



CLEVER Cities D4.1 CLEVER Monitoring and Evaluation Framework

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Contents

| | |
|--|-----------|
| Executive summary | 4 |
| 1. Introduction | 5 |
| 2. Monitoring and evaluation in CLEVER Cities | 6 |
| 2.1. Objectives | 6 |
| 2.2. Approach to monitoring and evaluation | 7 |
| 2.3. Principles underpinning the Impact Assessment Framework | 9 |
| 2.4. Factors influencing the measurement of effectiveness..... | 10 |
| 3. Co-designing an evaluation framework | 11 |
| 3.1. Theory of change as a methodology | 12 |
| 3.2. City workshops | 12 |
| 3.3. The City exchanges..... | 15 |
| 4. Operability for Monitoring | 16 |
| 4.1. Stakeholders for monitoring | 16 |
| 4.2. WP2-WP4 coordination | 20 |

Executive summary

This report falls under Work Package 4 of the CLEVER Cities project, which focused in assessing NBS impact through the CLEVER Cities Monitor by establishing and implementing a robust, long-term, integrated yet locally-adaptable co-monitoring framework and platform. Since the approach for Key Performance Indicators (KPI) definition is linked to a co-design process, this guidance is a living document which will be updated and iterated throughout the life of the CLEVER Cities project, culminating in a final version for wider dissemination in coordination with the CALs definition and launching.

The system of KPIs constitutes the back-bone component of the CLEVER cities Impact Assessment Framework which aims at monitoring and evaluating the performance of the effectiveness of the Nature-Based Solutions (NBS) and the effectiveness the specific regeneration interventions in the CLEVER Action Labs (CALs). The aim of having this monitoring framework is focused on 3 main goals: better informing decisions and planning processes, helping to track the progress of NBS interventions over time and contributing to better reporting in cities.

On the other hand, the key variables to be considered for this assesment are the folowing: building on and extending existing frameworks and current best practice, ongoing and dynamic process, co-created with cities, balancing the desirability for harmonised evaluation measures with a need for appropriately tailored local frameworks and enabling integration with city platforms and smart city data systems.

The process of impact assessment in the CLEVER cities project lifetime includes the following sequence of steps:

- Definition of challenges and NBS Intervention, that is planned to be defined during 2018;
- Creating the Co-design and Evaluation framework that will be addressed on the first 3 months of 2019;
- Creating the Baseline - that has to be part of a deliverable in February 2019;
- Monitoring and Evaluation Plan that includes the pregreening and post operam evaluation to compare both scenarios (before and after interventions).

One of the key elements of this guide is defining the principles for co-designing an evaluation framework. The used of Theory of Change process is planned and specifics exchange workshops will be addressed to achieve this goal. As preparatory actions: identifying workshop participants, familiarization with the CALs and brainstorming your intended outcomes. The main goal of this workshops is to identify commonalities and differences in terms of the outcomes anticipated for similar NBS interventions, the expected causal pathways between certain short, medium and long-term outcomes, the potential measures, indicators and KPIs for similar outcomes, explore the reasons for the differences identified and harmonize outcomes and proposed indicators where possible, review proposed data sources for measurement of shared/similar outcome indicators, and identify opportunities for harmonization or improved consistency of measurement. For this co-design process the results of the D.1.1. (theme 4) will be a relevant starting point since it includes the analysis of KPIs for urban regeneration challenges that has been considered in other European Projects.

To assure the operability of the monitoring process relevant stakeholders, thematic experts and Local Monitoring Teams were defined. Thematic experts play the role of attending to the technical and scientific credibility to the KPIs selected in CLEVER-cities, providing a definition of common KPIs list for CALs and Cities cross-mapping and their comparability on the European project framework, supporting LMT teams (represented by LMT leaders) to customize the KPIs to assure their applicability in the different CALs to assess effectiveness. A revision of Local Monitoring Plans will assure their consistency. On the other hand, Local Monitoring Teams will address the following tasks: definition of the Local Monitoring Plans in each CALs that include the final selection of KPIs to be monitored and the detail of their measurement, selection and provision the technical solutions for monitoring the selected KPIs, deployment of sensors and applying the different tools and metrics to obtain the variable to monitor the KPIs, collection of data of the monitoring process to be storage in the CLEVER Cities platform and conclusions about CAL interventions and NBS regarding their effectiveness to assess the defined challenges or objectives (by UIPs and cities).

1. Introduction

This guidance is a living document which will be updated and iterated throughout the life of the CLEVER Cities project, culminating in a final version for wider dissemination. It is deliberately designed to build on the co-design ethos of the project and to enable all partners to build on shared learnings as the implementation and monitoring of Clever Action Labs (CAL) evolves.

This is the first iteration of the guidance which sets out the process which will be followed to establish a monitoring and evaluation framework, with associated KPIs, for the Lead cities. Later versions of this document will include precise details of the framework and suggested indicators, along with reflections on the process. The final version will reflect on the learnings of CLEVER Cities and provide guidance on how this process and framework can be replicated in an international context.

This deliverable report D4.1 describes the monitoring framework of the project and introduces the roles of the stakeholders related with the monitoring process, the main challenges that the cities addressed in the project context and the methodology proposed for the do-design process of KPIs.

This report falls under Work Package 4 of the CLEVER Cities project, which focused in assessing NBS impact through the CLEVER Cities Monitor by establishing and implementing a robust, long-term, integrated yet locally-adaptable co-monitoring framework and platform.

To assess the effectiveness of NBS solution, the CLEVER Monitor will analyze:

- benefits, co-benefits, efficacy and cost-effectiveness of CALs against their urban regeneration baseline (Task 2.3);
- effectiveness of processes: in FR – incl. co-creation processes in UIP and CALs, applied governance, business, and financing models, as well as co-monitoring, planning and management procedures – to understand barriers and enabling conditions for scaling out NBS in urban contexts (input to WP3, WP5 and WP6), in FE in regard of effective and ‘unhindered’ replication of CLEVER Solutions;

- impact of CALs (i.e. integrated implementation of CLEVER Stimuli according to local P-M-grid) to meet the objectives of inclusive urban regeneration and deliver on 'prosperity'; innovation character of the CALs to qualify for becoming CLEVER Solutions.

The identification of KPI must be undertaken in collaboration with the city partners to guarantee validation of the suggested impact assessment approach and the usability of the system of KPIs. Also, the requirements of coordination with the Task Force initiative has been considered to make comparable the results of the NBS effectiveness assessment in different European projects.

2. Monitoring and evaluation in CLEVER Cities

2.1. Objectives

The system of Key Performance Indicators (KPI) constitutes the back-bone component of the **CLEVER cities Impact Assessment Framework** which aims at monitoring and evaluating the performance of:

The effectiveness of the Nature Based Solutions (NBS) and the extent to which these can achieve environmental, social and economic objectives, including delivering social value and cost savings compared to traditional solutions, in the range of different conditions that are found in cities;

The effectiveness the specific regeneration interventions in the City Action Labs (CALs) in promoting and integrating NBS solutions and other activities that build on and connect with the NBS; to obtain and maximise co-benefits

The **CLEVER cities Impact Assessment Framework** is conceived as a robust monitoring and evaluation framework:

For better informed decisions and planning processes

Results from impact assessment will create evidence to underpin business models and business cases to enable investment in NBS. Impact Assessment will support decisions in relation to the selection of NBS and cost-effective investment. Standard values for the assessment of NBS performance can inform benchmarking between design alternatives and help. for example, to further the consideration of NBS as an added value urban solution in regeneration,

The Impact Assessment will contribute to translating evidence and scientific information that will appeal to different audiences and actors, and to identify good practice examples and 'lessons learnt' to strengthen the understanding and awareness of the relevance of NBS.

Helping to track the progress of NBS interventions over time

The Impact Assessment is conceived as a multi-phase process which allows ex-ante and ex-post evaluation of NBS interventions, so the performance of different solutions and measures can be compared with the status of pre-greening scenarios. New or expanded data platforms and innovative monitoring instruments will be tested in partner cities (e.g. sensors, multi-criteria analysis, modelling tools, community-based monitoring, participatory approaches such as group-based deliberative valuation,) for co-monitoring the NBS interventions.

Monitoring during the project will run for 2 years, but is intended to continue for 5 years beyond the funded programme. The CLEVER Cities Impact Assessment will use quantitative data and qualitative findings to identify enabling factors and barriers (e.g. regulatory, economic, social and technical), that contribute towards effective NBS implementation and deployment.

Contributing to better reporting in cities-

Open-sourced data will feed into local and smart city platforms towards innovative reporting and showcasing. Reporting is recognized as such relevant activity in cities and vital in terms of economic development, investment, EU positioning in the global context of NBS, and exemplars of best practice.

2.2. Approach to monitoring and evaluation

The process of impact assessment in the CLEVER cities project lifetime is summarized in Figure 1 below.

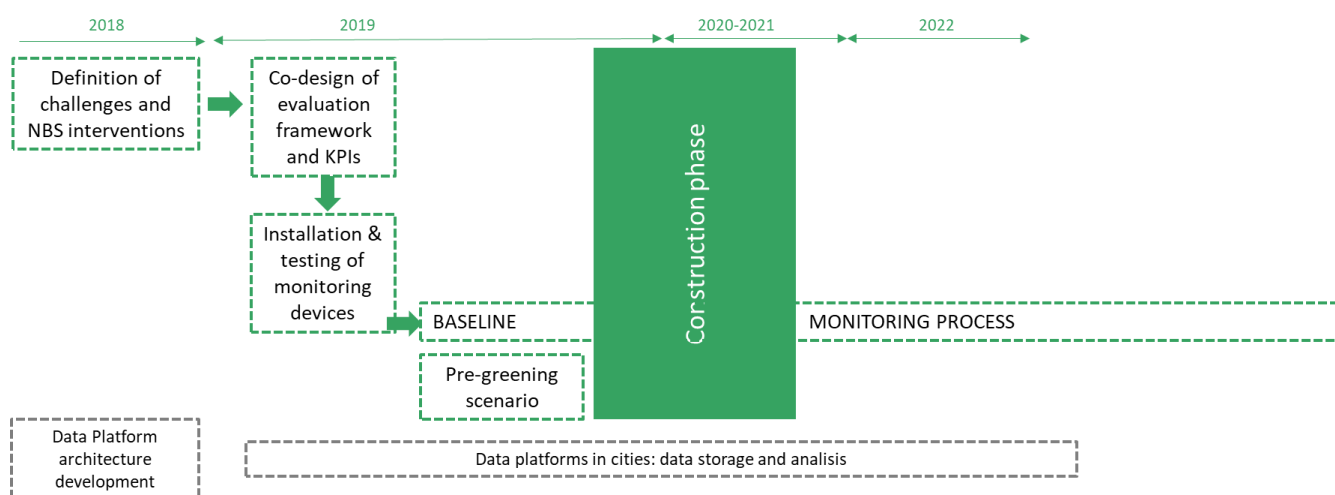


Figure 1 Impact Assessment process in the CLEVER cities project lifetime.

Step 1 - Definition of challenges and NBS Interventions

The first step in the process is the definition of challenges and NBS solution. This is conceived as an on-going process. The selected challenges will be enriched and further developed during the CALs definition and development. Where possible a range of stakeholders should be engaged to ensure that the definitions of challenges and NBS interventions reflect the thoughts and lived experiences of those who are directly impacted.

Step 2 - Creating the Co-design and Evaluation framework

The second step is the definition of 'how' to define and measure the KPIs and outcomes of the interventions.

- A co-design approach will be taken to bring together thematic and technical experts, with City and CAL leads, to define the outcomes to be measured.
- Following this, technical specifications for monitoring and measurement, data acquisition and management for each KPI and outcomes of the interventions will be defined as needed. This work will be done in collaboration with the teams developing the data platform architecture.

Thematic experts will also work closely with Cities to identify relevant measures for the indicators of desired outcomes. KPIs will be focused not only on assessing the effectiveness of the implemented NBS solutions, from a social, economic, and environmental perspective, but also on evaluating the process of engagement and the impact of CAL creation.

Monitoring and evaluation plans in each Front Runner city will be developed by the Local monitoring teams (joint effort between Front Runner cities and their LMT team leaders). The type of indicators being selected will dictate the required skills and expertise of the LMT.

Step 3 - Creating the Baseline

The baselining activity in the Front Runner cities will then help in optimizing the proposed KPIs and identify any changes needed before the monitoring process is finalized. This optimization will depend on a number of interrelated factors, including: the key issues faced within CAL; stakeholder/community engagement; technical and logistical considerations (both on-site and virtual, i.e. smart city compliance); and cost. Where required, baseline data should be collected for at least six months prior to the construction of interventions.

Step 4 - Monitoring and Evaluation Plan

The final step is the monitoring and evaluation of demonstration projects in each FR city. The monitoring will run for at least five years post-project as part of each Front Runner Cities' Smart City systems and future University research and innovation projects.

2.3. Principles underpinning the Impact Assessment Framework

The principles underlying the development of the CLEVER cities Impact Assessment Framework are as follows:

Building on and extending existing frameworks and current best practice

The ambition of CLEVER Cities is to make a significant contribution to the understanding of how to comprehensively and holistically assess the effectiveness of NBS in urban contexts. The aim is not to duplicate previous efforts, but to identify where there are opportunities to improve upon or expand the work done in this field to date. In particular, the EKLIPSE Impact Assessment Framework and the Nature4 Cities frameworks will be taken as starting points. These, and other inputs from allied-fields of evaluation, will be considered while taking into account the unique aspects of CLEVER cities, and their challenges and goals in a regeneration context.

On-going and dynamic process

The CLEVER cities monitoring framework is conceived as a dynamic, living instrument and process. It will be enriched, enlarged and updated with new methods, indicators, and tools to respond to the needs of cities as they evolve and, where appropriate, to incorporate new evidence from other projects in this field.

Co-created with cities

The CLEVER cities Impact Assessment Framework will be shaped by the needs of the Front Runner and Follower cities to ensure it is practically useful in supporting the implementation of a NBS as part of an urban regeneration process.

Balancing the desirability for harmonised evaluation measures with a need for appropriately tailored local frameworks

Using common indicators enables comparative evaluation across the Frontrunner cities and understanding on how different NBS perform (or other urban solutions) in different conditions. This consistency will be also useful to compare the results of the project with others and contributes to the evidences for effectiveness of NBS solution for different objectives from environmental, social and financial point of view.

Enabling integration with city platforms and smart city data systems

The framework will be closely linked to the architecture of data platforms, which is based on agreed open standards, coordinated with concurrent NBSs projects approved by the EC, and which acknowledges national and local contexts. As such, data acquisition and management specifications for each of the

KPIs defined for the impact assessment should be coordinated with the requirements and considerations presented in the Architecture of data platforms Plan 4.2.

2.4. Factors influencing the measurement of effectiveness

In addition to policies, standards and governance mechanisms (at local, regional, national and international level) that have an effect on planning processes, there are four main factors that influence how the effectiveness of NBS can and should be measured. All of these will be taken into consideration when developing the monitoring and evaluation framework.

SIZE & SCALE of the intervention to be monitored and evaluated

These are the levels that are commonly identified in the scientific literature and which are consistent with the approach to spatial planning adopted by the frontrunner and follower cities.



City level - the administrative, macro-governance, political and policy-making level of intervention. This scale is the most appropriate level for creating the overarching policy framework for NBS projects



Neighbourhood level - the 'real-life' areas that are often not recognised by formal administrative boundaries, but where communities and businesses exist and interact on a practical level and experience the day-to-day problems that exist in urban areas. This scale is the most appropriate level for the delivery of medium to large-scale NBS projects;



Site level - the component parts that make-up urban neighbourhood and the most appropriate level for the delivery of small-scale NBS projects

SCENARIO COMPARISON, baseline and boundary conditions

Having good baseline information of the so-called pre-greening scenario, as well as sound definition of the boundary conditions or determinant variables for the impact assessment is crucial element in the assessment of effectiveness

TIME FRAME of the monitoring and evaluation

Depending on the design of the NBS and the intended goals, different time frames will be needed from a monitoring perspective (e.g. hourly, daily, weekly, monthly, yearly).

URBAN TYPOLOGY, morphology and configuration

The urban typology has also an influence on the effectiveness of an NBS. Various studies have been, and are being, carried out in order to assess how different types of NBS perform in different urban settings (i.e. RESIN project).



Compact and high – density



Sprawled -



Peri-urban highly industrial



Predominantly rural sparsely populated areas

Figure 2 Examples of types of urban typologies in view of their morphology and predominant land use.
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3. Co-designing an evaluation framework

As a starting point for this co-design process the information presented in the CLEVER Cities D1.1.4: Defining key concepts and associated indicators to measure NBS impact on urban regeneration within CLEVER Cities will be considered.

In fact, the Thematic Topics (links to the Urban Regeneration Challenges) and the list of KPIs to be discussed in this co-design process will be based on this report that include a comparison between the KPIs defined in different European Projects: UNaLab, EKLIPSE, GreenUP, NAIAD, PHENOTYPE, PASTA GREENLULUS, IWUN, TAPAS, ESCAPE, EXPOSOMICS, HELIX, CITI-SENS, ICEPURE, GRABS project

in RECREATE, GREEN SURGE, NATURVATION, STAR Communities and other scientific references that can be applicable since most part of the European projects are not directly related to Urban Regeneration goal.

3.1. Theory of change as a methodology

A Theory of Change is description of how a desired goal or change is expected to happen as a result of one or more interventions or activities, within a specific context. It is sometimes also referred to as creating an “outcomes framework” or “logic model”.

Setting up a Theory of Change is like making a roadmap that outlines the steps by which to plan to achieve the CLEVER programme goal. It will help cities to:

- Define whether your work is contributing towards achieving the impact of CLEVER, and if there is another way that you need to consider as well.
- Clearly present and connect your work to the bigger goal or change you wish to make.
- Enable you to spot potential risks in your plan by documenting assumptions in each step.

And for large projects like CLEVER, where we have several cities running projects simultaneously, the Theory of Change helps to map these different projects first and then consider how they, link and relate to each other.

Theory of Change Process

The process starts by identifying the long-term goals or change and the problem being solved. Then working backwards setting out the overall, intermediate and short-term outcomes and outputs that must be in place to achieve it. The process is completed by adding the creating a causal thread from action to outcome and identifying any assumptions being made about the causal thread or pathway to change. These could include preconditions for success, or about the local environment or social context which will affect the outcome.

3.2. City workshops

Given the interactive and practical nature of Theory of Change, it is recommended that workshops are held to facilitate an in-depth discussion between UIP and CAL stakeholders, and the thematic experts who will be co-designing the evaluation framework. The aims of the workshop can be summarised as:

- Reaching an agreed understanding of the core elements of the NBS to be implemented in each CAL
- Reaching an agreed understanding of the anticipated outcomes of the NBS solutions
- Developing a draft Theory of Change for each NBS, and identifying which outcomes are priorities for measurement (to translate into KPIs)
- Capturing initial thoughts on existing data sources/ planned methods of data capture for key outcome measures/ KPIs

In advance of the workshop there is some preparatory work will be completed be done, this includes:

Identifying workshop participants

The first TOC will involve key representatives from each CLEVER City. Stakeholders from a mix of organisations/ departments is important to ensure we obtain a broad understanding of the anticipated outcomes and create a truly holistic theory of change for each intervention. It may be useful to think about your attendees in the context of the four core domains of impact (co-benefits) we will be exploring (see Figure X) e.g. Human Health and Wellbeing; Social Cohesion and Environmental Justice; and Citizen Safety. Ideally the workshop will include participants who have a knowledge or interest in the outcomes in each of these areas, as well as attendees who are focused on the direct environmental benefits of the planned NBS.

Ideally the workshop will comprise no more than 10 people. You may wish to draw your participants primarily from your UIP but can reach out into your wider group of stakeholders. The preliminary stakeholder analysis and mapping that you should have done as part of your work to establish the UIP may help with this. However, if there is a risk of consultation fatigue, it is possible to restrict attendees to core members of the city project team, with the proviso that there has been prior consultation on, and a good understanding of the diverse range of outcomes anticipated.

The participant list, with a brief explanation of who each individual is/ the organisation they represent should be shared with the workshop facilitators in advance.

Familiarisation with the CALs

Ideally ensuring all participants and workshop facilitators are familiar with the CALs and the proposed NBS to be implemented in each, as far as possible.

- A **short** slide deck which provides a brief introduction to each CAL (e.g. location, main challenges in the area, community profile and photos), and an overview of the proposed NBS.
 - The slide deck should be shared with the workshop facilitators at least 1 week before the workshop
 - The slide deck should be shared with other participants at least 48 hours before the workshop
- A site visit to at least one, or preferably more, of the CALs. This visit should be scheduled for the afternoon before the City Workshop to enable workshop facilitators to attend.
 - Details of the site visit, including timings and meeting point, should be shared with the workshop facilitators and participants at the same time as the workshop date is fixed.

Brainstorming your intended outcomes

Before the workshop, all participants will be asked to undertake some preparation to developing thinking ahead of the workshop,

- They will give some consideration to their own perception and understanding of the intended outcomes for each NBS within their CALs. This can be done individual or in small group brainstorm. A simple template will be provided to capture your thoughts but you can use any

brainstorming method that works for you or your team. Example below: There are no right or wrong answers: The aim of this session is to capture all top-of-mind thoughts.

- We are not looking for you to reach a consensus everyone's thoughts are useful and valid at this stage. Any disagreements will be explored in the workshop session
- You do not need to do 'research' to inform this focus on what you know about the area and your reasons for selecting both the CAL and the NBS. This will help you identify what really matters to the community and the wider group of stakeholders. Other co-benefits may emerge during the session as part of the process. You do not need to be certain about how or why your NBS will achieve the outcome that is part of the thinking that will happen in the workshop. At this stage it is about capturing your ambition and giving the workshop facilitators a better understanding of your starting point.

| CAL: City X, CAL A NBS: Green wall on community centre | | | | |
|---|---------------------------|---|--|----------------------------|
| | Environmental outcomes | Health wellbeing outcomes | & Social cohesion & environmental justice outcomes | Citizen safety outcomes |
| High priority/ common consensus | Improved air quality | Reduced respiratory problems | | |
| Low priority/ less consensus | | Improved mental health of local residents | | |

Completed template(s), will be sent to the workshop facilitators, ideally at least a week in advance of the session.

Workshop logistics

While the thematic experts will lead the workshop and provide the necessary tools for the day, it is the responsibility of cities to facilitate the practicalities around the event. You should:

- Book an appropriate venue - The workshop will last all day and so it must be comfortable for the number of attendees. It will also require people to be active and collaborate space to move around will be important.
- Ensure there are materials to enable creative collaboration flip charts, sticky notes, marker pens, and wall space (and adhesive tape or similar.)
- Make sure the IT works wifi, a projector and screen, and suitable laptop connection will all be needed
- Provide external attendees with the information they need directions for public transport, local accommodation and so on.
- Consider providing some visual inspiration Some large photos of the CAL locations, the type of intervention, or the community you hope to affect will all help the thinking process on the day.
- Catering lunch will be required during the day.

3.3. The City exchanges

Following the city workshops, programme leaders from Front Runner Cities will be invited to a City Exchange workshop. The aims of this workshop are to:

- Share the draft Theories of Change
- Identify commonalities and differences in terms of:
 - The outcomes anticipated for similar NBS interventions
 - The expected causal pathways between certain short-, medium- and long-term outcomes
 - The potential measures, indicators and KPIs for similar outcomes
- Explore the reasons for the differences identified and harmonize outcomes and proposed indicators where possible
- Review proposed data sources for measurement of shared/ similar outcome indicators, and identify opportunities for harmonization or improved consistency of measurement

Thematic experts will feed into this process recommendations from other NBS evaluation frameworks and their perspectives on gaps and opportunities for Clever Cities to make a significant contribution to expanding the knowledge base on the impacts of NBS and how best to measure those in the context of urban regeneration.

The final step in the workshop process will be to agree with the thematic leads the priority areas for exploring where common measures are possible/ desirable, and where cities feel that locally tailored measures are the greatest priority.

This will inform the subsequent work of the thematic and technical experts in developing the guidance and framework for NBS monitoring and evaluation.

4. Operability for Monitoring

4.1. Stakeholders for monitoring

The monitoring process has specific requirements to provide the conditions to be organized and developed attending to the criteria that apply in the CLEVER project framework:

- Obtaining comparable data to develop a cross analysis between CALs in the same city, cities and CLEVER project with other European projects (in Task Forces initiative context).
- Selecting KPIs that provide data to assess the effectiveness of NBS solution to achieve improvements in the challenges previously defined by cities and their UIPs.
- Assuring the development of the Local Monitoring Plan in each CAL and providing a clear operability to the monitoring process: installing the monitoring infrastructure attending to the schedule defined in the project (at least 6 months before intervention and 2 years after interventions).

As it is seen in the main conclusions of the meetings, for each city UIPs has been already defined. In all cases the UIP has the aim to define a common understanding of the project in the city and coordination de CALs and interventions to be aligned to the challenges defined in each city for urban regeneration plans and projects.

CALs stakeholder's definition has different degree of development in each city and the final members of CALs will be decided in parallel to the definition of the CAL interventions. The main function of CALs stakeholders in taking part in the decision process regarding interventions and developing the activities that are required to develop the interventions and the activities linked to them.

Considering this general framework for CLEVER cities stakeholders the aim of this paragraph is detailing how this group will contribute to the definition and development of the monitoring assessment in each CAL and which specific groups must be defined to assure the fulfilment of the objectives of monitoring in the project.

On that sense, in the following table a review of the stakeholders involvement for their achievement and the main role to be played.

| Objectives for Monitoring | Related WP2- Group | Role in WP4 |
|---|--|---|
| Obtaining comparable data to develop a cross analysis between CALs in the same city, cities and CLEVER project with other European projects (in Task Forces initiative context). | UIPs (including cities) will assure that the monitoring process provide useful data to obtain common information between CALs interventions | Thematic Experts: WP4 partners that will provide guides (from the scientific point of view) and to assure a battery of common KPIs in the project (and with other European Projects). LMTeam leaders: UIP and WP4 members that will have the role of coordinate the monitoring activities in the project. It could be useful to have the same LMT leader in all the CALs of each city. |
| Selecting KPIs that provide data to assess the effectiveness of NBS solution to achieve improvements in the challenges previously defined by cities and their UIPs. | UIPs and CALs stakeholders: in each CAL specific objectives for effectiveness assessment can be required. UIP will provide the general framework of challenges of the city in urban regeneration process. Conclusions of the effectiveness assessment of NBS and interventions. | LMTeam: UIP, CAL and WP4 organizations that will develop the monitoring process in the project. A Local Monitoring Plan must be developed to define: variables to be measured in each CAL to obtain KPIs, location of sensors infrastructure, methods and matrix to be measured and timeline. |
| Assuring the development of the Local Monitoring Plan in each CAL and providing a clear operability to the monitoring process: installing the monitoring infrastructure attending to the schedule defined in the project (at least 6 months before intervention and 2 years after interventions). | UIPs and CALs stakeholders: in each CAL specific objectives for effectiveness assessment can be required. UIP will provide the general framework of challenges of the city in urban regeneration process | LMTeam leaders: UIP and WP4 members will have to assure that the schedule requirements are fulfilled: six months of pre-greening and 2 years of post-interventions monitoring. |

As a proposal of visual proposal regarding the roles and functions of each group is as follows:

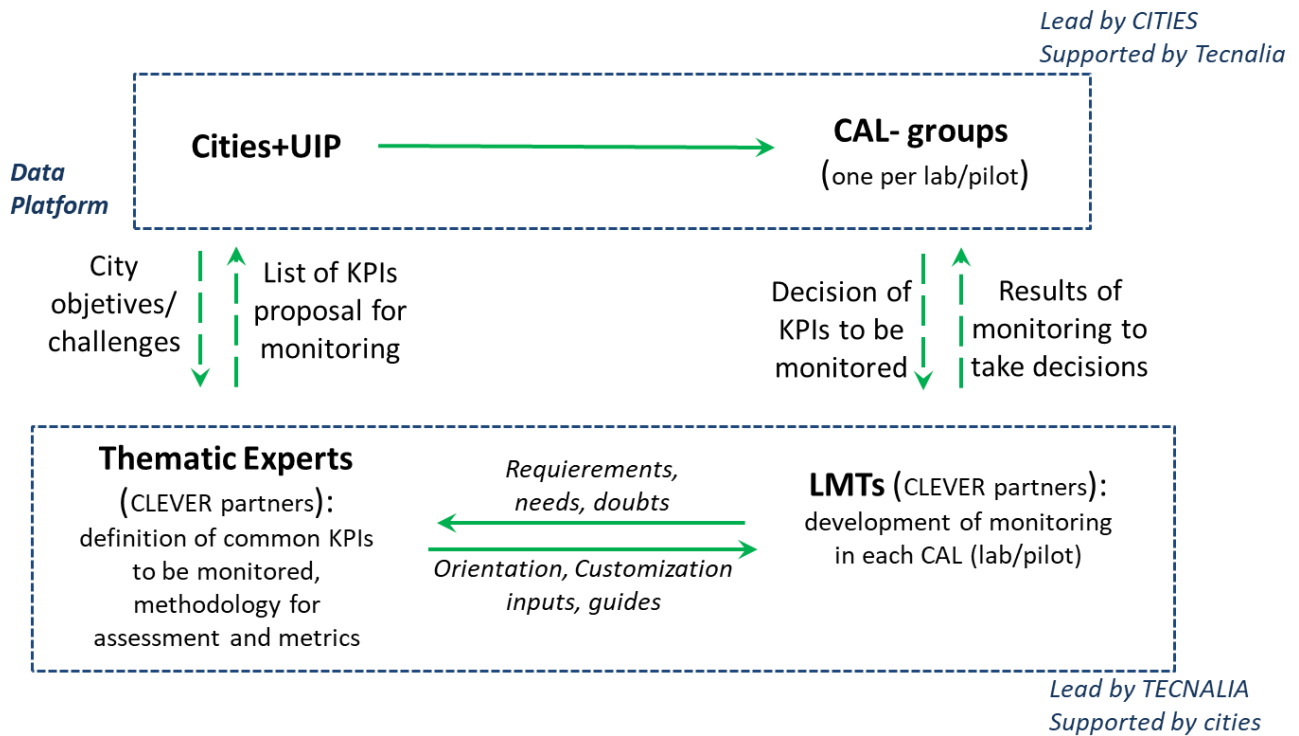


Figure 5. Conceptual Map of the relationship between the WP2 and WP4 groups. (Tecnalia. 2018).

4.1.1. Thematic Experts

This group is totally devoted to WP4 to provide:

- Technical and scientific credibility to the KPIs selected in CLEVER-cities.
- A definition of common KPIs list for CALs and Cities cross-mapping and their comparability on the European project framework.
- Support LMTeams (represented by LMT leaders) to customize the KPIs to assure their applicability in the different CALs to assess effectiveness.
- Revision of Local Monitoring Plans in assure their consistency

Specific meetings between Thematic Experts, Cities and Local Monitoring Team Leaders will be organized to achieve with their role and functions. But also, by demand, Thematic Experts can participate in meetings related with UIPs and CALs activities to provide their expertise when is required.

The Thematic Experts for Monitoring will be also organized by team leaders that will coordinate different topics and KPIs in the same challenge framework. The thematic expert leadership map is as follows:

| CHALLENGE | OBJETIVE | Thematic Expert Leader |
|--|---|-----------------------------------|
| Regeneration Challenge 1: Human health and well-being | To reduce physical, psychological and physiological stress, damage and negative health impact resulting from: exposure to excessive noise, air pollution or heat; lack of exercise and physical activity; poor quality public realm and access to green space. | Young Foundation |
| Regeneration Challenge 2 : Sustainable economic prosperity | to reduce poverty rates whilst boosting regional and local value chains by increasing access to job opportunities and encouraging external investments and business start-ups. To reduce the economic losses related to adverse environmental impacts such as flooding. (e.g. flooding) | Green4Cities |
| Regeneration Challenge 3 Social cohesion and environmental justice | To enhance equal distribution and access to environmental qualities (particularly for elderly and excluded social groups). To strengthen community ties and decision-making processes. | Università Polytechnics of Milano |
| Regeneration Challenge 4: Citizen security | To prevent insecurity (real and perceived) and crime in public spaces. To reduce and minimize the social degradation resulting from adverse environmental impacts such as flooding, noise, poor air quality and excess heat | Young Foundation |

4.1.2. Local Monitoring Teams

This group is totally devoted to WP4 to provide:

- Definition of the Local Monitoring Plans in each CALs that include the final selection of KPIs to be monitored and the detail of their measurement.
- Selection and provision the technical solutions for monitoring the selected KPIs
- Deployment of sensors and applying the different tools and metrics to obtain the variable to monitor the KPIs.
- Collection data of the monitoring process to be storage in the CLEVER-cities platform.
- Conclusions about CAL interventions and NBS regarding their effectiveness to assess the defined challenges or objectives (by UIPs and cities)

From a general perspective this team must include the scientific and technical staff that can be capable of developing the monitoring and assuring the collection of data to obtain KPIs and asses the effectiveness of solutions in each CAL.

The Local Monitoring Team Leader will have to coordinate and make possible (from an operative point of view) the monitoring in each CAL. It could be suitable if the Local Monitoring Team Leader is the same for

all the CALs defined in each city. By the moment the already defined Local Monitoring Team Leaders are as follows:

- Milano: Università Polytechnics of Milano
- Hamburg: Hamburg University of Technology
- London: Greater London Authority

4.2. WP2-WP4 coordination

After reviewing the general framework for the monitoring process, the main objective of this paragraph is presenting a visual summary of the process analysing the relationship between WP2 (task 2.3) and WP4 in order to provide a clearer idea of the steps to be followed in each phase.

As showed in the Figure 4, from a general perspective of the project, the development of monitoring is related to WP2 (task 2.3) and the definition of guides, criteria and the KPIs framework is part of WP4.

This approach requires a deep coordination of both WPs and the partners involved.

To materialize this, stakeholders for monitoring process are proposed. The map of WP4 stakeholders are totally linked to the WP2 already defined groups and provides the means to achieve the CLEVER Cities objectives for monitoring:

- Assuring that the selected KPIs provide useful information to assess the effectiveness of NBS and CALs interventions.
- Providing a Cross Mapping of KPIs between CALs, CLEVER cities and other European projects.
- Developing a Local Monitoring Plan for each city that details: what, where, how and when.
- Implementing all monitored data in the CLEVER platform.

Obtaining conclusions of the monitoring process

Figure 4. Flow Chart of the task to be developed during the project to assess monitoring until the CALs interventions (Tecnalia, 2018).

