities (described in the preceding section), planned for use, and those which cities would like to use but cannot due to various factors (the latter two described in the following sections) are presented in a table below.

City	Currently in use	Plans to use	Wants to use, but cannot
Hamburg	19	0	3
Gdynia	13	6	4
Klajpeda	11	1	7
Lathi	19	3	21
Kili	0	0	0
Umea	18	0	3
Porvo	21	9	10
Kalundborg	18	5	8

6. Cities were also asked to indicate indicators that are planned for implementation in the near future. It should be stressed that only two cities intend to do so. These indicators are pedestrian space, mobility space usage, access to community destinations from mobility services, and transportation-disadvantaged population served. The limited inclination to use new indicators may be attributed either to the general mobility monitoring framework or the inability to provide adequate data for indicators. Some of the remaining indicators were also selected, but only by single cities. The general picture here shows that there is a limited tendency to introduce new indicators, which limits the potential for effective active mobility policy making.

7. Some light may be shed on the limited inclination to use new indicators when another question is the analysed, which is declaration of indicators cities would like to use, but cannot due to various circumstances. Indicators selected here belong to several functional categories, which suggests that there are various expectations related to them. These indicators are: travel delay, number of observed violations, satisfaction with public transport/walking and cycling. It might be assumed that these indicators are a further refinement of indicators already in use and are selected to answer specific challenges in active mobility planning.
Other indicators mentioned in this category seem to follow the same pattern as

above. These are, among others: number of short trips, average travel time, opportunity for active mobility, access to jobs, and quality of public space.

8. The verification of the potential for active mobility monitoring will be complemented with an overview of indicators not planned for implementation. This provides valuable insight into the current needs of the cities as well as their perceived functional limitations of monitoring activities. Decision to exclude selected indicator may be dictated by an evaluation of its usefulness with regard to, e.g., data acquisition costs and not necessarily means that the indicator is considered irrelevant.
   Once again, the indicators most commonly selected by cities fall into various groups. Some of them are traffic-related indicators such as congestion level. There are also indicators that may be considered as combining several aspects of active mobility, such as the connectivity between operations index or operation connectivity by transport mode. Another group of indicators is related to spatial and economic aspects of mobility, including the potential for job creation and density of destinations. <u>As a common factor, all indicators excluded by cities are quite complex and specific and might be difficult to monitor on the regular basis, without direct incentive or even obligation to use them</u>.

9. In order to synthetise their approach to indicators, cities were asked to indicate their subjective perception of indicators importance. When combined with previous information such data gives an opportunity to understand both potential and drivers for monitoring active mobility in local context.
   <u>it should be stressed out, that subjective ranking of indicators importance might not directly translate into willingness to use selected indicators due to circumstances described previously</u>. The latter finds its confirmation in an observation, that is some areas answers to this question does not fully converge with results from previous questions. Traffic accidents, road deaths and modal split were indicated both as in current use and highly important. However, quality of public space and population served by walk/bike/public transport were considered as very important, but seldom used in current practice and not intended to be used in future. Also average travel distance, multimodal integration, traffic safety across modes and air pollution were considered as important (each indicated 3 times), but not present in current use.

10. To provide a quick overview of cities' perception of indicator importance, a weighted score was calculated for each indicator. Only ratings from 2 (slightly important) to 5 (very important) were taken into account, excluding 1 (not important at all) or lack of opinion. The values were normalised from 0 to 100 to facilitate the interpretation of the ranking. The five most important indicators were:
    a) Traffic accidents (SF1) – score 100
    b) Volume of pedestrians and cyclists (TP14) – score 92,31
    c) Modal split (TB11) – score 92,31
    d) Traffic safety active modes (SF2) – score 88,46
    e) Greenhouse gas emissions (EN1) – score 84,62

    For comparison, the least important indicators were:

a) Job creation (23,08)
b) Operations continuity by transport mode (TP21) – 11,54
c) Congestion (TP6) – score 7,69
d) Urban functional diversity (TP18) – score 3,85
e) Intermodal connectivity index (TP12) – score 0,00

10. Rating the barriers in monitoring active mobility led to expected conclusions. 6 cities indicated financial problems are a very important barrier. Lack of staff was rated as very important by 3 cities and fairly important by 4. Lack of knowledge was not top rated, as 3 cities marked it as fairly important and 3 as important. Among other potential barriers, lack of political will was rated very important by 3 cities and fairly important by 4, which highlights the importance of this factor as a driver for introducing changes in the active mobility planning system. The lack of data concerned cities where 4 of them marked this factor as fairly important. However, this category was ranked lower than lack of staff.

Summary of findings based on closed-ended questions

1.2. Briefly describe the active mobility objectives

Regarding the adoption of active mobility objectives, the predominant option among participating cities was to increase the combined modal share of public transport, walking and cycling. Two cities (Lahti, Umea) stated tangible targets in this regard, while Kalundborg cycling policy sets a tangible target for children cycling to school. However, only one city (Hamburg) mentioned building AM-related infrastructure as the main objective, followed by soft incentives and awareness & knowledge building for the public. In most cases, active mobility is considered a solution that promotes a healthy lifestyle, improves physical activity, and reduces carbon footprint.

1.6. Who is responsible for selecting measures to develop active mobility in the planning and monitoring processes in your city/region?

As a general rule, measures are selected at the city level. However, there is an internal diversity regarding the actual place where decisions are made. In most cases, it is decided by the scale and cost of the measure to be implemented. For large-scale interventions, the city council may be required to make decisions. For other measures, local transport departments, SUMP teams, or traffic planners. In Hamburg, due to the specificity of its local authority structure, some decisions are made at the upper ministry-state level (those related to general mobility change objectives), while other decisions are delegated to districts.

2.2. Do your travel distance/travel time observations allow seasonal comparison (i.e., summer vs. winter)?

Six out of eight cities responded positively to this question. Still, there is a major differentiation in the actual level coverage of this matter. Some municipalities pointed to the lack of resources available to make consistent observations, which limiting the availability of reliable data. There were also differences between municipalities in the same region in terms of seasonal data availability. Porvoo indicated a problem related to the National Travel Survey, which covers yearly variation, but is done every 4 years. Umea declared that the results of the municipal travel survey carried out in the fall are confronted with the summer and winter surveys with regard to particular measures.

2.5. Does the data (on travel-related accidents) allow to identify any YRAM-related factors (time of day, weather, etc.)?

In general, in most cities it is possible to identify some YRAM-related factors. The most frequent cases were time of day, month, and year. In Lahti, the weather conditions were mentioned. The common issue related to the accident database was that AM-related incidents would not be reported.

2.7. Do you have the ability to monitor transport emissions levels in specific areas of the city? How do you measure emission levels?

Six out of eight municipalities were denied the ability to monitor transport emissions in specific areas of the city. In other cases meteo stations or other fixed instruments were mentioned for air quality measurement.

2.8. Are data or methods available to calculate traffic pollution in your city? What are these data sources and methods?

In contrast to the previous question about transport emissions in specific areas, there are solutions to estimate this factor at the general city-level scale. Data might be aggregated from air quality monitoring stations for the whole city (Klaipeda) or extracted from agglomeration level models (as in Gdynia). It is also possible to do calculations based on unit emission levels (Lahti) or use a national calculation model (Porvoo), but because of the lack of transport-related data, the results are far from satisfactory.

2.15. What time periods are covered in your modal split?

The answers here proved a highly differentiated practice among the cities involved. In Hamburg it is regulated by a DIN standard, and the covered time is 6A – 9AM and 15 – 18PM. In Gdynia, no detailed information is available and a modal split survey is conducted in Autumn. In Klaipeda, only a year of recent survey was provided. Lahti conducts a full-year survey every two years. In Umea, the travel behaviour survey and traffic measurement are carried out in Autumn, but in 2025 winter will be covered. Porvoo has the whole year covered in the National Travel Survey every 4 years and Kalundborg has data for summer and winter.

2.18. What is the scope (city level, neighbourhood, street level, other – specify) of indicators that you use? (Open question, e.g.: SF.1 – city level, TP.1 – street level)

Half of the cities surveyed indicated that AM indicators are available at the city level (Gdynia, Klaipeda, Porvoo, Kalundborg). Umea indicated the local or urban level, where the latter might be identified as the city level. In Kiili, the indicators were mostly at the national level, with some available at the local level. Lahti provided a detailed overview of 18 indicators, where 5 were at city level, 2 at neighbourhood level, 9 at street level and 2 other (line level, which might be identified as road section).

2.21. Comments on the application of active mobility indicators in your city (e.g., other indicators in use than suggested in the indicator table)

Hamburg was concerned about the dispersion of the data between different departments and positions. On the other hand, Umea was confident with their indicators as a solid base for informed planning in the future. Porvoo pointed out that many of the indicators in use do not have a formalised mechanism of processing and follow-up, as they are provided on the request from policymakers or planners.

3.2. Who is responsible for the analysis of data on active mobility indicators? Transport indicators? Please provide a relevant department, position, etc. If no dedicated active mobility indicators are used, indicate who is responsible for transportation planning or mobility data management at the city level

There were two groups of answers. The predominant one with four cities indicated that various municipal departments are responsible for this task, such as transport departments, the department of building environment, the city transport board, the road and park departments. These units might be supported when needed by other units such as the GIS department. The second group of cities (Hamburg and Gdynia) pointed out that different units deal with mobility indicators.

3.3. Are these data obtained from city departments, ITS/Smart City services, or external services (e.g., car sharing or bike sharing systems, data from transport companies)?

The answers here proved a mixed approach among the municipalities involved. Two of them use external (national) sources of data (Kalundborg and Porvoo). Other cities use internal data, sometimes supplemented with information from PT operators, bike sharing systems, and transport companies. National surveys were also included there.

3.5. Are there tools/software available in the city to calculate the results? List the software you use

The answers revealed that there is no common approach to calculate the results. In some cases, surveyees were not sure about the software is in use as it is operated by various units. Porvo and Lahti use traffic simulation tools or QGIS, MS Power Query (Excel, PowerBI), and R Studio, respectively. Other cities use standard MS Office tools or apply software, depending on the case.

3.6. Do you use open data or share data within open data? What kind of data is it?

The responses varied from municipality to municipality. Hamburg was not sure about open data usage, the same as Umea. Gdynia both uses and shares open data, while Klaipeda and Lahti are able to share data on car parking availability and road traffic, respectively. Kiili does not share, but other municipalities have their own platform for data processing. Porvoo mentioned that open datasets might be used by external consultants.

3.7. Do you plan to share your data as open data? What kind of data is it?

Hamburg, Klaipeda, Porvoo and Kalundborg do not plan to share data. Lahti shares data on counting (traffic?) and Gdynia has a dedicated website for sharing data. Umea needs additional consultation with the statistics office to verify plans for data sharing, and Kiili does not own any data to share.

3.8. Do you plan to share your data from ITS/Smart City services as open data? What kind of data is it?

The responses directly mirror the previous question. Only Gdynia is sharing ITS/SmartCity data on a regular basis, and other cities do not.

3.9. What are the main barriers to the provision of data for active mobility indicators?

Porvoo mentioned the lack of data to begin with, as much of it is owned and shared by other actors. Other responses indicated inadequate expertise, funding, and other resources.

4.1. What should be the minimum set of indicators to monitor active mobility indicators in your city?

Six out of cities mentioned the modal split (TB111) as a desired indicator, while Kalundbord restricted itself to the number of cyclists in the summer and winter period. Hamburg defined an extensive list of indicators including: number of trips travelled per km/ average commute distance per day/ average commuting time spent by transport mode/ gender related commuting/travel trips & number per day/ summer-winter commuting travel behaviour. Gdynia added also data on infrastructure and Umea pointed out that 18-20 indicators should be rational for analysis, without deciding which ones. Kiili pointed out that they have no power to define indicators on regional level.

4.2. What should be the minimum set of indicators to monitor the YRAM indicators in your city?

In general, the results here mirrored the previous question with an additional requirement of coverage throughout the year. This was a case for Gdynia, Lahti, Porvoo, and Kalundborg. Hamburg added the following indicators: choice of transport modes winter-summer/ change of travel behaviour (from which mode of transport)/ number of single crashes during summer time and during winter time/ accidents during winter-summer time&reason. Umea and Kiili repeated their previous answers.

4.3. What data would you like to use to monitor active mobility?

The response here proved a very differentiated approach to the provision of data for monitoring active mobility, both concerning the scope of data coverage and its level of detail. In general, two groups might be roughly drawn out: one policy and user-orientated, and other traffic-orientated. In the first group Kalundborg mentioned user satisfaction survey while Kiili underlined the requirement to verify if the policy interventions are working. Also Kalipeda mentioned user satisfaction. Cities in the second group focused mostly on actual information on the traffic structure including various of users, number of users, distance travelled km/day/year/ and gender. Lafti mentioned using Google maps GPS tracking. Umea stressed the need to further investigate this issue by involving specialists from other departments to provide optimal results.

4.4. What data would you like to use to monitor YRAM?

The answers in this question correspond to the results of the previous questions. Hamburg added the number of users in summer-winter/km travelled in summer-winter/ gender. Porvoo also data on quality of winter maintenance.

4.5. What must be implemented (built, bought, done) in your city to enable effective monitoring of active mobility?

The response might be categorised into two categories. The first one is related to organisational aspects of working with data, while the second one is related to technical aspects of data provision. Under the first category, Hamburg highlighted the need for better understanding who collects and analyses data and what data are being provided. Lahti mentioned the need for advanced reporting on indicators. In the second category cities opted for regular modal split surveys (Gdynia), digital counters and annual coverage of data (Klaipeda), more local surveys supported by automatic counts (Porvoo), and recurring measurement carried out in summer and winter (Kalundborg).

4.6. What has to be implemented (built, bought, done) in your city to enable effective monitoring of YRAM?

In general, most of the answers repeated issues stated previously. However, there were some new observations related specifically to YRAM. Hamburg stressed to bring all data related to YRAM together in order to optimise its use. Gdynia suggested a possibility to upgrade existing traffic monitoring cameras in order to better recognise pedestrians and cyclists, as well as having regular modal split surveys multiple times in a year. Lahti mentioned the importance of the IT infrastructure to monitor YRAM and Umea highlighted the importance of travel survey during the winter months with the most snow coverage.

4.7.What are the main barriers to effective monitoring of active mobility?

The cities here raised two main factors. One is the lack of awareness and knowledge of the topic, and the other is insufficient financial and human resources. Another important barrier was insufficient political support toward monitoring of active mobility coupled with inadequate funding. Also, a small scale of several surveys was highlighted as a barrier to make a reliable statistical conclusions.

4.8. What are the main barriers to effective monitoring of YRAM?

The same issues were raised here as regarding the preceding question.

5.1. – 5.4 Questions related to pilot actions

Results are presented in the following table

City	5.1 Name of experiment and list of indicators for monitoring YRAM	5.2 What data do you need to estimate the indicators and how do you obtain them	5.3 What methods and tools do you intend to use to calculate KPIs	5.4 Do you plan to calculate KPIs with your resources or will you outsource them?
Hamburg	**Winter service** No indicators provided	Single crashes/accidents/ subjective-perceived safety/ qualitative data	countings/qualitative data	Both
Gdynia	**Thermal imaging sensors at 2 intersections** Indicators: TP.4, TP.5, TP.6, TP,7, TP.8, **Promotional and informational campaign** focused on increasing YRAM Indicators: TB.7, TB.11,	Data about travel time, routes, chosen mean of transport and waiting time for freen light on modified intersection. Data obtained from surveys and waiting time for freen light on modified intersection.	Collecting data from available sensors and conduct surveys KPIs will be calculated in-house using available software - propably Microsoft excel	Own resources
Klaipeda	No experiments	Do not know	Need suggestion and advise	Not decided yet
Kiili	**Kiili school accessibility pilot** No indicators provided	Counting (CCTV and visual evaluation)	To be confirmed	To be confirmed
Umea	**Lighting**- No indicators, but could be measured through satisfaction with pedestrian and cycle lanes where the projections will be installed. **Loan of electric bicycles** Share of cyclists, share of borrowed bikes Winter scouts & test travellers - start and final meeting, evaluation questionnaire will also be answered by citizens at the end of the activity. It will also be possible to see the number of users giving feedback through the error reporting system.	Satisfaction, mode split, suggestions for improvement, etc.	Through surveys, error reporting system, travel survey, dialogue at start and end meetings.	This depends on whether or not we have staff with that competence, we usually, and will continue to, calculate key figures. But sometimes we need to hire others to carry out measurements for us.
Porvoo	**3D modelling of an AM bridge** indicators to de decided **Winter agent programme** accessibility to bus stops, satisfaction in winter maintenance	Targeted surveys for the 3D modelling, the winter agent program pruduces itself data	To de decided	To de decided
Kalundborg	**Retrofitting Elmegade and light on Rynkevangen** User satisfaction and feeling of security. Numbers of cyclists	User satisfaction and feeling of security - survey. Numbers of cyclists - count.	Survey Xact	In house

Synthetic overview of the survey results

This section focuses on survey analysis of yes/no questions. There were 7 questions in total related do different aspects of active mobility and related data. The main conclusion that can be stated before in depth analysis is that there are at least two main groups of municipalities, when it comes to dealing with the data and monitoring: developed and developing (more advanced and less advanced). While there are some instances where certain municipalities can lay in between of these two categories, this division is made so two main paths of working with the partner cities can be prepared. The ones that are less advanced need more guidance related to making their first steps. If a municipality is not "developed" in terms of data, but already has some experience, they already are falling into the more advanced group, therefore at this stage only two groups are being identified.

Fig. 1 illustrates whether municipalities have set policy objectives to increase active mobility. The majority have set some kind of objectives, while only single municipality has not. However that single municipality also mentioned that while they do not have direct policies related to increasing active mobility, they have policies to decrease the usage of private vehicles.

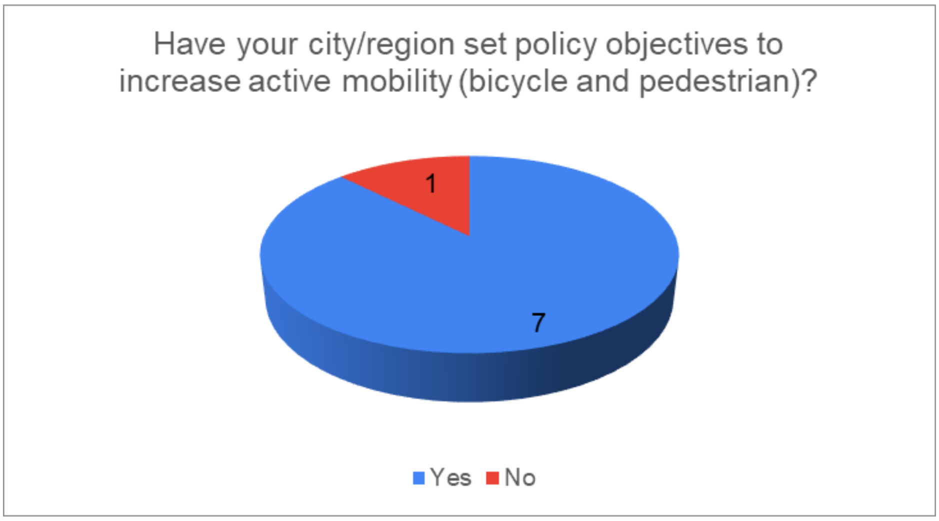


Fig. 1 Policy objectives to increase active mobility

Fig. 2 shows the distribution of municipalities conducting studies or surveys on transport user perceptions and preferences, such as security and comfort. The responses are evenly split, with four municipalities conducting such studies and four not doing so. Based on this question we can draw the main line between more advanced and less advanced municipalities (at least in terms of data maturity)

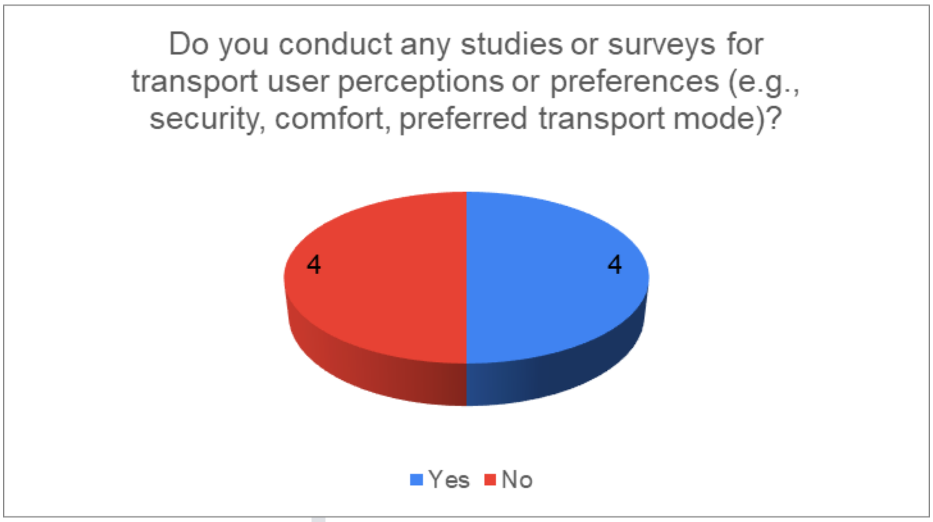


Fig. 2 Surveys regarding user preferences

Fig. 3 depicts whether performance indicators are used in planning and decision-making processes. Five of municipalities use these indicators, while three do not. This highlights a trend towards data-driven decision-making in many areas. The answers for "yes" generally overlap with conducting surveys from the previously described question.

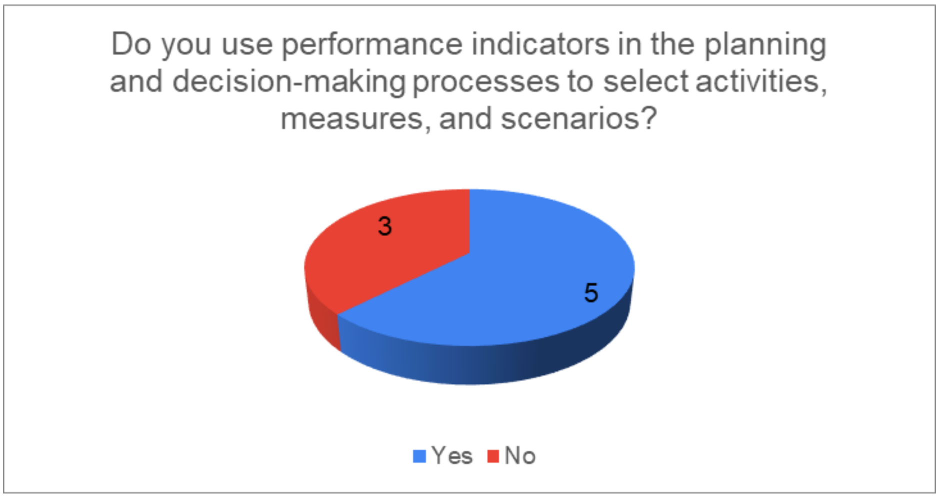


Fig. 3 Usage of indicators

Fig. 4 represents the number of municipalities conducting surveys on the travel behavior of inhabitants, including choice of transport mode and travel patterns. Most (six municipalities) conduct these surveys, while a minority (only two) do not, indicating a focus on understanding travel behaviors in all of the more advanced municipalities and some of the less advanced ones.

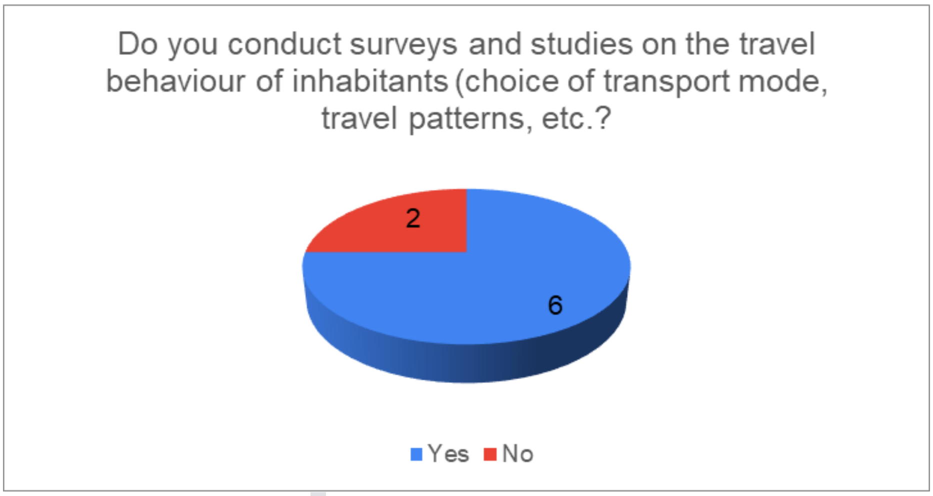


Fig. 4 Surveys regarding travel behaviour

Fig. 5 This pie chart shows whether municipalities have a formalized process for selecting indicators to develop active mobility. The responses are evenly split, with 4 municipalities having a formal process and 4 not having one. The important thing is the fact that some of the municipalities that were deemed as "more advanced" do not have formalised process of selecting indicators.

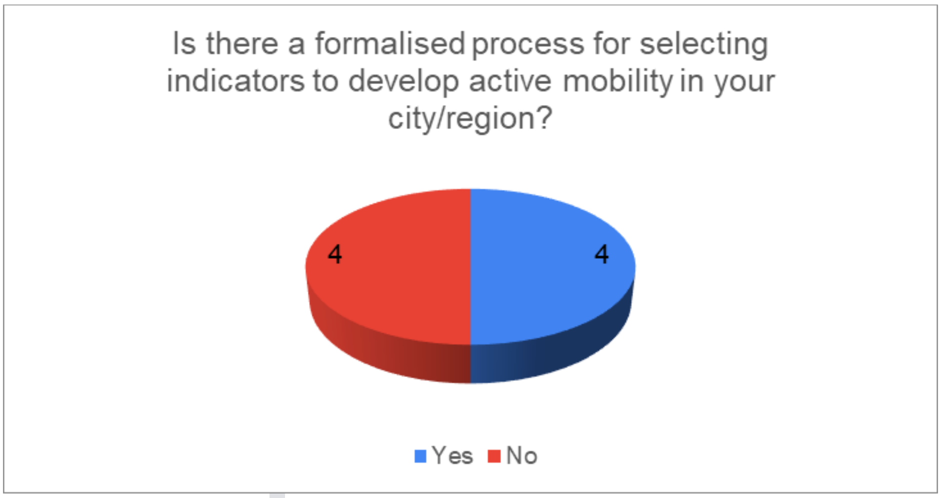


Fig. 5 Formalised process for selecting indicators

Fig. 6 This pie chart illustrates the availability of seasonal data on the modal split among municipalities. Similarly to some of the previous answers, a slight majority (five municipalities) have access to this data, while the others (three municipalities) do not. This suggests that the more advances municipalities generally are tracking how transportation mode choices vary with seasons, which can influence planning and policy decisions.

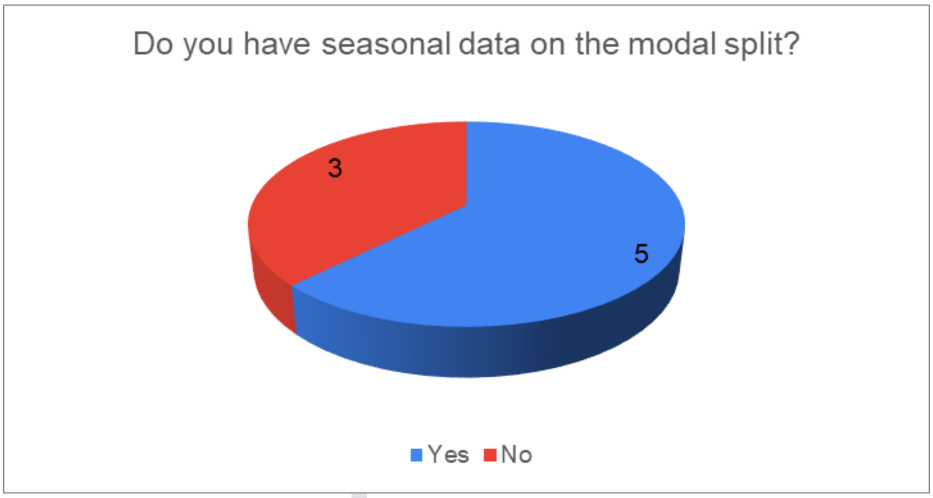


Fig. 6 Seasonal data on model split

Fig. 7 This pie chart depicts whether municipalities have access to data on travel-related accidents. Most municipalities have access, while only two do not. What is also important is the fact that in some countries there are national-wide statistics related to accidents, but the data is not available on the local level, therefore complicating the process of making well-informed decision in regards to safety.

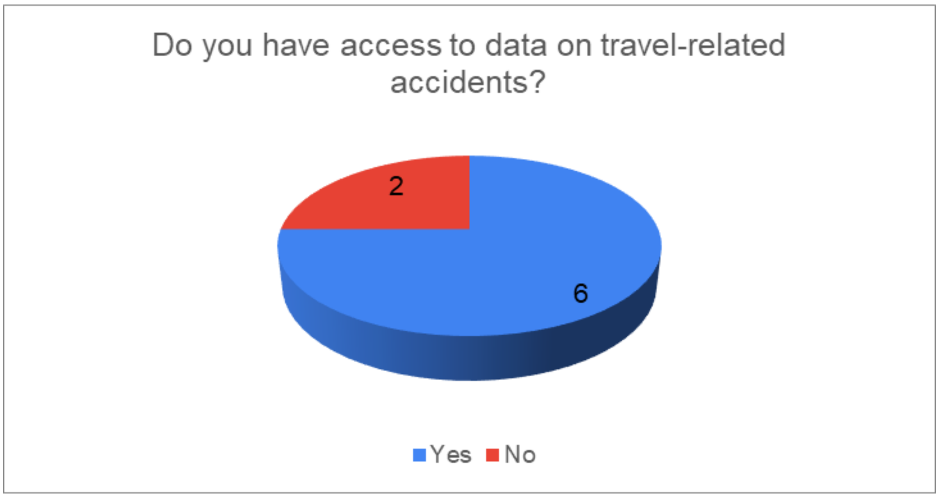


Fig. 7 Data on travel-related accidents

The next section is devoted to particular indicators. Municipalities were asked to provide information about whether they use an indicator, have plans to use it, want to use it but cannot due to some limitation or that they acknowledge the indicator and do not intend to use it. Option for "No opinion / no required information to answer" was also possible for the cities to select. The tables are divided into 4 categories based on possible responses:

- Currently in use (how many municipalities are using this indicator)
- Planning to use (how many municipalities plan to use this indicator in the future)
- Wants to use (how many municipalities want to use this indicator but can't due to different reasons e.g. not enough money, staff, etc)
- Not planning to use (how many municipalities acknowledge that they do not plan and do not want to use this indicator)

The numbers in the tables below show how many cities picked which option for which indicator. Given the number of indicators, the tables with results were further divided, but each category is stated in upper-right corner of every table.

Tab. 1 Indicators currently in use – scores: 6, 5, 4, 3

Indic. Name	Indic. No.	Currently in use
Traffic accidents	SF1	6
Road deaths	SF3	6
Motorization Rate	TB10	6
Modal split	TB11	5
Street trees	TB12	5
Vehicle Operation Costs	EC2	5
Kilometers of pedestrian/bicycle facilities	TP13	4
Volume of pedestrians/cyclists	TP14	4
Occupancy rate	TP16	4
Traffic safety active modes	SF2	4
Greenhouse gas emissions (GHG)	EN1	4
Accessibility of public transport for mobility-impaired groups	TB15	4
Transportation infrastructure costs	EC1	4
Number of short trips	TP2	3
Network completness	TP10	3
Person throughput	TP17	3
Air pollutant emissions	EN2	3
Noise hindrance	EN3	3
Physical Activity and Health	TB1	3
Opportunity for active mobility	TB3	3
Population Served by Walk/Bike/Public Transport	TB9	3
Security	TB17	3

Tab. 2 Currently in use – scores: 2, 1

Indic. Name	Indic. No.	Currently in use
Average travel distance	TP3	2
Level of service	TP8	2
Vehicle kilometers traveled (VKT) impacts	TP15	2
Route Directness	TP19	2
Level of integration of various transport modes	TP20	2
Adherence to accessibility laws	TB6	2
Access to community destinations from mobility services	TB7	2
Facility maintenance	TB8	2
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	2
Land value	EC5	2
Distance between pedestrain/bicycle crossings	TP1	1
Average travel time	TP4	1
Commuting travel time	TP7	1
Multimodal integration	TP11	1
Operation continuity by transport mode	TP21	1
Land consumption	EN4	1
Energy efficiency	EN5	1
Quality of public area	TB13	1
Transportation-Disadvantaged Population Served	TB14	1
Retail Impacts	EC3	1
Economic opportunity	EC6	1

Tab. 3 Currently in use – scores: 0

Indic. Name	Indic. No.	Currently in use
Delay	TP5	0
Congestion	TP6	0
Pedestrian space	TP9	0
Connectivity (Intermodal Connectivity) index	TP12	0
Urban functional diversity	TP18	0
Traffic conflict index	SF4	0
Number and types of citations issued	SF5	0
Number of observed violations	SF6	0
Mobility space usage	TB2	0
Access to jobs	TB4	0
Density of destinations	TB5	0
Affordability of transport for poorest group	TB16	0
Transport-related net public finance	EC4	0
Job creation	EC7	0

Total Indicator usage: The data shows that a variety of indicators are employed across municipalities, with a total of 119 instances of indicator usage.
Unique Indicators in use: There are 57 indicators listed, 14 of them are not in use by any of the municipalities that responded to the survey. This means, that 43 unique indicators are being used.

Most Commonly Used Indicators:

1. Traffic Accidents, Road Deaths, and Motorization Rate (6 municipalities each). This is group of most frequently used indicators, reflecting a strong focus on safety and number of vehicles per inhabitant.
2. Modal Split, Street Trees and Vehicle Operation Costs (5 municipalities each). This is second group of commonly used indicators highlight concerns about selection of transportation mode, costs of public transport and the number of trees.

Tab. 4 Planning to use – scores: 2, 1

Indic. Name	Indic. No.	Planning to use
Pedestrian space	TP9	2
Mobility space usage	TB2	2
Access to community destinations from mobility services	TB7	2
Transportation-Disadvantaged Population Served	TB14	2
Average travel distance	TP3	1
Average travel time	TP4	1
Multimodal integration	TP11	1
Kilometers of pedestrian/bicycle facilities	TP13	1
Occupancy rate	TP16	1
Urban functional diversity	TP18	1
Greenhouse gas emissions (GHG)	EN1	1
Access to jobs	TB4	1
Population Served by Walk/Bike/Public Transport	TB9	1
Modal split	TB11	1
Quality of public area	TB13	1
Accessibility of public transport for mobility-impaired groups	TB15	1
Affordability of transport for poorest group	TB16	1
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	1
Vehicle Operation Costs	EC2	1
Transport-related net public finance	EC4	1

Tab. 5 Planning to use – scores: 0

Indic. Name	Indic. No.	Planning to use
Distance between pedestrain/bicycle crossings	TP1	0
Number of short trips	TP2	0
Delay	TP5	0
Congestion	TP6	0
Commuting travel time	TP7	0
Level of service	TP8	0
Network completness	TP10	0
Connectivity (Intermodal Connectivity) index	TP12	0
Volume of pedestrians/cyclists	TP14	0
Vehicle kilometers traveled (VKT) impacts	TP15	0
Person throughput	TP17	0
Route Directness	TP19	0
Level of integration of various transport modes	TP20	0
Operation continuity by transport mode	TP21	0
Traffic accidents	SF1	0
Traffic safety active modes	SF2	0
Road deaths	SF3	0
Traffic conflict index	SF4	0
Number and types of citations issued	SF5	0
Number of observed violations	SF6	0
Air pollutant emissions	EN2	0
Noise hindrance	EN3	0
Land consumption	EN4	0
Energy efficiency	EN5	0
Physical Activity and Health	TB1	0
Opportunity for active mobility	TB3	0
Density of destinations	TB5	0
Adherence to accessibility laws	TB6	0
Facility maintenance	TB8	0
Motorization Rate	TB10	0
Street trees	TB12	0
Security	TB17	0
Transportation infrastructure costs	EC1	0
Retail Impacts	EC3	0
Land value	EC5	0
Economic opportunity	EC6	0
Job creation	EC7	0

There are four indicators that are planned to use by 2 different municipalities. These indicators are:

- Pedestrian Space (TP9)
- Mobility Space Usage (TB2)
- Access to Community Destinations from Mobility Services (TB7)
- Transportation-Disadvantaged Population Served (TB14)

These planned indicators reflect strategic priorities in enhancing pedestrian infrastructure, optimizing mobility space usage, improving connectivity, and ensuring equitable access to transportation services.

Some of the remaining indicators were planned by a single municipality, but most of them were not planned to be introduced at all. This might be due to the fact, that most commonly, if an indicator can be used – it is used. When it cannot be used due to e.g. lack of required data, cities do not plan to introduce it in the future, because the lack of data might come from different limitation related usually to budget. Therefore there are only few instances where indicators are actually planned, and more commonly, if they are needed, municipalities stated that they want to use certain indicator, but they cannot, and next section is devoted to that.

Tab. 6 Want but cannot – scores: 3, 2

Indic. Name	Indic. No.	Wants to use
Delay	TP5	3
Number of observed violations	SF6	3
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	3
Retail Impacts	EC3	3
Number of short trips	TP2	2
Average travel time	TP4	2
Congestion	TP6	2
Commuting travel time	TP7	2
Level of service	TP8	2
Route Directness	TP19	2
Operation continuity by transport mode	TP21	2
Traffic safety active modes	SF2	2
Greenhouse gas emissions (GHG)	EN1	2
Opportunity for active mobility	TB3	2
Access to jobs	TB4	2
Access to community destinations from mobility services	TB7	2
Quality of public area	TB13	2

Tab. 7 Want but cannot – scores: 1

Indic. Name	Indic. No.	Wants to use
Distance between pedestrain/bicycle crossings	TP1	1
Network completness	TP10	1
Volume of pedestrians/cyclists	TP14	1
Person throughput	TP17	1
Urban functional diversity	TP18	1
Level of integration of various transport modes	TP20	1
Traffic accidents	SF1	1
Road deaths	SF3	1
Traffic conflict index	SF4	1
Number and types of citations issued	SF5	1
Air pollutant emissions	EN2	1
Noise hindrance	EN3	1
Land consumption	EN4	1
Energy efficiency	EN5	1
Physical Activity and Health	TB1	1
Modal split	TB11	1
Security	TB17	1
Transport-related net public finance	EC4	1

Tab. 8 Want but cannot – scores: 0

Indic. Name	Indic. No.	Wants to use
Average travel distance	TP3	0
Pedestrian space	TP9	0
Multimodal integration	TP11	0
Connectivity (Intermodal Connectivity) index	TP12	0
Kilometers of pedestrian/bicycle facilities	TP13	0
Vehicle kilometers traveled (VKT) impacts	TP15	0
Occupancy rate	TP16	0
Mobility space usage	TB2	0
Density of destinations	TB5	0
Adherence to accessibility laws	TB6	0
Facility maintenance	TB8	0
Population Served by Walk/Bike/Public Transport	TB9	0
Motorization Rate	TB10	0
Street trees	TB12	0
Transportation-Disadvantaged Population Served	TB14	0
Accessibility of public transport for mobility-impaired groups	TB15	0
Affordability of transport for poorest group	TB16	0
Transportation infrastructure costs	EC1	0
Vehicle Operation Costs	EC2	0
Land value	EC5	0
Economic opportunity	EC6	0
Job creation	EC7	0

The indicators most commonly (three times) selected as wanted, but unable to be introduced due to some barriers are:

- Delay (TP5)
- Number of Observed Violations (SF6)
- Comfort and Pleasure: Satisfaction with Public Transport, Walking, Cycling (TB18)
- Retail Impacts (EC3)

Some of the remaining indicators were also mentioned by 1 or 2 municipalities, however many of them were not selected for this category at all. This can be due to three reasons:

- Cities do not intend to use these indicators because they do not think it will be valuable for their situation
- Cities already use this indicator
- Cities do not know yet if these indicators are useful or not

Tab. 9 Not planning to use – scores: 3, 2

Indic. Name	Indic. No.	Not planning to use
Congestion	TP6	3
Connectivity (Intermodal Connectivity) index	TP12	3
Operation continuity by transport mode	TP21	3
Traffic conflict index	SF4	3
Number and types of citations issued	SF5	3
Density of destinations	TB5	3
Adherence to accessibility laws	TB6	3
Facility maintenance	TB8	3
Transportation infrastructure costs	EC1	3
Job creation	EC7	3
Distance between pedestrain/bicycle crossings	TP1	2
Delay	TP5	2
Commuting travel time	TP7	2
Pedestrian space	TP9	2
Land consumption	EN4	2
Opportunity for active mobility	TB3	2
Quality of public area	TB13	2
Economic opportunity	EC6	2

Tab. 10 Not planning to use – scores: 1

Indic. Name	Indic. No.	Not planning to use
Average travel distance	TP3	1
Average travel time	TP4	1
Level of service	TP8	1
Multimodal integration	TP11	1
Kilometers of pedestrian/bicycle facilities	TP13	1
Vehicle kilometers traveled (VKT) impacts	TP15	1
Occupancy rate	TP16	1
Person throughput	TP17	1
Urban functional diversity	TP18	1
Level of integration of various transport modes	TP20	1
Traffic safety active modes	SF2	1
Number of observed violations	SF6	1
Air pollutant emissions	EN2	1
Noise hindrance	EN3	1
Mobility space usage	TB2	1
Population Served by Walk/Bike/Public Transport	TB9	1
Motorization Rate	TB10	1
Street trees	TB12	1
Transportation-Disadvantaged Population Served	TB14	1
Affordability of transport for poorest group	TB16	1
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	1
Vehicle Operation Costs	EC2	1
Transport-related net public finance	EC4	1
Land value	EC5	1

Tab. 11 Not planning to use – scores: 0

Indic. Name	Indic. No.	Not planning to use
Number of short trips	TP2	0
Network completness	TP10	0
Volume of pedestrians/cyclists	TP14	0
Route Directness	TP19	0
Traffic accidents	SF1	0
Road deaths	SF3	0
Greenhouse gas emissions (GHG)	EN1	0
Energy efficiency	EN5	0
Physical Activity and Health	TB1	0
Access to jobs	TB4	0
Access to community destinations from mobility services	TB7	0
Modal split	TB11	0
Accessibility of public transport for mobility-impaired groups	TB15	0
Security	TB17	0
Retail Impacts	EC3	0

The indicators that are not planned to be used by municipalities relate to different aspects of mobility. The fact that they are selected does not mean that they are not useful at all. This means that municipalities that selected them in this category acknowledge the information that they bring and they do not think that this piece of information will be important to their current situation. Another possibility is the fact that certain municipalities are aware of the limitations related to data currently and know that in
the nearest future there is no possibility of introducing such indicator, therefore they do not plan to use it.
From the mentioned indicators (three times) there are 3 related to travel performance, 3 related to travel behaviour, 2 related to economic aspects and 2 related to safety aspects, so the categories of these indicators are relatively evenly distributed except for the environmental indicators, that rarely appeared in this category.

Municipalities were asked to assign a rank to every indicator based on their perception of importance of every indicators. The ranks are: 5 – Very important, 4 – fairly important, 3 – important, 2 – slightly important, 1 – not important at all
The numbers in the tables below show how many cities picked which option for which indicator. The option of selecting "0 – no opinion" was also possible.

Tab. 12 Very important – scores: 5, 4, 3

Indic. Name	Indic. No.	Very Important
Traffic accidents	SF1	5
Quality of public area	TB13	5
Road deaths	SF3	4
Population Served by Walk/Bike/Public Transport	TB9	4
Modal split	TB11	4
Average travel distance	TP3	3
Multimodal integration	TP11	3
Traffic safety active modes	SF2	3
Greenhouse gas emissions (GHG)	EN1	3
Air pollutant emissions	EN2	3
Facility maintenance	TB8	3
Motorization Rate	TB10	3
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	3
Transportation infrastructure costs	EC1	3
Vehicle Operation Costs	EC2	3

Tab. 13 Very important – scores: 2

Indic. Name	Indic. No.	Very Important
Number of short trips	TP2	2
Pedestrian space	TP9	2
Network completness	TP10	2
Volume of pedestrians/cyclists	TP14	2
Vehicle kilometers traveled (VKT) impacts	TP15	2
Occupancy rate	TP16	2
Person throughput	TP17	2
Level of integration of various transport modes	TP20	2
Noise hindrance	EN3	2
Land consumption	EN4	2
Energy efficiency	EN5	2
Physical Activity and Health	TB1	2
Opportunity for active mobility	TB3	2
Density of destinations	TB5	2
Access to community destinations from mobility services	TB7	2
Street trees	TB12	2
Transportation-Disadvantaged Population Served	TB14	2
Security	TB17	2
Retail Impacts	EC3	2

Tab. 14 Very important – scores: 1

Indic. Name	Indic. No.	Very Important
Average travel time	TP4	1
Delay	TP5	1
Level of service	TP8	1
Kilometers of pedestrian/bicycle facilities	TP13	1
Traffic conflict index	SF4	1
Number and types of citations issued	SF5	1
Number of observed violations	SF6	1
Mobility space usage	TB2	1
Access to jobs	TB4	1
Adherence to accessibility laws	TB6	1
Accessibility of public transport for mobility-impaired groups	TB15	1
Affordability of transport for poorest group	TB16	1
Transport-related net public finance	EC4	1
Land value	EC5	1
Economic opportunity	EC6	1
Job creation	EC7	1

Tab. 15 Very important – scores: 0

Indic. Name	Indic. No.	Very Important
Distance between pedestrain/bicycle crossings	TP1	0
Congestion	TP6	0
Commuting travel time	TP7	0
Connectivity (Intermodal Connectivity) index	TP12	0
Urban functional diversity	TP18	0
Route Directness	TP19	0
Operation continuity by transport mode	TP21	0

The indicators most commonly selected as very important are:

- By five municipalities:
    - Traffic accidents (SF1)
    - Quality of public area (TB13)
- By four municipalities:
    - Population served by walk/bike/public transport (TB9)
    - Modal Split (TB11)
    - Average Travel Distance (TP3)

Many of the remaining indicators were also mentioned by at least one municipality as very important, but there were only few that were never selected for this category:

- Distance between pedestrian/bicycle crossings
- Congestion
- Commuting travel time
- Connectivity Index
- Urban functional diversity
- Route Directness
- Operation continuity by transport mode

Tab. 16 Fairly important – scores: 4, 3

Indic. Name	Indic. No.	Fairly important
Volume of pedestrians/cyclists	TP14	4
Number of short trips	TP2	3
Kilometers of pedestrian/bicycle facilities	TP13	3
Traffic safety active modes	SF2	3
Traffic conflict index	SF4	3
Greenhouse gas emissions (GHG)	EN1	3
Noise hindrance	EN3	3
Opportunity for active mobility	TB3	3
Access to jobs	TB4	3
Access to community destinations from mobility services	TB7	3
Accessibility of public transport for mobility-impaired groups	TB15	3
Transportation infrastructure costs	EC1	3
Transport-related net public finance	EC4	3

Tab. 17 Fairly important – scores: 2

Indic. Name	Indic. No.	Fairly important
Distance between pedestrain/bicycle crossings	TP1	2
Average travel time	TP4	2
Level of service	TP8	2
Pedestrian space	TP9	2
Occupancy rate	TP16	2
Traffic accidents	SF1	2
Road deaths	SF3	2
Mobility space usage	TB2	2
Adherence to accessibility laws	TB6	2
Facility maintenance	TB8	2
Population Served by Walk/Bike/Public Transport	TB9	2
Motorization Rate	TB10	2
Modal split	TB11	2
Transportation-Disadvantaged Population Served	TB14	2
Affordability of transport for poorest group	TB16	2
Security	TB17	2
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	2
Vehicle Operation Costs	EC2	2
Land value	EC5	2
Economic opportunity	EC6	2

Tab. 18 Fairly important – scores: 1

Indic. Name	Indic. No.	Fairly important
Average travel distance	TP3	1
Delay	TP5	1
Congestion	TP6	1
Commuting travel time	TP7	1
Network completness	TP10	1
Connectivity (Intermodal Connectivity) index	TP12	1
Route Directness	TP19	1
Level of integration of various transport modes	TP20	1
Air pollutant emissions	EN2	1
Energy efficiency	EN5	1
Physical Activity and Health	TB1	1
Density of destinations	TB5	1
Street trees	TB12	1
Retail Impacts	EC3	1

Tab. 19 Fairly important – scores: 0

Indic. Name	Indic. No.	Fairly important
Multimodal integration	TP11	0
Vehicle kilometers traveled (VKT) impacts	TP15	0
Person throughput	TP17	0
Urban functional diversity	TP18	0
Operation continuity by transport mode	TP21	0
Number and types of citations issued	SF5	0
Number of observed violations	SF6	0
Land consumption	EN4	0
Quality of public area	TB13	0
Job creation	EC7	0

When it comes to indicators selected as fairly important, there was only one placed in this category by four municipalities: Volume of pedestrians/cyclists (TP14). The remaining ones were mentioned 3 or less times, with a handful of indicators that were not placed in this group.

Tab. 20 Important – scores: 4, 3

Indic. Name	Indic. No.	Important
Route Directness	TP19	4
Commuting travel time	TP7	3
Network completness	TP10	3
Kilometers of pedestrian/bicycle facilities	TP13	3
Vehicle kilometers traveled (VKT) impacts	TP15	3
Number and types of citations issued	SF5	3
Density of destinations	TB5	3
Adherence to accessibility laws	TB6	3
Street trees	TB12	3

Tab. 21 Important – scores: 2

Indic. Name	Indic. No.	Important
Average travel distance	TP3	2
Average travel time	TP4	2
Delay	TP5	2
Level of service	TP8	2
Pedestrian space	TP9	2
Multimodal integration	TP11	2
Person throughput	TP17	2
Urban functional diversity	TP18	2
Level of integration of various transport modes	TP20	2
Operation continuity by transport mode	TP21	2
Number of observed violations	SF6	2
Air pollutant emissions	EN2	2
Mobility space usage	TB2	2
Access to jobs	TB4	2
Accessibility of public transport for mobility-impaired groups	TB15	2
Security	TB17	2
Retail Impacts	EC3	2
Job creation	EC7	2

Tab. 22 Important – scores: 1

Indic. Name	Indic. No.	Important
Distance between pedestrain/bicycle crossings	TP1	1
Congestion	TP6	1
Connectivity (Intermodal Connectivity) index	TP12	1
Volume of pedestrians/cyclists	TP14	1
Occupancy rate	TP16	1
Traffic safety active modes	SF2	1
Traffic conflict index	SF4	1
Noise hindrance	EN3	1
Land consumption	EN4	1
Energy efficiency	EN5	1
Physical Activity and Health	TB1	1
Opportunity for active mobility	TB3	1
Access to community destinations from mobility services	TB7	1
Facility maintenance	TB8	1
Motorization Rate	TB10	1
Modal split	TB11	1
Transportation-Disadvantaged Population Served	TB14	1
Affordability of transport for poorest group	TB16	1
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	1
Vehicle Operation Costs	EC2	1
Transport-related net public finance	EC4	1
Land value	EC5	1

Tab. 23 Important – scores: 0

Indic. Name	Indic. No.	Important
Number of short trips	TP2	0
Traffic accidents	SF1	0
Road deaths	SF3	0
Greenhouse gas emissions (GHG)	EN1	0
Population Served by Walk/Bike/Public Transport	TB9	0
Quality of public area	TB13	0
Transportation infrastructure costs	EC1	0
Economic opportunity	EC6	0

Fo the Important category, there was again only one indicator that was selected by four municipalities: Route Directness (TP19). The remaining ones were mentioned 3 or less times, with a few of indicators that were not placed in this group.

Tab. 24 Slightly important – scores: 5, 2

Indic. Name	Indic. No.	Slightly Important
Distance between pedestrain/bicycle crossings	TP1	5
Commuting travel time	TP7	2
Multimodal integration	TP11	2
Operation continuity by transport mode	TP21	2
Number of observed violations	SF6	2
Economic opportunity	EC6	2

Tab. 25 Slightly important – scores: 1

Indic. Name	Indic. No.	Slightly
Number of short trips	TP2	1
Average travel distance	TP3	1
Average travel time	TP4	1
Delay	TP5	1
Congestion	TP6	1
Volume of pedestrians/cyclists	TP14	1
Occupancy rate	TP16	1
Urban functional diversity	TP18	1
Route Directness	TP19	1
Level of integration of various transport modes	TP20	1
Number and types of citations issued	SF5	1
Greenhouse gas emissions (GHG)	EN1	1
Air pollutant emissions	EN2	1
Land consumption	EN4	1
Energy efficiency	EN5	1
Physical Activity and Health	TB1	1
Density of destinations	TB5	1
Facility maintenance	TB8	1
Motorization Rate	TB10	1
Street trees	TB12	1
Quality of public area	TB13	1
Transportation-Disadvantaged Population Served	TB14	1
Security	TB17	1
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	1
Job creation	EC7	1

Tab. 26 Slightly important – scores: 0

Indic. Name	Indic. No.	Slightly
Level of service	TP8	0
Pedestrian space	TP9	0
Network completness	TP10	0
Connectivity (Intermodal Connectivity) index	TP12	0
Kilometers of pedestrian/bicycle facilities	TP13	0
Vehicle kilometers traveled (VKT) impacts	TP15	0
Person throughput	TP17	0
Traffic accidents	SF1	0
Traffic safety active modes	SF2	0
Road deaths	SF3	0
Traffic conflict index	SF4	0
Noise hindrance	EN3	0
Mobility space usage	TB2	0
Opportunity for active mobility	TB3	0
Access to jobs	TB4	0
Adherence to accessibility laws	TB6	0
Access to community destinations from mobility services	TB7	0
Population Served by Walk/Bike/Public Transport	TB9	0
Modal split	TB11	0
Accessibility of public transport for mobility-impaired groups	TB15	0
Affordability of transport for poorest group	TB16	0
Transportation infrastructure costs	EC1	0
Vehicle Operation Costs	EC2	0
Retail Impacts	EC3	0
Transport-related net public finance	EC4	0
Land value	EC5	0

For the indicators that were selected as slightly important there is one that was commonly selected – by five municipalities: Distance between pedestrian / bicycle crossings (TP1). The rest was selected 2 or less times, with many indicators not being placed in this group at all.

Tab. 27 Not important – scores: 2, 1

Indic. Name	Indic. No.	Not important at all
Delay	TP5	2
Level of service	TP8	2
Person throughput	TP17	2
Average travel time	TP4	1
Congestion	TP6	1
Pedestrian space	TP9	1
Connectivity (Intermodal Connectivity) index	TP12	1
Operation continuity by transport mode	TP21	1
Traffic conflict index	SF4	1
Opportunity for active mobility	TB3	1
Job creation	EC7	1

There were only few indicators selected as “Not important at all”, and it was mostly by 2 or 1 municipalities. Those that were put into this category by two municipalities are:

- Delay (TP5)
- Level of service (TP8)
- Person Throughput (TP17)

Tab. 28 Not important – scores: 0

Indic. Name	Indic. No.	Not at all
Distance between pedestrain/bicycle crossings	TP1	0
Number of short trips	TP2	0
Average travel distance	TP3	0
Commuting travel time	TP7	0
Network completness	TP10	0
Multimodal integration	TP11	0
Kilometers of pedestrian/bicycle facilities	TP13	0
Volume of pedestrians/cyclists	TP14	0
Vehicle kilometers traveled (VKT) impacts	TP15	0
Occupancy rate	TP16	0
Urban functional diversity	TP18	0
Route Directness	TP19	0
Level of integration of various transport modes	TP20	0
Traffic accidents	SF1	0
Traffic safety active modes	SF2	0
Road deaths	SF3	0
Number and types of citations issued	SF5	0
Number of observed violations	SF6	0
Greenhouse gas emissions (GHG)	EN1	0
Air pollutant emissions	EN2	0
Noise hindrance	EN3	0
Land consumption	EN4	0
Energy efficiency	EN5	0
Physical Activity and Health	TB1	0
Mobility space usage	TB2	0
Access to jobs	TB4	0
Density of destinations	TB5	0
Adherence to accessibility laws	TB6	0
Access to community destinations from mobility services	TB7	0
Facility maintenance	TB8	0
Population Served by Walk/Bike/Public Transport	TB9	0
Motorization Rate	TB10	0
Modal split	TB11	0
Street trees	TB12	0
Quality of public area	TB13	0
Transportation-Disadvantaged Population Served	TB14	0
Accessibility of public transport for mobility-impaired groups	TB15	0
Affordability of transport for poorest group	TB16	0
Security	TB17	0
Comfort and pleasure. Satisfaction with public transport, walking, cycling	TB18	0
Transportation infrastructure costs	EC1	0
Vehicle Operation Costs	EC2	0
Retail Impacts	EC3	0
Transport-related net public finance	EC4	0
Land value	EC5	0
Economic opportunity	EC6	0

Weighted Indicator importance

In order to determine which indicators can be determined as most important (at least for the partner cities participating in the survey, in the view of the fact that conducted project is related to year-round active mobility) weighted score was calculated for every indicator. Weights were assigned in accordance to scores presented when asking the question:

- 5 – very important
- 4 - fairly important
- 3 – important
- 2 - slightly important

There was no score assigned for response "1 – not important at all" or for lack of opinion/information. The values were normalized using min-max normalization to show values that are easier to interpret (0-100 with normalized scale rather than 0.5-2.36 in weighted scale). All the indicators with their scores are presented in Tab. 29.

The three most important ones are:

- Traffic Accidents (SF1) – score: 100
- Volume of pedestrians/cyclists (TP14) – score: 92.31
- Modal split (TB11) – score: 92.31

While the three with the least importance are:

- Congestion (TP6) – score: 7.69
- Urban functional diversity (TP18) – score: 3.85
- Connectivity Index (TP12) – score 0

Tab. 29 List of all Indicators, sorted by weighted score

Sort by weight	Indic. No.	Indic. Name	Normalized
2.36	SF1	Traffic accidents	100.00
2.21	TP14	Volume of pedestrians/cyclists	92.31
2.21	TB11	Modal split	92.31
2.14	SF2	Traffic safety active modes	88.46
2.07	EN1	Greenhouse gas emissions (GHG)	84.62
2.00	TB10	Motorization Rate	80.77
2.00	TB18	Comfort and pleasure. Satisfaction with public transport, walking, cycling	80.77
2.00	TB8	Facility maintenance	80.77
2.00	SF3	Road deaths	80.77
2.00	TB9	Population Served by Walk/Bike/Public Transport	80.77
1.93	EN2	Air pollutant emissions	76.92
1.93	TP3	Average travel distance	76.92
1.93	EC1	Transportation infrastructure costs	76.92
1.93	TB13	Quality of public area	76.92
1.86	TB17	Security	73.08
1.86	TP13	Kilometers of pedestrian/bicycle facilities	73.08
1.86	EC2	Vehicle Operation Costs	73.08
1.79	TB12	Street trees	69.23
1.79	TB5	Density of destinations	69.23
1.79	TP11	Multimodal integration	69.23
1.79	EN3	Noise hindrance	69.23
1.79	TB3	Opportunity for active mobility	69.23
1.79	TB7	Access to community destinations from mobility services	69.23
1.71	TP2	Number of short trips	65.38
1.71	TP9	Pedestrian space	65.38
1.64	TB14	Transportation-Disadvantaged Population Served	61.54
1.64	TB15	Accessibility of public transport for mobility-impaired groups	61.54
1.64	TB4	Access to jobs	61.54
1.64	TP10	Network completness	61.54
1.64	TP16	Occupancy rate	61.54
1.57	TB6	Adherence to accessibility laws	57.69
1.57	TP20	Level of integration of various transport modes	57.69
1.50	TP1	Distance between pedestrain/bicycle crossings	53.85
1.50	TP4	Average travel time	53.85
1.43	EC3	Retail Impacts	50.00
1.43	EC4	Transport-related net public finance	50.00
1.43	SF4	Traffic conflict index	50.00
1.36	EN5	Energy efficiency	46.15
1.36	TB1	Physical Activity and Health	46.15
1.36	TB2	Mobility space usage	46.15
1.36	TP15	Vehicle kilometers traveled (VKT) impacts	46.15
1.36	TP8	Level of service	46.15
1.29	TP19	Route Directness	42.31
1.21	TP7	Commuting travel time	38.46
1.21	EC6	Economic opportunity	38.46
1.21	TP5	Delay	38.46
1.14	SF5	Number and types of citations issued	34.62
1.14	EC5	Land value	34.62
1.14	TB16	Affordability of transport for poorest group	34.62
1.14	TP17	Person throughput	34.62
1.07	SF6	Number of observed violations	30.77
1.07	EN4	Land consumption	30.77
0.93	EC7	Job creation	23.08
0.71	TP21	Operation continuity by transport mode	11.54
0.64	TP6	Congestion	7.69
0.57	TP18	Urban functional diversity	3.85
0.50	TP12	Connectivity (Intermodal Connectivity) index	0.00

There are some barriers that stop cities from implementing the indicators and enhancing their monitoring process over year round active mobility. Main barriers and how much they affect municipalities were listed in Tab. 30.

Tab. 30 Main barriers for municipalities

Indic. No.	Very Important	Fairly important	Important	Slightly	Not at all	No opinion
Financial factors - lack of funds	6	0	2	0	0	1
Lack of persons	3	4	1	0	0	1
Lack of knowledge	1	3	3	1	0	1
Lack of methods	0	2	3	1	2	1
Lack of access to data	1	4	1	1	1	2
Lack of tools	0	3	5	0	0	1
Lack of political will	3	4	1	0	0	1

When considering all of the responses the one barrier that can be identified by the municipalities as the most important one is related to the financial factors, in other words the lack of funds. All of the barriers are to some degree important to most of the municipalities, but for those not important, selected only by 2 municipalities there is “lack of methods”. It means that these partner cities believe they are generally capable of tackling the issues related to data, indicators and monitoring.

Summary

Tab. 31 Shows the number of indicators that are currently used, planned to be used and wanted but not possible to be used with current municipality capabilities.

Indicators currently is use: the amount varies city by city, but most of municipalities are using some indicators, or at least acknowledge the presence of said indicators based on available data. That being said, in some cases due to different aspects related to data quality, the number of indicators does not necessarily directly reflect the overall advancement of city when it comes to data-related aspects.

Indicators planned: Half of municipalities do not currently plan to use any indicators. The other half has planned some indicators that are usually related to the local experiment that is going to be implemented in the city. In some cases, there is no need for implementing indicators relevant to the experiment as they are already in use, however there is still need for continuity in data gathering for the purpose of calculating that indicator in the view of upcoming local experiments.

Indicators wanted but unable to be implemented: Most of the municipalities pointed out at least few of the indicators. It means that municipalities acknowledge the fact that the information behind the indicator is useful, but it is not possible to implement those due to some limitations. These limitations will vary city by city, but the most typical answer to all of the problems would be “lack of funds”.

Tab. 31 Count of indicators for every city – indicators: currently used, planned to be used, wanted but not implementable

City	Counnt of indicators: Currently in use	Counnt of indicators: Plans to use	Counnt of indicators: Wants to use but cannot
Hamburg	19	0	3
Gdynia	13	6	4
Klaipeda	11	1	7
Lahti	19	3	21
Kiili	0	0	0
Umea	18	0	3
Porvoo	21	9	10
Kalundborg	18	5	8

Tab. 32 Presents the Yes/No answers for each city, Tab. 33 shows the sum of all "yes" and "no" answers. The answers vary with some of the municipalities responding "yes" to all questions, while some responded "no" to all of the presented questions. These answers help with establishing the level of data maturity related to active mobility. That being said, they serve as a supporting measure and the decision whether a city is more or less advanced was also based on the entirety of responses to the survey, and the information received during partner meetings, workshops and overall collaboration. Tab. 34 shows the classification of cities.

More advanced cities require help in streamlining the process of dealing with indicators and data management.

Less advanced cities require help in setting up the process of dealing with indicators and data management.

Tab. 32 Responses to yes/no questions for every city and question separately

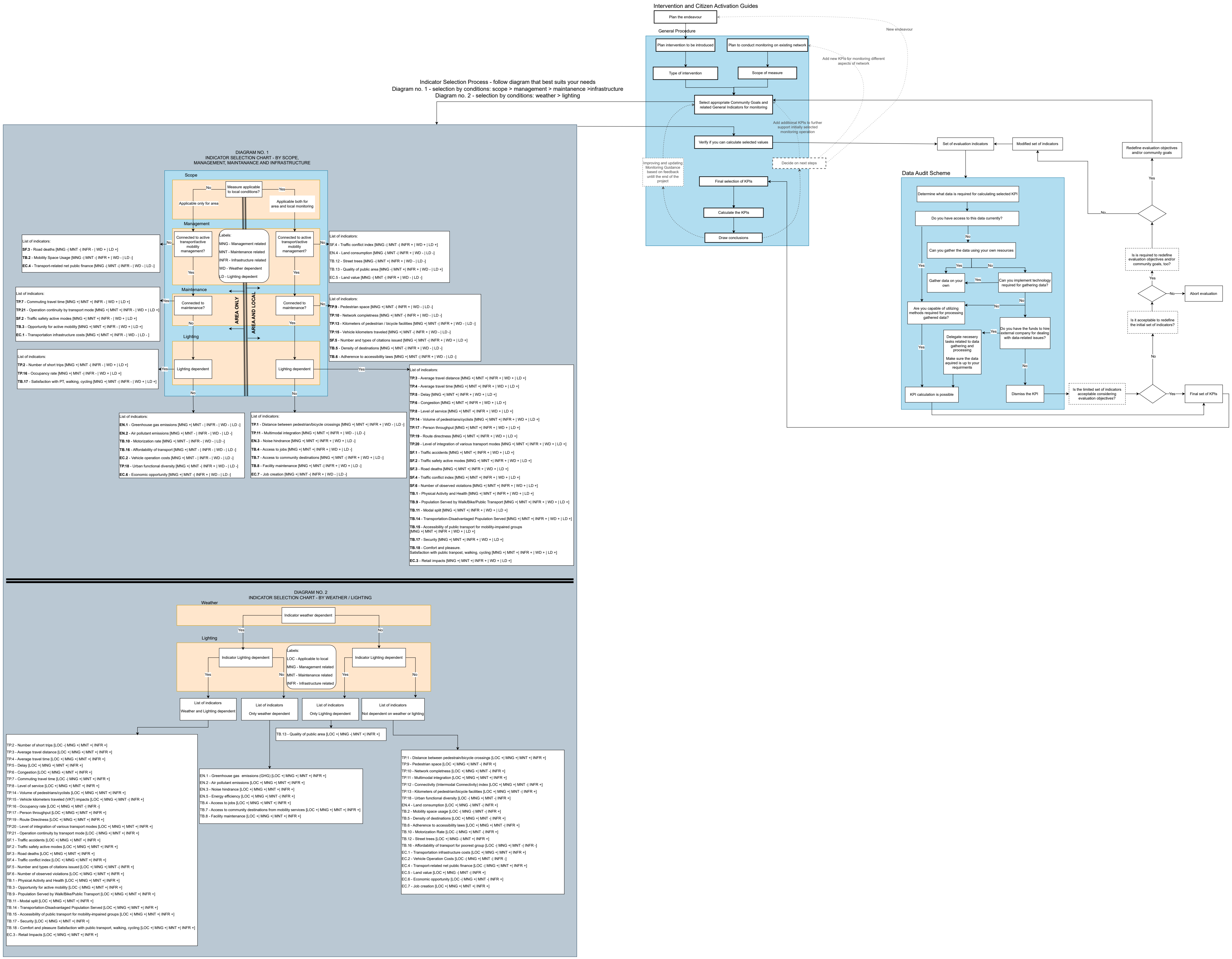
City	Have your city/region set policy objectives to increase active mobility	Do you use performance indicators in the planning and decision-making processes to select activities, measures, and scenarios?	Is there a formalised process for selecting indicators to develop active mobility in your city/region?	Do you have access to data on travel-related accidents?	Do you conduct any studies or surveys for transport user perceptions or preferences	Do you conduct surveys and studies on the travel behaviour of inhabitants	Do you have seasonal data on the modal split
Hamburg	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gdynia	Yes	Yes	No	Yes	Yes	Yes	No
Klaipeda	Yes	No	No	No	Yes	Yes	No
Lahti	Yes	Yes	Yes	Yes	No	No	Yes
Kiili	No	No	No	No	No	No	No
Umea	Yes	Yes	Yes	Yes	No	Yes	Yes
Porvoo	Yes	Yes	No	Yes	No	Yes	Yes
Kalundborg	Yes	No	Yes	Yes	Yes	Yes	Yes

Tab. 33 Count of yes/no responses to questions for every city

City	Yes Count	No Count
Hamburg	7	0
Gdynia	5	2
Klaipeda	3	4
Lahti	5	2
Kiili	0	7
Umea	6	1
Porvoo	5	2
Kalundborg	6	1

Tab. 34 Proposed classification of cities based on initial responses and discussion with cities

City	Level of Advancment
Hamburg	Higher
Gdynia	Higher
Klaipeda	Lower
Lahti	Higher
Kiili	Lower
Umea	Higher
Porvoo	Lower
Kalundborg	Lower


Intervention and Citizen Activation Guides
Plan the endeavour
General Procedure
Plan intervention to be introduced
Plan to conduct monitoring on existing network
Type of intervention
Scope of measure
Select appropriate Community Goals and related General Indicators for monitoring
Verify if you can calculate selected values
Final selection of KPIs
Calculate the KPIs
Draw conclusions
Improving and updating Monitoring Guidance based on feedback untill the end of the project
Decide on next steps
Add additional KPIs to further support initially selected monitoring operation
Add new KPIs for monitoring different aspects of network
New endeavour
Set of evaluation indicators
Modified set of indicators
Redefine evaluation objectives and/or community goals
Yes
No
Data Audit Scheme
Determine what data is required for calculating selected KPI
Do you have access to this data currently?
No
Can you gather the data using your own resources
Yes
Yes
No
Gather data on your own
Yes
Can you implement technology required for gathering data?
No
No
Are you capable of utilizing methods required for processing gathered data?
Yes
Do you have the funds to hire external company for dealing with data-related issues?
Yes
Delegate necesery tasks related to data gathering and processing
Make sure the data aquired is up to your requirments
No
KPI calculation is possible
Dismiss the KPI
Is the limited set of indicators acceptable considering evaluation objectives?
Yes
Final set of KPIs
No
Is it acceptable to redefine the initial set of indicators?
No
Abort evaluation
Yes
Is is required to redefine evaluation objectives and/or community goals, too?
Indicator Selection Process - follow diagram that best suits your needs
Diagram no. 1 - selection by conditions: scope > management > maintenance >infrastructure
Diagram no. 2 - selection by conditions: weather > lighting
DIAGRAM NO. 1
INDICATOR SELECTION CHART - BY SCOPE, MANAGEMENT, MAINTANANCE AND INFRASTRUCTURE
Scope
Measure applicable to local conditions?
No
Yes
Applicable only for area
Applicable both for area and local monitoring
Management
Connected to active transport/active mobility management?
Connected to active transport/active mobility management?
Labels:
MNG - Management related
MNT - Maintenance related
INFR - Infrastructure related
WD - Weather dependent
LD - Lighting depedent
No
No
Yes
Yes
List of indicators:
SF.3 - Road deaths [MNG -| MNT -| INFR - | WD + | LD +]
TB.2 - Mobility Space Usage [MNG -| MNT -| INFR + | WD - | LD -]
EC.4 - Transport-related net public finance [MNG -| MNT -| INFR - | WD - | LD -]
List of indicators:
SF.4 - Traffic conflict index [MNG -| MNT -| INFR + | WD + | LD +]
EN.4 - Land consumption [MNG -| MNT -| INFR + | WD - | LD -]
TB.12 - Street trees [MNG -| MNT +| INFR + | WD - | LD -]
TB.13 - Quality of public area [MNG -| MNT +| INFR + | WD - | LD +]
EC.5 - Land value [MNG -| MNT -| INFR + | WD - | LD -]
Maintenance
AREA ONLY
AREA AND LOCAL
Connected to maintenance?
Connected to maintenance?
Yes
No
No
Yes
List of indicators:
TP.7 - Commuting travel time [MNG +| MNT +| INFR - | WD + | LD +]
TP.21 - Operation continuity by transport mode [MNG +| MNT +| INFR - | WD + | LD +]
SF.2 - Traffic safety active modes [MNG +| MNT +| INFR - | WD + | LD +]
TB.3 - Opportunity for active mobility [MNG +| MNT +| INFR - | WD + | LD +]
EC.1 - Transportation infrastructure costs [MNG +| MNT +| INFR - | WD - | LD -]
List of indicators:
TP.9 - Pedestrian space [MNG +| MNT -| INFR + | WD - | LD -]
TP.10 - Network completness [MNG +| MNT -| INFR + | WD - | LD -]
TP.13 - Kilometers of pedestrian / bicycle facilities [MNG +| MNT -| INFR + | WD - | LD -]
TP.15 - Vehicle kilometers traveled [MNG +| MNT -| INFR + | WD - | LD -]
SF.5 - Number and types of citations issued [MNG +| MNT -| INFR + | WD + | LD +]
TB.5 - Density of destinations [MNG +| MNT -| INFR + | WD - | LD -]
TB.6 - Adherence to accessibility laws [MNG +| MNT -| INFR + | WD - | LD -]
Lighting
Lighting dependent
Lighting dependent
Yes
Yes
No
No
List of indicators:
TP.2 - Number of short trips [MNG +| MNT -| INFR - | WD + | LD +]
TP.16 - Occupancy rate [MNG +| MNT -| INFR - | WD + | LD +]
TB.17 - Satisfaction with PT, walking, cycling [MNG +| MNT -| INFR - | WD + | LD +]
List of indicators:
EN.1 - Greenhouse gas emissions [MNG +| MNT - | INFR - | WD - | LD -]
EN.2 - Air pollutant emissions [MNG +| MNT - | INFR - | WD - | LD -]
TB.10 - Motorization rate [MNG +| MNT - | INFR - | WD - | LD -]
TB.16 - Affordability of transport [MNG +| MNT - | INFR - | WD - | LD -]
EC.2 - Vehicle operation costs [MNG +| MNT - | INFR - | WD - | LD -]
TP.18 - Urban functional diversity [MNG +| MNT -| INFR + | WD - | LD -]
EC.6 - Economic opportunity [MNG +| MNT -| INFR + | WD - | LD -]
List of indicators:
TP.1 - Distance between pedestrian/bicycle crossings [MNG +| MNT +| INFR + | WD - | LD -]
TP.11 - Multimodal integration [MNG +| MNT +| INFR + | WD - | LD -]
EN.3 - Noise hindrance [MNG +| MNT +| INFR + | WD + | LD -]
TB.4 - Access to jobs [MNG +| MNT +| INFR + | WD + | LD -]
TB.7 - Access to community destinations [MNG +| MNT -| INFR + | WD + | LD -]
TB.8 - Facility maintenance [MNG +| MNT -| INFR + | WD + | LD -]
EC.7 - Job creation [MNG +| MNT -| INFR + | WD - | LD -]
List of indicators:
TP.3 - Average travel distance [MNG +| MNT +| INFR + | WD + | LD +]
TP.4 - Average travel time [MNG +| MNT +| INFR + | WD + | LD +]
TP.5 - Delay [MNG +| MNT +| INFR + | WD + | LD +]
TP.6 - Congestion [MNG +| MNT +| INFR + | WD + | LD +]
TP.8 - Level of service [MNG +| MNT +| INFR + | WD + | LD +]
TP.14 - Volume of pedestrians/cyclists [MNG +| MNT +| INFR + | WD + | LD +]
TP.17 - Person throughput [MNG +| MNT +| INFR + | WD + | LD +]
TP.19 - Route directness [MNG +| MNT +| INFR + | WD + | LD +]
TP.20 - Level of integration of various transport modes [MNG +| MNT +| INFR + | WD + | LD +]
SF.1 - Traffic accidents [MNG +| MNT +| INFR + | WD + | LD +]
SF.2 - Traffic safety active modes [MNG +| MNT +| INFR + | WD + | LD +]
SF.3 - Road deaths [MNG +| MNT +| INFR + | WD + | LD +]
SF.4 - Traffic conflict index [MNG +| MNT +| INFR + | WD + | LD +]
SF.6 - Number of observed violations [MNG +| MNT +| INFR + | WD + | LD +]
TB.1 - Physical Activity and Health [MNG +| MNT +| INFR + | WD + | LD +]
TB.9 - Population Served by Walk/Bike/Public Transport [MNG +| MNT +| INFR + | WD + | LD +]
TB.11 - Modal split [MNG +| MNT +| INFR + | WD + | LD +]
TB.14 - Transportation-Disadvantaged Population Served [MNG +| MNT +| INFR + | WD + | LD +]
TB.15 - Accessibility of public transport for mobility-impaired groups
[MNG +| MNT +| INFR + | WD + | LD +]
TB.17 - Security [MNG +| MNT +| INFR + | WD + | LD +]
TB.18 - Comfort and pleasure.
Satisfaction with public tranpost, walking, cycling [MNG +| MNT +| INFR + | WD + | LD +]
EC.3 - Retail impacts [MNG +| MNT +| INFR + | WD + | LD +]
DIAGRAM NO. 2
INDICATOR SELECTION CHART - BY WEATHER / LIGHTING
Weather
Indicator weather dependent
Yes
No
Lighting
Indicator Lighting dependent
Labels:
LOC - Applicable to local
MNG - Management related
MNT - Maintenance related
INFR - Infrastructure related
Indicator Lighting dependent
Yes
No
Yes
No
List of indicators
Weather and Lighting dependent
List of indicators
Only weather dependent
List of indicators
Only Lighting dependent
List of indicators
Not dependent on weather or lighting
TB.13 - Quality of public area [LOC +| MNG -| MNT +| INFR +]
TP.2 - Number of short trips [LOC -| MNG +| MNT +| INFR +]
TP.3 - Average travel distance [LOC +| MNG +| MNT +| INFR +]
TP.4 - Average travel time [LOC +| MNG +| MNT +| INFR +]
TP.5 - Delay [LOC +| MNG +| MNT +| INFR +]
TP.6 - Congestion [LOC +| MNG +| MNT +| INFR +]
TP.7 - Commuting travel time [LOC -| MNG +| MNT +| INFR +]
TP.8 - Level of service [LOC +| MNG +| MNT +| INFR +]
TP.14 - Volume of pedestrians/cyclists [LOC +| MNG +| MNT +| INFR +]
TP.15 - Vehicle kilometers traveled (VKT) impacts [LOC +| MNG +| MNT -| INFR +]
TP.16 - Occupancy rate [LOC +| MNG +| MNT -| INFR -]
TP.17 - Person throughput [LOC +| MNG +| MNT +| INFR +]
TP.19 - Route Directness [LOC +| MNG +| MNT +| INFR +]
TP.20 - Level of integration of various transport modes [LOC +| MNG +| MNT +| INFR +]
TP.21 - Operation continuity by transport mode [LOC -| MNG +| MNT +| INFR +]
SF.1 - Traffic accidents [LOC +| MNG +| MNT +| INFR +]
SF.2 - Traffic safety active modes [LOC +| MNG +| MNT +| INFR +]
SF.3 - Road deaths [LOC +| MNG +| MNT +| INFR +]
SF.4 - Traffic conflict index [LOC +| MNG +| MNT +| INFR +]
SF.5 - Number and types of citations issued [LOC +| MNG +| MNT -| INFR +]
SF.6 - Number of observed violations [LOC +| MNG +| MNT +| INFR +]
TB.1 - Physical Activity and Health [LOC +| MNG +| MNT +| INFR +]
TB.3 - Opportunity for active mobility [LOC -| MNG +| MNT +| INFR +]
TB.9 - Population Served by Walk/Bike/Public Transport [LOC +| MNG +| MNT +| INFR +]
TB.11 - Modal split [LOC +| MNG +| MNT +| INFR +]
TB.14 - Transportation-Disadvantaged Population Served [LOC +| MNG +| MNT +| INFR +]
TB.15 - Accessibility of public transport for mobility-impaired groups [LOC +| MNG +| MNT +| INFR +]
TB.17 - Security [LOC +| MNG +| MNT +| INFR +]
TB.18 - Comfort and pleasure Satisfaction with public transport, walking, cycling [LOC +| MNG +| MNT +| INFR +]
EC.3 - Retail Impacts [LOC +| MNG +| MNT +| INFR +]
EN.1 - Greenhouse gas emissions (GHG) [LOC +| MNG +| MNT +| INFR +]
EN.2 - Air pollutant emissions [LOC +| MNG +| MNT +| INFR +]
EN.3 - Noise hindrance [LOC +| MNG +| MNT +| INFR +]
EN.5 - Energy efficiency [LOC +| MNG +| MNT -| INFR +]
TB.4 - Access to jobs [LOC +| MNG +| MNT +| INFR +]
TB.7 - Access to community destinations from mobility services [LOC +| MNG +| MNT +| INFR +]
TB.8 - Facility maintenance [LOC +| MNG +| MNT +| INFR +]
TP.1 - Distance between pedestrain/bicycle crossings [LOC +| MNG +| MNT +| INFR +]
TP.9 - Pedestrian space [LOC +| MNG +| MNT -| INFR +]
TP.10 - Network completness [LOC +| MNG +| MNT -| INFR +]
TP.11 - Multimodal integration [LOC +| MNG +| MNT +| INFR +]
TP.12 - Connectivity (Intermodal Connectivity) index [LOC +| MNG +| MNT -| INFR +]
TP.13 - Kilometers of pedestrian/bicycle facilities [LOC +| MNG +| MNT -| INFR +]
TP.18 - Urban functional diversity [LOC -| MNG +| MNT -| INFR +]
EN.4 - Land consumption [LOC +| MNG -| MNT -| INFR +]
TB.2 - Mobility space usage [LOC -| MNG -| MNT -| INFR +]
TB.5 - Density of destinations [LOC +| MNG +| MNT -| INFR +]
TB.6 - Adherence to accessibility laws [LOC +| MNG +| MNT -| INFR +]
TB.10 - Motorization Rate [LOC -| MNG +| MNT -| INFR +]
TB.12 - Street trees [LOC +| MNG -| MNT +| INFR +]
TB.16 - Affordability of transport for poorest group [LOC -| MNG +| MNT -| INFR -]
EC.1 - Transportation infrastructure costs [LOC +| MNG +| MNT +| INFR +]
EC.2 - Vehicle Operation Costs [LOC -| MNG +| MNT -| INFR -]
EC.4 - Transport-related net public finance [LOC -| MNG +| MNT +| INFR +]
EC.5 - Land value [LOC +| MNG -| MNT -| INFR +]
EC.6 - Economic opportunity [LOC -| MNG +| MNT -| INFR +]
EC.7 - Job creation [LOC +| MNG +| MNT +| INFR +]