



**CitiObs**

**CitiObs - ENHANCING CITIZEN OBSERVATORIES FOR  
HEALTHY, SUSTAINABLE, RESILIENT, AND INCLUSIVE CITIES**

**DELIVERABLE 3.9**

# **NEEDS ASSESSMENT OF FRONTRUNNER AND ALLIANCE CASES (1/2)**

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| <b>Abstract:</b>                  | This deliverable provides a comprehensive account of the methodology and initial results of the Needs Assessment for Citizen Observatories (COs) in the five Frontrunner Cases (FRCs). It details the methodological framework for engaging with COs in mutual learning with CitiObs across different locations, which includes engagement preparation, Needs capture, and Needs analysis. Through mapping CO stakeholders, conducting workshops, and utilizing tools like the Needs Assessment Tool, this |                               |                 |

|  |                                                                                                                |
|--|----------------------------------------------------------------------------------------------------------------|
|  | report showcases the current process of assessing and prioritising needs, in order to support and enhance COs. |
|--|----------------------------------------------------------------------------------------------------------------|

## VERSION LOG

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| <b>0.1</b> | 14.03.24 | EUROC, IHE, IAAC                                      | Updated Outline                                                                 |
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## CITIOBS: ENHANCING CITIZEN OBSERVATORIES FOR HEALTHY, SUSTAINABLE, RESILIENT, AND INCLUSIVE CITIES

CitiObs is a four-year project funded under Horizon Europe by the European Commission. CitiObs will consolidate and apply tools and practice-based knowledge for co-creating data, knowledge and local action via Citizen Observatories (COs): these tools will enhance existing and new citizen observatories to engage people from a diverse range of communities, add value to environmental observations in the urban context, increase and validate citizen observations of the urban environment as part of the existing in-situ Earth Observation systems, co-create inclusive local actions for sustainability and ensure that CO data contributes to research and policy development towards the objectives of the European Green Deal. To ensure broad use, the CitiObs tools and approaches will be developed in co-creation with COs in 5 Frontrunner cities, finetuned with 30 Implementer cities and showcased to 50 Fellow cities.

CitiObs will support Citizen Observatories in distinct cities to create/enhance/or scale up inclusive and diverse Citizen Observatories, fostering in particular an active role of citizens in the observation of the urban environment using low-cost sensor technologies and wearables, with a particular focus on air quality and related environmental measures. CitiObs will formalise, valorise and legitimise the role of citizen observations.

The CitiObs methodology of using a large-scale demonstration, co-design and coaching approaches with CO stakeholders (citizens, scientists, policy/decision makers) in 5+30+50 cities in Europe explicitly builds on the Responsible Research & Innovation (RRI) dimensions as founding principles. Ethics consideration will be addressed consistently across all Work Packages.

- WP1. Social dimensions of Citizen Observatories for transition governance
- WP2. Tools, Technologies, and Data Services for Citizen Observatories
- WP3. Co-creation of data and actions for healthy, sustainable and resilient cities with Citizen Observatories
- WP4. Impact creation, Communication, Dissemination and Exploitation
- WP5. Project management
- WP6. Ethics

## EXECUTIVE SUMMARY

CitiObs seeks to enhance existing and emerging COs by co-creating data knowledge and local action. This deliverable outlines the methodology and initial results from the Needs assessment. D3.9 is part of Task 3.2, focusing on developing and applying self-assessment tools to understand the priorities and learning requirements of participant cases.

A methodological framework was developed to engage with COs across different locations, structured around engagement preparation, Needs capture, Needs analysis, and the design and implementation of a Capacity Building Programme. The process involved mapping CO stakeholders, conducting in-person and online workshops, and utilizing tools like the Needs Assessment Tool to capture and prioritize the Needs of COs.

Preliminary findings in the Frontrunner Cases include:

- **Athens:** showcasing the importance of targeted stakeholder involvement and mutual learning workshops.
- **Barcelona:** emphasizing the necessity for improved communication and technical collaboration among diverse community stakeholders.
- **Dublin:** leveraging existing relationships to address environmental monitoring challenges, highlighting the potential for collaborative action.
- **Kristiansand:** underlining the necessity for dialogue between citizens and the nearby industries to enhance local environmental conditions.
- **Rotterdam:** offering insights into sustaining a dense network of air quality sensors post-project support, emphasizing self-sustainability.

Engagement with Frontrunner Cases has laid the foundation for the development of scalable self-assessment tools. The CitiObs project explored the use of the [MICS tool for impact assessment](#) and is developing a Self-assessment Matrix to refine engagement and facilitate knowledge sharing.

The ultimate goal is to support COs in implementing relevant, efficient tools and methodologies, that will ensure the CO reaches its aims. This deliverable marks a significant step towards understanding and addressing the Needs of COs participating in the CitiObs project, providing a clear pathway for future activities aimed at strengthening COs across Europe.

## TABLE OF CONTENTS

|                                                                    |    |
|--------------------------------------------------------------------|----|
| ACRONYMS .....                                                     | 11 |
| GLOSSARY .....                                                     | 12 |
| 1. INTRODUCTION.....                                               | 15 |
| 2. METHODOLOGICAL FRAMEWORK.....                                   | 17 |
| 2.1 ENGAGEMENT PREPARATION.....                                    | 18 |
| 2.2 NEEDS CAPTURE .....                                            | 22 |
| 2.3 NEEDS ANALYSIS.....                                            | 25 |
| 3. RESULTS: INITIAL NEEDS ASSESSMENT IN THE FRONTRUNNER CASES..... | 28 |
| 3.1 Athens .....                                                   | 28 |
| 3.2 Barcelona .....                                                | 35 |
| 3.3 Dublin .....                                                   | 43 |
| 3.4 Kristiansand.....                                              | 50 |
| 3.5 Rotterdam.....                                                 | 56 |
| 4. CONCLUSION: CURRENT STATUS AND NEXT STEPS .....                 | 64 |
| REFERENCES.....                                                    | 67 |
| ANNEXES .....                                                      | 68 |
| ANNEX 1 .....                                                      | 68 |
| ANNEX 2.....                                                       | 70 |
| ANNEX 3.....                                                       | 73 |

## INDEX OF FIGURES

|                                                         |    |
|---------------------------------------------------------|----|
| Figure 1. Self-Assessment Tool development process..... | 17 |
| Figure 2. Internal Dashboard for FRC coordination ..... | 19 |
| Figure 3. Excerpt of a FRC Briefing.....                | 19 |

|                                                                                                                                                                                                                                                                     |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 4. Tasks/Pains/Gains Tool .....                                                                                                                                                                                                                              | 23 |
| Figure 5. Excerpt of the Logbook Template.....                                                                                                                                                                                                                      | 24 |
| Figure 6. Evaluation form template.....                                                                                                                                                                                                                             | 25 |
| Figure 7. Needs Assessment Tool Template.....                                                                                                                                                                                                                       | 26 |
| Figure 8. Grade scale example .....                                                                                                                                                                                                                                 | 27 |
| Figure 9. Workshop venue .....                                                                                                                                                                                                                                      | 28 |
| Figure 10. Workshop participants during the Tasks/Pains/Gains activity.....                                                                                                                                                                                         | 30 |
| Figure 11. All material gathered from the workshop .....                                                                                                                                                                                                            | 30 |
| Figure 12. Overall Satisfaction from the workshop according to the evaluation form (with 1 meaning “Low” and 5 meaning “High”) .....                                                                                                                                | 31 |
| Figure 13. Screen shots with examples from Athens' Needs Prioritization digital board .....                                                                                                                                                                         | 33 |
| Figure 14. Getting to know the Citizen Observatories in Barcelona (Photo by Fab Lab Barcelona) .....                                                                                                                                                                | 36 |
| Figure 15. Collaborating with Citizen Observatories in Barcelona. Photo by Fab Lab Barcelona .....                                                                                                                                                                  | 37 |
| Figure 16. Phase 02 - Frontrunner demonstration by Fab Lab Barcelona .....                                                                                                                                                                                          | 39 |
| Figure 17 Screenshot of the Miro digital board designed for the Prioritization Workshop in Barcelona (Citizen Observatory: LABCSU) .....                                                                                                                            | 40 |
| Figure 18 Screenshot of the Miro Board platform designed for the Prioritization Workshop in Barcelona – Cluster of Needs .....                                                                                                                                      | 41 |
| Figure 19. Screenshot of a map of the area from the Miro-board used for the ‘Getting to know the Citizen Observatory activity. Information was added to the map (and translated to English) after the meeting, based on oral descriptions of the participants ..... | 52 |
| Figure 20. Screenshot from the Miro-board used for the Task/Pains/Gains activity.....                                                                                                                                                                               | 53 |
| Figure 21. Measurement points in Rotterdam (light orange background) (Source: <a href="http://www.samenmeten.rivm.nl">www.samenmeten.rivm.nl</a> ).....                                                                                                             | 57 |
| Figure 22. Fishbowl discussion during the second part of the workshop .....                                                                                                                                                                                         | 58 |
| Figure 23. The results of the discussions in Rotterdam FRC captured by a local artist.....                                                                                                                                                                          | 59 |

Figure 24. Miro Board results Rotterdam public servants (not including citizens) .....61

## INDEX OF TABLES

|                                                                                                                    |    |
|--------------------------------------------------------------------------------------------------------------------|----|
| Table 1 Summary of Citizen Observatories (COs) involved in initial engagement stages in each Frontrunner Case..... | 18 |
| Table 2. Excerpt of the Stakeholder Mapping tool from Barcelona (anonymized).....                                  | 21 |
| Table 3. Athens' results summary .....                                                                             | 34 |
| Table 4. Barcelona's results summary.....                                                                          | 43 |
| Table 5. Stakeholder Attendees by CO during the FRC Dublin Onboarding Workshop .....                               | 45 |
| Table 6. Occurrence of General Themes in the Dublin FRC COs Needs Assessment .....                                 | 47 |
| Table 7. Needs Prioritization in the Dublin FRC COs Needs Assessment .....                                         | 48 |
| Table 8. Dublin's results summary .....                                                                            | 49 |
| Table 9. Kristiansand's results summary .....                                                                      | 56 |
| Table 10. Rotterdam's results summary .....                                                                        | 62 |
| Table 11. Aggregated results summary.....                                                                          | 64 |

## ACRONYMS

| Acronym        | Full name                                                   |
|----------------|-------------------------------------------------------------|
| <b>CCLL</b>    | Coastal City Living Lab                                     |
| <b>CO</b>      | Citizen Observatory                                         |
| <b>D</b>       | Deliverable                                                 |
| <b>DCC</b>     | Dublin City Council                                         |
| <b>DCMR</b>    | Environmental Protection Agency                             |
| <b>DLRCOCO</b> | Dún Laoghaire Rathdown County Council                       |
| <b>FRC</b>     | Frontrunner Cases                                           |
| <b>GLOBE</b>   | Global Learning and Observations to Benefit the Environment |
| <b>GT2.0</b>   | Ground Truth 2.0                                            |
| <b>RRI</b>     | Responsible Research & Innovation                           |
| <b>SDL</b>     | Spatial Dynamics Lab                                        |
| <b>WP</b>      | Work Package                                                |

## GLOSSARY

| Acronym                            | Full name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Alliance Cases</b>              | To ensure broad use, the CitiObs tools and approaches will be developed in co-creation with Citizen Observatories (COs) in 5 Frontrunner cities, finetuned with 30 Alliance CO cases and showcased to 50 Fellow CO cases. Note that Alliance Cases were previously referred as Implementer Cities. This change was done in order to promote a more accurate description of CitiObs engagement with Citizen Observatories (not cities per se), and the nature of said engagement (not only implementing tools, but collaborating with Citizen Observatories).                                                                                                                            |
| <b>Citizen Observatories (COs)</b> | COs are community-based environmental monitoring and information systems, typically at the community level or in a specific location, even if linked to a national or global environmental concern. COs involve citizens using modern mobile and web technologies and/or sensors to collect and share data, which enhance Earth observation systems and official data sources by filling in gaps and adding detail. Often using dedicated IT infrastructure, COs support the flow of data and information between citizens, scientists and decision-makers, and typically have a distinct focus on influencing decision-making, policy change and/or environmental governance outcomes. |
| <b>Engagement Strategy</b>         | A strategic approach to connect with stakeholders by utilizing tailored communication methods to ensure active participation in Citizen Observatories.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Fellow Cases</b>                | To ensure broad use, the CitiObs tools and approaches will be developed in co-creation with Citizen Observatories (COs) in 5 Frontrunner cities, finetuned with 30 Alliance CO cases and showcased to 50 Fellow CO cases. Note that Fellow Cases were previously referred as Fellow Cities. This change was done in order                                                                                                                                                                                                                                                                                                                                                               |

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                             | to promote a more accurate description of CitiObs engagement with Citizen Observatories (not cities per se).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Fishbowl Methodology</b> | The Fishbowl Methodology is a participatory technique used in workshops to facilitate inclusive and dynamic discussions among large groups. It involves arranging chairs in two concentric circles, with a small group in the inner circle actively discussing a topic, while the outer circle listens silently. Participants from the outer circle can enter the inner circle to replace speakers, ensuring fresh perspectives continually enrich the conversation. This method promotes deep listening and broad participation, making it ideal for exploring complex issues and generating collective solutions in a structured yet flexible environment. |
| <b>Frontrunner Cases</b>    | To ensure broad use, the CitiObs tools and approaches will be developed in co-creation with Citizen Observatories (COs) in 5 Frontrunner cities, finetuned with 30 Alliance CO cases and showcased to 50 Fellow CO cases. Note that Frontrunner Cases were previously referred as Frontrunner Cities. This change was done in order to promote a more accurate description of CitiObs engagement with Citizen Observatories (not cities per se).                                                                                                                                                                                                             |
| <b>MICS Tool</b>            | The MICS tool (Measuring the Impact of Citizen Science) is designed to assess the impact of citizen science projects across various domains such as science, environment, economy, governance, and society. It offers a structured approach to evaluate project impacts from inception through realization, and over time. The tool allows users to compare projects within the same discipline, generate impact summaries for stakeholders, and observe changes in impact over time. For more detailed information, you can visit the <a href="#">MICS website</a> .                                                                                        |
| <b>Needs Analysis</b>       | A methodical process to identify and assess the requirements of stakeholders in COs, aiming to match these needs with effective solutions during the design of a Capacity Building Programme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Needs Capture</b>            | An initial stage involving direct engagement with stakeholders in Onboarding Workshops to identify and document their primary needs, employing tools like the Tasks/Pains/Gains Tool for effective Need identification and analysis.                                                                                                                                                                                                                                                     |
| <b>Onboarding Workshops</b>     | Interactive sessions designed to introduce stakeholders to project objectives, build trust, and identify their needs, fostering a deeper understanding of the Citizen Observatories' scope and potential impact.                                                                                                                                                                                                                                                                         |
| <b>Prioritization Workshops</b> | Workshops focused on refining and grading stakeholder Needs to determine their relevance and urgency, which informs subsequent solution development and implementation strategies.                                                                                                                                                                                                                                                                                                       |
| <b>Stakeholder Mapping</b>      | A process to systematically identify key stakeholders, understand their roles, and determine the relevance of their involvement in Citizen Observatories, essential for targeted engagement strategies.                                                                                                                                                                                                                                                                                  |
| <b>Tasks/Pains/Gains Tool</b>   | This tool is based on the Value Proposition Canvas (Osterwalder, A., et al., 2014), and updated to CitiObs approach as a Tasks/Pains/Gains Tool. The main goal of this tool is to operationalize participatory activities during workshops to encourage participants to connect their “jobs” (e.g., tasks that describe what they want to get done as part of the CO) with key “pains” (e.g., main obstacles and risks in their tasks) and “gains” (e.g., results they want to achieve). |

# 1. INTRODUCTION

## 1.1 Background

This deliverable reports on activities that span the CitiObs **Inception Phase** (especially through the advancement of tools, methodologies, and socio-technical approaches) and early stages of the **Demonstration Phase** (with the current and upcoming testing of technical and social tools and methodologies with the Frontrunner Cases (FRCs). Therefore, this period includes the initial engagement of CitiObs with FRCs, the organization and implementation of the first and second rounds of workshops, and the development of the first versions of the CitiObs socio-technical tools in WP1 and WP2.

The assessment and prioritization of the **needs of COs in the FRCs** is central for CitiObs activities, ensuring the co-created, tested and implemented tools are relevant, efficient, and timely. Therefore, current efforts aimed at refining Needs Assessment methodologies, tools, and activities that have been developed and conducted with FRCs.

## 1.2 Purpose of this report

This Deliverable **D3.9** is part of the work undertaken by T3.2 (“Citizen Observatories in Implementer Cities: applying CitiObs approaches based on materials & peer learning”). It reports on the process of developing and applying self-assessment tools to understand priorities and learning needs of participating Frontrunner Cases.

Please note that D3.9 presents the methodology and initial results of this activity with the FRCs, while Deliverable D3.1 will report on the Needs Assessment of the Alliance cases in M24 of this project.

## 1.3 Structure of this report

This report is structured as follows.

- **Section 2: Methodological Framework:** This section reports on the development of a methodological framework to engage with COs in different locations, using a structured process to leverage insights for the development of a self-assessment tool.
  - **2.1 Engagement Preparation:** This section reports on the development of an engagement strategy, involving the creation and distribution of tailored Invitation Letters in local languages and the organization of the engagement process with COs

to facilitate stakeholder engagement, supported by an internal Dashboard for coordination.

- **2.2 Needs Capture:** This section reports on the organization and implementation of Onboarding Workshops, focused on building trust and identifying stakeholders' needs, followed by internal debriefing and participant feedback to guide future engagement steps.
- **2.3 Needs Analysis:** This section reports on the internal data analysis so far with a Needs Assessment Tool, leading to a deeper understanding and the organization of Prioritization Workshops. Stakeholders were guided in an activity to refine and prioritize needs, which will inform the development of a tailored Capacity Building Programme matching these needs with specific solutions or indicating new tool development.
- **Section 3 - Results: Initial Needs Assessment in the Frontrunner Cases:** This section reports on the hands-on experiences in operationalizing the CitiObs methodological framework in 5 different locations with FRCs, its main insights, challenges, and opportunities.
- **Section 4 - Conclusion: Current status and next steps:** This section summarizes the engagement with FRCs, highlighting the development of scalable, context-adjustable self-assessment tools, and outlining next steps including the fit-for-purpose of the MICS tool for impact assessment and the creation of a Self-assessment Matrix to refine engagement and facilitate knowledge sharing between FRC and Alliance Cases.

## 2. METHODOLOGICAL FRAMEWORK

CitiObs WP3 developed a specific methodological framework to engage with different COs in 5 Frontrunner Cases (hereafter: FRC). This methodology considers context specificities while providing a coherent structure for engagement with multiple COs within each FRC, and with multiple stakeholders within each CO. Based on this methodological framework, a self-assessment tool will be developed that can be used to engage with the 30 Alliance Cases and 50 Fellow Cases.

This methodology steers a process that is currently composed of four main stages: Engagement Preparation, Needs Capture, Needs Analysis, and Design and Implementation of a Capacity Building Programme. In each stage, specific tools, events and activities are used for data collection and analysis. Deliverable 3.9 focuses on the 3 first stages, leveraging insights and learnings from the current process to develop, consolidate and apply a self-assessment tool that can be used by the Alliance and Fellow Cases.



*Figure 1. Self-Assessment Tool development process*

At the time of submission of this report, WP3 has completed key steps in the consolidation of the self-assessment tool, such as undertaking CO and Stakeholder Mapping, Analysis and Engagement, conducting in-person Onboarding Workshops and online Prioritization Workshops in all FRCs (see Figure 1). The following sections detail the current state of this process and the next steps for the development of the self-assessment tool.

Table 1 below presents a summary of COs involved in the initial engagement stages in each FRC, from the first onboarding workshop through selection and participation in the second workshop round on Needs prioritization. Originally, the intention was to have one CO in each FRC engaged

in the next steps, however, following the onboarding workshops in Barcelona and Dublin, the contact points identified several initiatives that were eager to and could benefit from being involved in the next steps. After internal discussions among CitiObs partners, it was agreed that the FRCs could allow more than one CO to take part in a more light-touch follow-up, including the Needs prioritization workshop. Not all the “additional COs” mentioned in Table 1 matched the specific criteria for COs, yet for clarity only the term CO is used here. More nuanced information is included in sections 3.1-3.5.

| Frontrunner Case | COs attending the Onboarding Workshops | Selected as CitiObs Frontrunner Case and attending Needs prioritization workshop | Additional COs attending the Needs prioritization workshops |
|------------------|----------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------------------|
| Athens           | 3 COs                                  | 1 CO                                                                             | N/A                                                         |
| Barcelona        | 8 COs                                  | 1 CO                                                                             | 3 COs                                                       |
| Dublin           | 6 COs                                  | 1 CO                                                                             | 2 COs                                                       |
| Kristiansand     | 1 CO                                   | 1 CO                                                                             | N/A                                                         |
| Rotterdam        | 1 CO                                   | 1 CO                                                                             | N/A                                                         |
| <b>TOTAL</b>     | 19 COs                                 | 5 COs                                                                            | 5 COs                                                       |

*Table 1 Summary of Citizen Observatories (COs) involved in initial engagement stages in each Frontrunner Case*

## 2.1 ENGAGEMENT PREPARATION

CitiObs identified, at the proposal stage, five Frontrunner Cases (FRC). The cases were selected based on a set of criteria, including their ongoing operation for a significant period of time, their alignment with CitiObs objectives and the existing links within the CO between citizen generated data and policy. WP3 team is composed of **contact points** for each location (i.e., Athens, Barcelona, Dublin, Kristiansand, and Rotterdam) who are responsible for the direct engagement with the COs in the FRC.

An internal **Dashboard** was created by WP3 to promote efficient planning and coordination among all FRCs. This tool supports contact points in monitoring their progress, planning their next steps, coordinating event timings, resource allocation, and centralizing links to the relevant documentation.

| FRC          | PREP          |                      | MUTUAL LEARNING WORKSHOPS |                         |              |              |           |        |         |            | 1st WORKSHOP FOLLOW-UP |                             |           |                  |
|--------------|---------------|----------------------|---------------------------|-------------------------|--------------|--------------|-----------|--------|---------|------------|------------------------|-----------------------------|-----------|------------------|
|              | CASE BRIEFING | STAKEHOLDERS MAPPING | INVITATION LETTER         | AGENDA & SESSION DESIGN | PRESENTATION | CONSENT FORM | MATERIALS | PHOTOS | OUTPUTS | EVALUATION | FOLLOW-UP EMAIL        | PARTICIPANT EVALUATION FORM | RESPONSES | NEEDS ASSESSMENT |
| ATHENS       | Yes           | Yes                  | Yes                       | Yes                     | Yes          | Yes          | Yes       | Yes    | Yes     | Yes        | Yes                    | Yes                         | Yes       | Yes              |
| BARCELONA    | Yes           | Yes                  | Yes                       | Yes                     | Yes          | Yes          | Yes       | Yes    | Yes     | Yes        | Yes                    | Yes                         | Yes       | Yes              |
| DUBLIN       | Yes           | Yes                  | Yes                       | Yes                     | Yes          | Yes          | Yes       | Yes    | Yes     | Yes        | Yes                    | Yes                         | Yes       | Yes              |
| KRISTIANSAND | Yes           | Yes                  | Yes                       | Yes                     | Yes          | Yes          | Yes       | Yes    | Yes     | Yes        | Yes                    | Yes                         | Yes       | Yes              |
| ROTTERDAM    | Yes           | Yes                  | Yes                       | Yes                     | Yes          | Yes          | Yes       | Yes    | Yes     | Yes        | Yes                    | Yes                         | Yes       | Yes              |

Figure 2. Internal Dashboard for FRC coordination

The first step for WP3 was the development of **Frontrunner Cases Profile Briefings** in which the overall context of each case was analysed. These briefings explored current challenges, existing infrastructure, relevant actors, and foreseen engagement between FRCs and CitiObs. These briefing documents and internal discussions provided the necessary information to understand the context in which the CO is operating. The resulting insights have implications for how CitiObs approaches engagement with the cases and identified other factors that have the potential to influence the processes and outcomes of the CO. Such insights were used to inform the WP3 next steps to map relevant stakeholders.

|                                                                                                                                                  |                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| City                                                                                                                                             | City of Athens                                                                                                                                                                                                                                                                              |
| Name of the region where it is located                                                                                                           | Attica                                                                                                                                                                                                                                                                                      |
| Country                                                                                                                                          | Greece                                                                                                                                                                                                                                                                                      |
| Population of the city                                                                                                                           | 664,046                                                                                                                                                                                                                                                                                     |
| Citizen Science projects that took place in the city                                                                                             | <a href="#">SCENT</a> , <a href="#">CompAir</a> , <a href="#">Community Observation Measurement &amp; Participation in AIR Science</a> , <a href="#">ISPEX</a>                                                                                                                              |
| Established COs in the city                                                                                                                      | CISD- Citizens' Inspectorate For Sustainable Development, <a href="#">ANIMA</a> , <a href="#">Network of Organizations and Citizens for the Historic Center of Athens</a> , <a href="#">City Nature Challenge 2019: Athens, Greece</a> , <a href="#">City Nature Challenge 2021: Athens</a> |
| CO currently operative (or easy to bring back to life)                                                                                           | <a href="#">CitizenHeritage</a> , <a href="#">Community Observation Measurement &amp; Participation in AIR Science</a> , <a href="#">ISPEX</a>                                                                                                                                              |
| Plans to establish a new CO (within next 2-3 years)                                                                                              | To be announced: <a href="#">REsearch INfrastructures FOR Citizens in Europe</a> , <a href="#">Cos4Cloud</a>                                                                                                                                                                                |
| Public authorities/Agencies at urban level the partner has contact with and the policy areas they represent (air quality, climate change, other) | Municipality of Athens, Chief Heat Officer for the City of Athens, Athens Resilience Office, etc.                                                                                                                                                                                           |
| What are the possibilities to contact upper governance levels (regional and national) to engage with on policy and regulation                    | High                                                                                                                                                                                                                                                                                        |
| Does the city intend to apply to join the Mission on 100 Climate Neutral and Smart Cities?                                                       | Yes                                                                                                                                                                                                                                                                                         |
| Does the city have specific plans on Air Pollution and/or Climate Change?                                                                        | Yes, a Climate Mitigation and Adaptation plan and a Resilience Strategy for 2030.                                                                                                                                                                                                           |
| What is the level of expertise in the local public authorities/agencies at urban level on establishing, running or participating in COs?         | Medium                                                                                                                                                                                                                                                                                      |

Figure 3. Excerpt of a FRC Briefing

Next, a stakeholder **mapping exercise** was undertaken to identify the core stakeholders involved in existing COs and their roles, as well as potential or missing actors. Using this tool, CO contact points were able to systematically identify key stakeholders in their respective COs, whom would be invited to engage with the CitiObs project's work. The stakeholder mapping exercise resulted in a short list of key CO stakeholders and their contact details so that tailored CitiObs invitations could be sent to them.

Three primary stakeholder categories were identified in the COs, drawing on the categories used in CO stakeholder analysis from the Ground Truth 2.0 (GT2.0) project (Pfeiffer et al., 2016) and the Ground Truth 2.0 concept of COs (Wehn and Pfeiffer, 2020). The three core stakeholder groups identified in citizen science initiatives are: **citizens, scientists/data aggregators and decision/policy makers**. In later stages, CitiObs will also engage with the remaining stakeholder categories according to the relevant identified stakeholders within the CitiObs project (i.e., expert advisers, stakeholders in the enabling environment of COs and market forces).

| CO stakeholder type for onboarding (select) | Organisation name OR personal capacity                | Contact person (person's name) | Contact person's role in the organisation (if applicable) | Contact person's role in the CO (e.g. initiator, key contact for stakeholder type) | Contact person's email | Contact owner (CitiObs team member) | What can enable/hinder their participation in CitiObs activities?                                                                                                      |
|---------------------------------------------|-------------------------------------------------------|--------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------|------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Citizen                                     | Lichen Social Innovation (civil society organisation) |                                |                                                           |                                                                                    |                        |                                     | They know about the project, and have interest in it. They also support some work on the Citizen-led action toolkit.<br>Nothing that could hinder their participation. |
| Citizen                                     | aquí (association / civil society organisation)       |                                |                                                           |                                                                                    |                        |                                     | They know about the project, and have interest in it. Budget availability could hinder their participation as they are a small association.                            |
| Citizen                                     | Science for change                                    |                                |                                                           |                                                                                    |                        |                                     | -                                                                                                                                                                      |
| Citizen                                     | Making Sense Community                                |                                |                                                           |                                                                                    |                        |                                     | Motivation in Citizen Science projects.<br>Was part of Making Sense                                                                                                    |
| Scientists/data aggregators                 | ISGLOBAL                                              |                                |                                                           |                                                                                    |                        |                                     | Available only during working hours.<br>Time availability from her day-to-day job.                                                                                     |
| Scientists/data aggregators                 | Universitat de Barcelona                              |                                |                                                           |                                                                                    |                        |                                     | Available only during working hours.<br>Time availability from her day-to-day job.                                                                                     |
| Scientists/data aggregators                 | Universitat Autònoma Barcelona                        |                                |                                                           |                                                                                    |                        |                                     | Available only during working hours.<br>Time availability from her day-to-day job.                                                                                     |
| Scientists/data aggregators                 | Institut de Ciències del Mar                          |                                |                                                           |                                                                                    |                        |                                     |                                                                                                                                                                        |
| Decision/policy makers                      | Municipality of Barcelona                             |                                |                                                           |                                                                                    |                        |                                     | (I assume) available only during working hours.                                                                                                                        |

Table 2. Excerpt of the Stakeholder Mapping tool from Barcelona (anonymized)

With identified COs and stakeholders in each case, an engagement procedure was developed. Firstly, WP3 created a **template for Invitation Letters** to be sent to the selected key stakeholders. This template used inclusive, engaging, and accessible language and narrative, with a clear message for stakeholders to participate in “mutual learning” with CitiObs, as opposed to a top-down approach. Consecutively, the templates were translated to the local languages of each location, tailored to each case, and refined by the contact points based on their experience and previous engagements with the stakeholders. The final versions of the Invitation Letters were sent out informing these stakeholders about CitiObs project, indicating our goals and next steps, and offering opportunities for engagement.

The main call to action in the Invitation Letter was the official invitation for participation in the first Onboarding Workshop. The dates and venues for the workshops were selected by case leads to facilitate participant attendance. The structure and activities of the workshops were also designed to be engaging, accessible and inspiring to participants.

## 2.2 NEEDS CAPTURE

The first step for the Needs Capture stage was directly engaging with COs in the in-person **Onboarding Workshop** (also called “Mutual Learning Workshop”). The workshop’s structure, agenda and activities were discussed internally and optimized to build trust among CO participants, secure their commitment, and identify the main needs emerging from each stakeholder in different COs. These workshops were conducted by WP3 contact points, WP1 and WP2 mentors, in the local language of FRCs.

The workshop had sessions dedicated to developing a deeper understanding of the context, background and future of participating COs. Additionally, these workshops were important in providing a general understanding and clarity of CitiObs scope and goals within the COs landscape, reflecting on how it can co-create value to enhance, support and connect COs.

The core activity of these workshops is based on the Value Proposition Canvas (Osterwalder, A., et al., 2014), a management tool that aims to position the product or service around the customers’ values and needs. This framework was adjusted and updated to the CitiObs approach as a **Tasks/Pains/Gains Tool** to identify social and technical needs emerging from each stakeholder. The main goal of this activity was encouraging participants to connect their “jobs” (e.g., tasks that describe what they want to get done as part of the CO) with key “pains” (e.g., main obstacles and risks in their tasks) and “gains” (e.g., results they want to achieve).

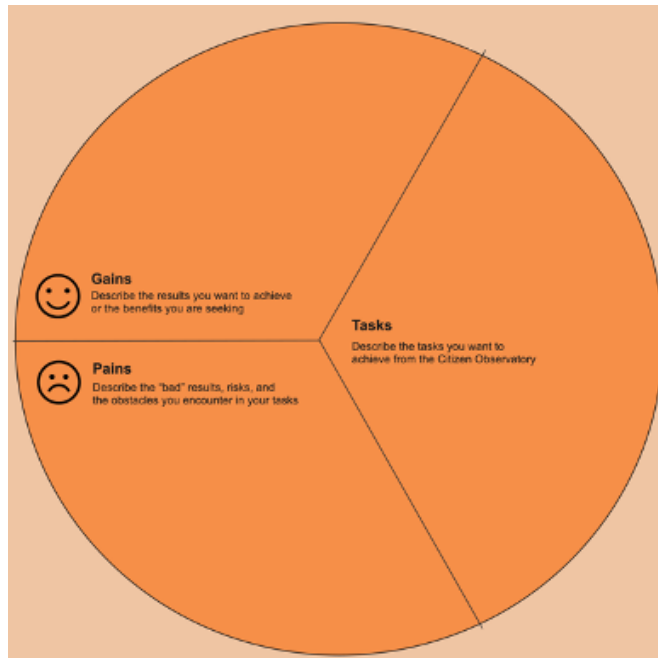


Figure 4. Tasks/Pains/Gains Tool

In addition to general and specialized discussions during the workshop, the resulting scheme from the Tasks/Pains/Gains activity was a crucial resource to aid the CitiObs team in identifying the main emerging **Needs** from COs. Therefore, internal debriefing meetings were conducted after the workshops with CitiObs team in order to synthesize workshop results, share lessons learned across cases and make improvements to forthcoming workshops based on the experience of other case leaders.

After the Onboarding Workshops, the team also completed the **Logbook**, a crucial internal tool designed for the evaluation of WP3 events. This tool captures important information about the case context, effectiveness of the events and lessons learned that will then feed into subsequent FRC engagement stages.

| CitiObs FRC                                                 | <case name>                                                                                                                                                                                        |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event information                                           |                                                                                                                                                                                                    |
| Event title                                                 | e.g. first onboarding workshop                                                                                                                                                                     |
| Event date                                                  |                                                                                                                                                                                                    |
| Event location                                              |                                                                                                                                                                                                    |
| CitiObs team                                                | (names, orgs, role in the event)                                                                                                                                                                   |
| Participants per CO                                         | CO title<br>List of participants (name, org, role in CO per participant)<br><br><enter for all COs, if more than one attending>                                                                    |
| Objectives of the event                                     | 1. <u>CitiObs</u> objectives for the event:<br>e.g. onboarding, creating commitment to work with <u>CitiObs</u> , identifying CO needs<br><br>2. List objectives as presented to the participants: |
| Structure of the event                                      | High level agenda:<br><br><include link to detailed event design>                                                                                                                                  |
| Methods used                                                | e.g. session design for the onboarding session<br>link to online resources in case study folder                                                                                                    |
| Evaluation by participants                                  |                                                                                                                                                                                                    |
| Participants feedback (e.g. comments received during event) |                                                                                                                                                                                                    |

Figure 5. Excerpt of the Logbook Template

A **follow-up email** with more information about next steps and an **evaluation form** was sent to participants. The form asked for feedback about participants' satisfaction related to the workshop's content, materials, methods, and organization. The forms responses also served as critical information for designing the next steps of CitiObs engagement with COs.



**CitiObs Workshop Participant Evaluation Form**  
First Mutual Learning Workshop on Citizen Observatories in Dublin

1. My citizen observatory or initiative is

2. My name is


**CitiObs Workshop Participant Evaluation Form**  
**Section 1: Workshop content**  
Please respond to the following questions by selecting a rating level from low to high for each question. There is a separate section for any comments if you have any suggestions for improving future CitiObs workshops.

Your views are very important and will help us to improve future CitiObs events.

3. Overall, my satisfaction with this workshop was

|                       |                       |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Low                   |                       |                       |                       |                       | High                  | N/A                   |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4. The relevance of the CitiObs for the work done by my Citizen Observatory is

|                       |                       |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Low                   |                       |                       |                       |                       | High                  | N/A                   |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

5. The benefit of being introduced to the CitiObs project is

|                       |                       |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Low                   |                       |                       |                       |                       | High                  | N/A                   |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Figure 6. Evaluation form template

## 2.3 NEEDS ANALYSIS

After the first workshop in each FRC, WP3 engaged in analyzing the data collected via an internal **Needs Assessment Tool** to support this process. In this tool, the main topics emerging from the workshop discussions and activities were transcribed onto a table where Tasks, Pains, and Gains were articulated as a “Need” and associated with the relevant stakeholders. In forthcoming stages, these needs will be connected to solutions when possible (drawing from CitiObs toolkits or already existing external tools).

Figure 7. Needs Assessment Tool Template

Once again, a common **Invitation Letter** template was discussed, contextualized, and calibrated to each FRC, and translated to local languages. Additionally, the **workshop structure** was internally discussed and consolidated to be an engaging and participative event where participants would be able to discuss and make decisions on prioritization of their main needs.

The Needs Prioritization Workshops were conducted in the local language of each FRC. It focused on two main activities, **validation and prioritization**. For the validation, an open discussion was undertaken with participants to clarify and agree on what the Needs mean and who they affect. Consecutively, stakeholders engaged in a participatory activity to **prioritize the identified needs** and position them on a grading scale.

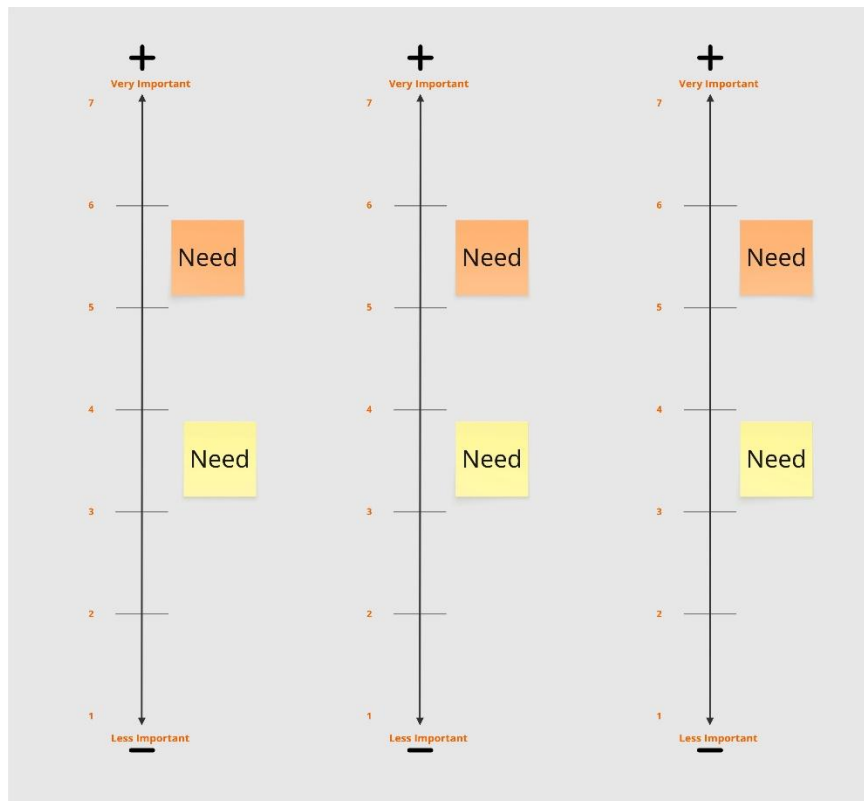


Figure 8. Grade scale example

The results provide critical information to the subsequent development of the **Capacity Building Programme**, where these Needs will be matched to specific solutions from CitObs tools (either from WP1 social dimensions tools/kits or WP2 technical dimensions tools/kits, or cross-cutting socio-technical tools), existing tools (e.g., WeObserve Cookbook, or elsewhere), or none of the above (indicating the importance of developing an entirely new tool to address this Need). These articulations will guide CitiObs **mentoring process**, guiding COs in implementing the solutions for prioritized Needs throughout several sessions with FRC COs.

## 3. RESULTS: INITIAL NEEDS ASSESSMENT IN THE FRONTRUNNER CASES

### 3.1 Athens

#### Engagement Preparation

During the second half of 2023, the contact points in Athens conducted a stakeholder analysis to identify key stakeholders for the CitiObs project. Leveraging their extensive network within the city, DRAXIS contacted these identified stakeholders through the Invitation Letter that was crafted and translated to the local language.

#### Needs Capture



Figure 9. Workshop venue

As a result of the stakeholder mapping and analysis efforts, three COs were invited to participate in the first Onboarding Workshop, alongside various other stakeholders. This workshop took place on January 18th, 2024, at the National Hellenic Research Foundation.

In total, 15 people were present at the workshop. Among them, four represented CitiObs partners, contributing from various work packages (WP2, WP3, and WP4) to ensure the smooth facilitation of the event. Their roles were, among others, to deliver presentations, offer support, facilitate discussions, document proceedings, and assist during the interactive activities as needed. The remaining 11 participants represented various stakeholder groups, including scientists, decision-makers, and citizens. Specifically, there were

three decision-makers, four citizens, and four scientists, each bringing unique insights and viewpoints to the table.

During the workshop, there was an emphasis on ensuring that it was not perceived merely as a project presentation but rather as an interactive discussion. To achieve this, only a brief overview

of the project was provided at the beginning, reserving detailed presentation of CitiObs for the latter part of the event, after the participants had the chance to present themselves.

The workshop was structured into three distinct sections:

- Getting to Know the Citizen Observatories: Participants engaged in activities aimed at presenting themselves and their COs activities.
- Exploring Collaboration: This section focused on discussions and brainstorming sessions to identify potential areas of collaboration between the COs and the CitiObs project.
- Identifying Needs from COs: During this segment, each participant had the opportunity to present the specific Needs and challenges faced by their respective COs.

During the "Getting to know the Citizen Observatories" interactive session, the CO cards were used to gather information about each CO. In a round table format, each participant had the opportunity to introduce themselves and provide insights into their respective COs. This approach provided a structured framework for each participant, ensuring that all voices were heard, and all participants were given the opportunity to participate.

In the subsequent "Collaborating with Citizen Observatories" interactive session, the Tasks/Pains/Gains tools were used to identify the main challenges associated with each CO. Unlike the first session, this activity didn't follow a round table format. As the session progressed and participants became more at ease with each other, the activity transitioned to a more open format. During the second round, anyone who wished to start could do so, allowing for a dynamic, participatory dialogue where others could comment or pose questions.

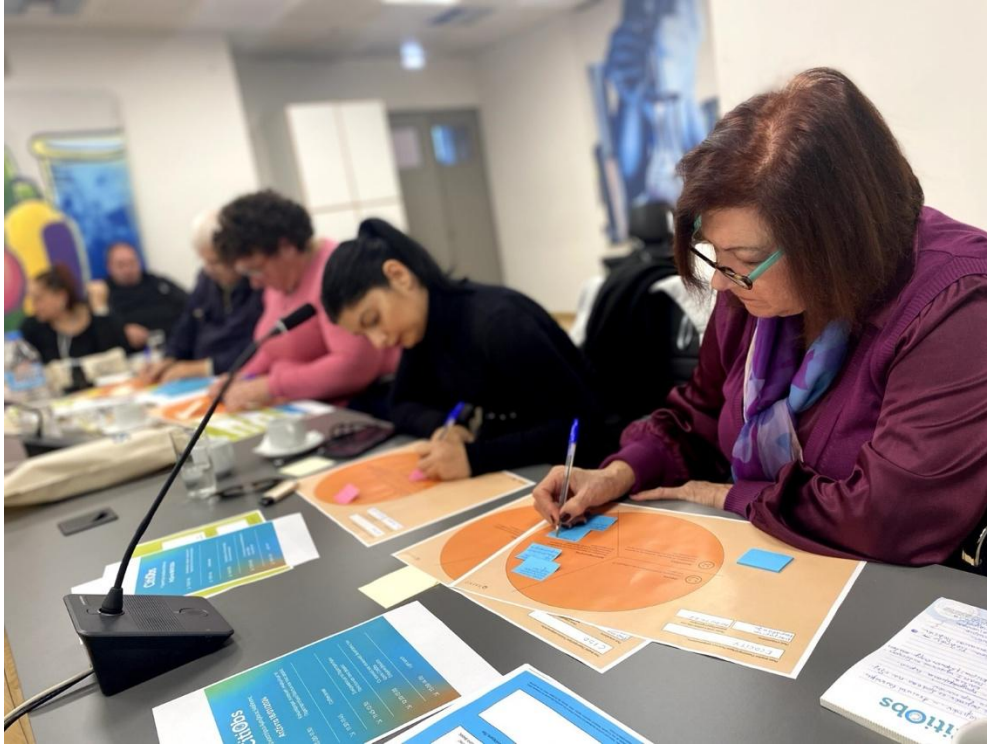


Figure 10. Workshop participants during the Tasks/Pains/Gains activity



Figure 11. All material gathered from the workshop

One thing that became evident from the meeting was that certain participants held significant expectations, including the belief that CitiObs came to organize all initiatives in the city. This is why precise management is required to ensure clarity in roles and prevent unrealistic expectations and misunderstandings. Also, the workshop provided clarity on the fact that two out of the three

participating COs were not as active as initially anticipated. Despite efforts post-COVID, these two COs struggled to regain momentum.

Another important note is that many of the difficulties and Needs mentioned by the COs during the workshop were general or beyond the scope of the project, often related to government management issues. As a result, it became clear that after selecting the CO it would be important to dive deeper into their unique and more specific challenges.

In general, the first Onboarding Workshop was a success and provided a significantly clearer understanding of the current situation and activities of the COs. Following the workshop, participants received a thank-you email with an evaluation form attached. This allowed them to share their feedback anonymously. The workshop received very positive feedback and high evaluation scores, with overall satisfaction and discussion quality rated at 4–5 out of 5, as depicted in Figure 12. Participants described the atmosphere as participative and constructive, highlighting the value of exchanging experiences between Citizen Observatories. Qualitative comments reflected a strong sense of engagement, with respondents looking forward to future opportunities and expressing interest in exploring local citizen science initiatives in greater depth in upcoming sessions. The organisational aspects of the workshop were equally well received. Participants were satisfied with the practical arrangements, from the overall coordination and flow of the event to the choice of venue, and the smooth logistics seemed to contribute to the open atmosphere described above. This is reflected in the ratings, with satisfaction with the organisation averaging 4.7 out of 5 and the quality and suitability of the event space rated 5 out of 5 by all respondents.

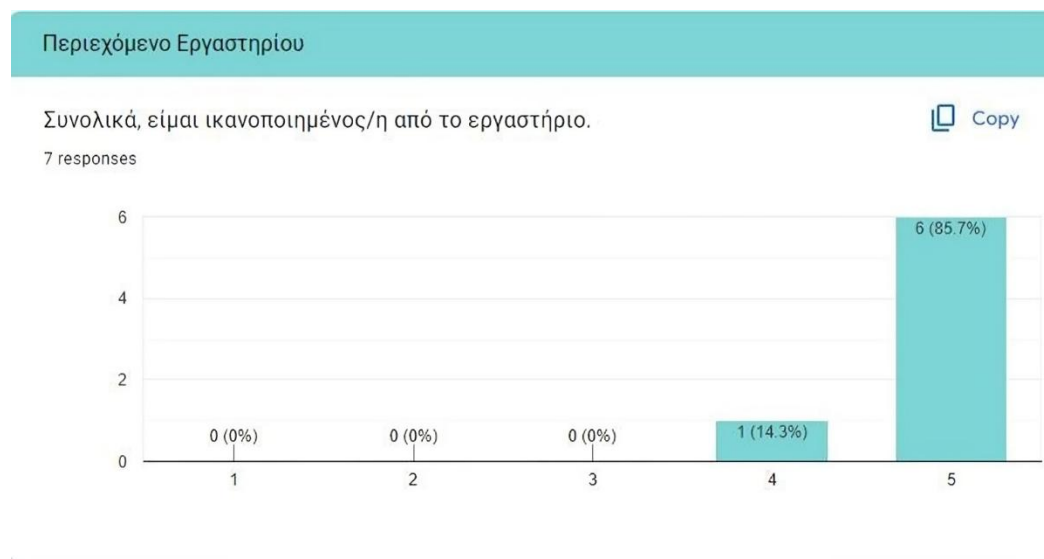


Figure 12. Overall Satisfaction from the workshop according to the evaluation form (with 1 meaning “Low” and 5 meaning “High”)

## Needs Analysis

After the conclusion of the workshop, the contact points collected and analyzed the identified Needs. Careful review of each CO helped finalize the selection. The Needs of the selected CO were further analyzed, and the Needs Assessment Tool was populated. Moreover, during the 2024 CitiObs internal Plenary Meeting, an attempt was made to establish an initial connection between the Needs and the tools that were being developed in the project. These face-to-face discussions with the project partners developing the tools proved to be highly beneficial for the FRC contact points, as they led to the identification of important matters and potential risks, allowing for early initiation of discussions.

Communication was maintained after the conclusion of the workshop and thorough research was conducted into the selected CO's activities, as well as the challenges and benefits they highlighted. To further explore collaboration opportunities, an unofficial meeting with two key individuals from the CO was arranged. After these activities, the contact points were ready for the Needs Prioritization Workshop.

On April 2nd, 2024, the Needs Prioritization Workshop was conducted, engaging the selected CO. The session was hosted online and lasted approximately one hour, aiming to validate and prioritize existing Needs. This step was crucial, especially since the first workshop involved multiple COs, making it challenging to focus specifically on the Needs of one. Extensive preparation started before the workshop, and a digital board was developed. Certain information was already prefilled on the board from previous discussions to showcase our attentiveness.

There was a total of seven participants, including three representatives from the CitiObs project and four members of the CO. The objective was to ensure diverse stakeholder representation was achieved. Specifically, there were two researchers, one policymaker, and a citizen, each contributing valuable insights from their distinct backgrounds. This smaller group was not a limitation but a deliberate choice, reflecting the scale of the local Citizen Observatory landscape. The composition of participants was intentional and balanced, with a representative from each key stakeholder category (researchers, policymakers, and citizens). Crucially, these were key actors within the CO and within their respective fields: individuals with the standing, knowledge, and networks to drive the process forward. Building trust with this core group first was a priority, as establishing strong relationships and open dialogue at this stage would lay the foundation for meaningful and sustained collaboration going forward. Their cross-sectoral representation

enabled genuine discussion, active engagement, and collaborative prioritization, achieving a quality of dialogue that would have been harder to reach in a larger, less focused setting.

Initially, participants reviewed and refined the documented Needs to ensure they were accurate and to address any potential oversights. Clarification questions were asked to understand key elements related to the COs' activities. The CO members mentioned some additional Needs, leading to the next step which was the prioritization phase. Each participant was given a few minutes to prioritize individually. Following individual prioritization, a brief discussion took place, with participants also mentioning some of their general concerns and thoughts.

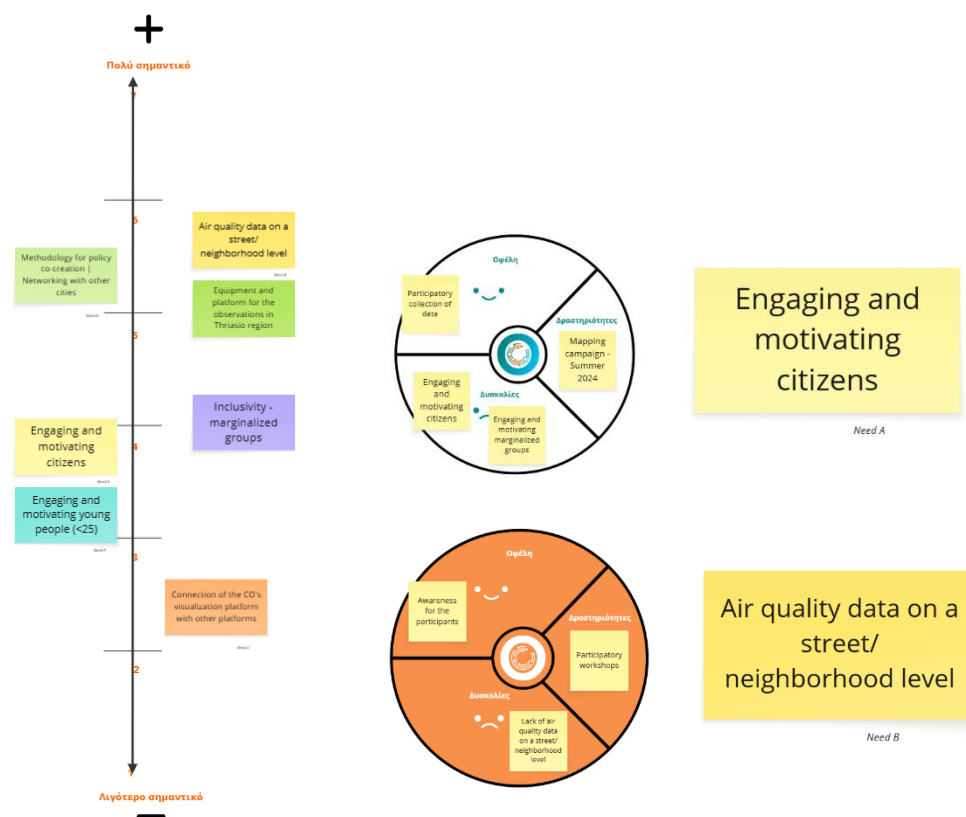


Figure 13. Screen shots with examples from Athens' Needs Prioritization digital board

To manage expectations, it was emphasized that prioritization outcomes would be subject to further discussion with project partners. The meeting concluded with the presentation of the next steps and future actions. A post-event thank-you note was sent to all participants.

## Preliminary results and next steps

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Workshops Overview</b>                                  | <p><b>Onboarding workshop:</b> 11 stakeholders including decision-makers, scientists, and citizens from 3 COs.</p> <p><b>Prioritization workshop:</b> 4 participants including researchers, policymakers, and citizens from 1 CO.</p>                                                                                                                                                                                                               |
| <b>Needs Assessment</b>                                    | <p><b>Citizen Engagement:</b> Need for enhanced citizen participation.</p> <p><b>Air Quality Data:</b> Requirement for detailed neighbourhood-level data.</p> <p><b>Inclusivity:</b> Engaging marginalized groups in disadvantaged neighbourhoods.</p> <p><b>Networking and Collaboration:</b> Enhancing collaboration and shared learning with other COs.</p>                                                                                      |
| <b>Connection Between Needs and Toolkits or Components</b> | <p><b>Air Quality Data Collection:</b></p> <ul style="list-style-type: none"> <li>- CitiObs Environmental Monitoring Toolkit (10 Smart Citizen Kits deployed).</li> <li>- Connection with COs Data Access and Interoperable Architecture Component</li> <li>- Connection with COs Data Quality and Validation (Analysis Ready Data) Component</li> </ul> <p><b>Inclusivity:</b> CitiObs LNOB Toolkit planned to address participation barriers.</p> |
| <b>Next Steps</b>                                          | <p><b>Mentoring sessions:</b></p> <p>Sensor data collection, validation, interoperable data storage, and visualization.</p> <p>LNOB reflection workshop</p> <p>Connecting with other Cos</p>                                                                                                                                                                                                                                                        |

*Table 3. Athens' results summary*

From the very start of CitiObs' collaboration with the CO, the possibility of supplying **air quality sensors** was explored. As the CO plans an extensive mapping campaign in Athens during summer, discussions were held with CitiObs partners to provide air quality sensors. Consequently, it was decided to provide Smart Citizen Kits, intended for use both during the mapping campaign and as permanent installations on their premises.

In conclusion, it is essential to note that all communications thus far have been conducted in the local language. This approach was chosen as it aims to create a comfortable environment for participants, enabling them to freely express themselves and articulate their concerns without the barrier of language differences.

## 3.2 Barcelona

### Engagement Preparation

Barcelona contact points developed a Case Briefing, contextualizing COs and identifying general challenges and opportunities. Consecutively, stakeholder mapping and analysis resulted in the final list of stakeholders to be engaged with in this project, including 8 COs based in Barcelona.

### Needs Capture

The first CitiObs Onboarding workshop in Barcelona took place at Fab Lab Barcelona/ IAAC on November 3rd, 2023 with the participation of 14 representatives from all 8 COs. In addition to multistakeholder associations and universities, independent citizen-led initiatives and the Citizen Science Office (under the Barcelona City Council) also attended to the event. The workshop showcased a diverse profile of professionals with 6 attendees from academia, 3 from administration, and 5 representing citizen science (either privately or individually).

The agenda of the meeting was shared with the participants in advanced, and featured the following parts:

1. a general presentation on the CitiObs project,
2. a round of presentations by each participant,
3. a main workshop activity,
4. a more in-depth presentation of the CitiObs project and its approach.

The main workshop activity was divided into 2 activities, both aimed at collecting information about the local Citizen Observatories:

- **‘Getting to know the Citizen Observatories’**: mapping of the existing initiatives in the Barcelona metropolitan area, aiming to collect information about their status, approach, objectives, as well as the data they measure. This allowed to collect additional information about how these initiatives are currently distributed throughout the territory.
- **‘Collaborating with Citizen Observatories’**: identifying the task, pains, and gains of the different Citizen Observatories. This allowed to better understand opportunities for collaboration and thus the name of the activity.

After the collaborative exercises, the local team, with support from representatives of WP2, introduced the CitiObs approach and the interaction sought with the Citizen Observatories present in the event. It presented the strategies related to the technical and social dimensions of CitiObs and opportunities on how the project could collaborate with the initiatives in future sessions and the FRC Mutual Learning process. The structure of the event was designed in such way that it would not interfere with the data collection part (done during the main workshop activity) and introduced the CitiObs approach at a later stage of the event. The event concluded with a discussion on the format and dates for next meetings.

Each organization was invited to complete a card with information about their initiatives or Citizen Observatories and to locate on the A0-size map of Barcelona (with the possibility of exploring regions outside the metropolitan area) their areas of action. 38 initiatives were added to the map, and 14 cards were completed. This exercise provided an insightful overview of the territorial scope of participants' activities and highlighted areas of the city with fewer initiatives.



*Figure 14. Getting to know the Citizen Observatories in Barcelona (Photo by Fab Lab Barcelona)*

The second dynamic of the session focused on identifying, for each CO, their future tasks (developed or in planning stage) and what would be potential pains and gains related to them. To get this information, each organisation received a canvas in which CO's representatives were asked to add notes and ideas.



*Figure 15. Collaborating with Citizen Observatories in Barcelona. Photo by Fab Lab Barcelona*

Among the social challenges shared by participants, some examples linked to existing initiatives were identified, including the necessity for stronger connections between citizen initiatives, academia, and municipal bodies. Additionally, there were recognized Needs to enhance communication strategies to effectively reach and engage a diverse array of stakeholders and the demand for accessible tools for individuals without technical background. Regarding technical challenges, participants cited complexities associated with sensor installation, ensuring the continuous reliability of data, achieving interoperability among various data sources, and managing the diversity of data origins and formats.

After the event, as part of T3.5, the participants were invited to complete a survey in order to gather feedback on the methodology, structure, and quality of content during the event. The survey showed that the first event was well received by the participants, and overall feedback was positive with high levels of satisfaction regarding the workshop's relevance, networking opportunities, and the introduction to the CitiObs project. Participants particularly valued the opportunity to exchange experiences, learn from other Citizen Observatories, and build connections for future collaboration. Several attendees highlighted the importance of sharing methodologies, discussing common challenges, and identifying possibilities for joint initiatives.

A recurring theme in the feedback was the desire to go deeper into practical and strategic aspects of Citizen Observatories. Participants expressed interest in exploring concrete methods for citizen

engagement, improving collaboration between projects, ensuring data quality and credibility with public administrations, and increasing the visibility and long-term impact of results. There was also interest in discussing more practical tools, sustainability strategies, and ways to strengthen public trust and policy relevance.

Regarding the workshop structure, participants appreciated the overall approach and dynamics, especially the small-group exchanges and networking opportunities. However, some suggested refining the facilitation and time management. Comments indicated that certain discussions overlapped between activities, and some sessions could benefit from clearer thematic distinctions. Others mentioned that the schedule felt slightly too dense, recommending fewer activities or more flexible timing to allow deeper conversations.

The FRC Contact Point from Barcelona, in collaboration with other project partners, filled out the corresponding event logbook (T3.5) after the session. Additionally, a summary report that compiled all responses and data was shared with the participants, allowing them to contribute with corrections and suggestions. After their validation, the collected data underwent translation and analysis to understand its relevance and connection to the project's scope and objectives.

### **Needs Analysis**

Important insights emerged from the workshop activities. Not all participant organizations met the criteria of being a fully active citizen observatory as outlined by the project, either by not being focused on environmental aspects, or by not involving citizens in an active role, or by not having policy goals among their objectives. This became evident thanks to the first activity of the workshop (*Getting to know the COs*). During the second activity (*Collaborating with the COs*), most of the tasks, pains and gains identified by the initiatives were closely related to CitiObs scope, even those that are not Citizen Observatories *per se*. Consequently, the Barcelona FRC contact points, in discussions with other CitiObs project partners, selected one specific initiative for the capacity building, implementation and assessment of tools during the demonstration phase. However, given the considerable interest from other initiatives to collaborate closely with Fab Lab Barcelona and leverage CitiObs resources, the local team decided to extend invitations for dedicated mutual learning sessions, as part of the capacity building program, to facilitate knowledge exchange and collaboration.

Structured in an online format, the **Needs Prioritization Workshop** took place on March 20th and had the confirmation of 6 out of the 8 COs that attended the first event. Four COs finally participated in the meeting with 7 representatives (comprising 2 men and 5 women). The workshop started with a brief introduction and update of the project's status, followed by the explanation of the prioritization workshop.

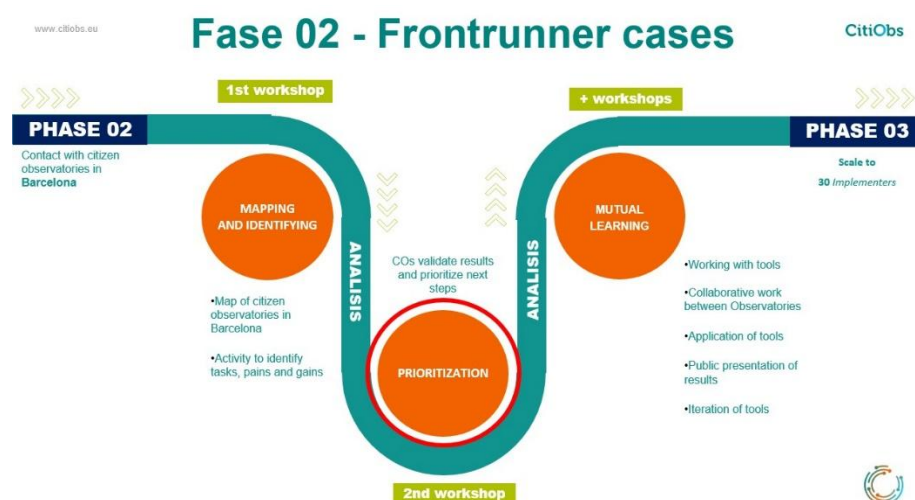


Figure 16. Phase 02 - Frontrunner demonstration by Fab Lab Barcelona

The exercise proposed consisted of a methodology of four steps, aiming at reaching a consensus on potential Needs to be prioritized during the capacity building program:

1. Validating the first workshop outcomes by the COs
2. Needs prioritization
3. Needs clustering
4. Next steps

Each CO was provided with their own dedicated space on the iterative Miro Board platform. The initial phase focused on validating the Needs description compiled by the local team following the first workshop. Representatives were encouraged to review and edit these descriptions as necessary, and to suggest additional Needs for exploration, resulting in 31 final Needs. In the second step, COs were tasked with prioritizing these Needs on a scale from 1 to 7, taking into consideration their level of importance and urgency. This was followed by a presentation round, enabling all participants to share, listen and respond to the insights shared by each CO.

For the third step, participants were invited to collaboratively cluster the Needs in an open discussion format. This presented a deviation with respect to the other FRCs, justified by the presence of various observatories and the Need to have open discussions during the sessions,

expressed by the participants themselves. In this phase of the workshop, six categories were proposed, encompassing *Influencing Public Policy, Communication and Language Accessibility, Data Validation, Collaboration Channels, Influencing University and School Curricula, and Platform for Data Visualization and Projects*. Participants proposed the addition of a 7th category, named *Feasibility and Sustainability*, to accommodate certain Needs that did not align with the other clusters. The post-its were moved by the participants to the cluster circles and new entries were added by the BCN CitiObs team considering the valuable insights from the discussion.

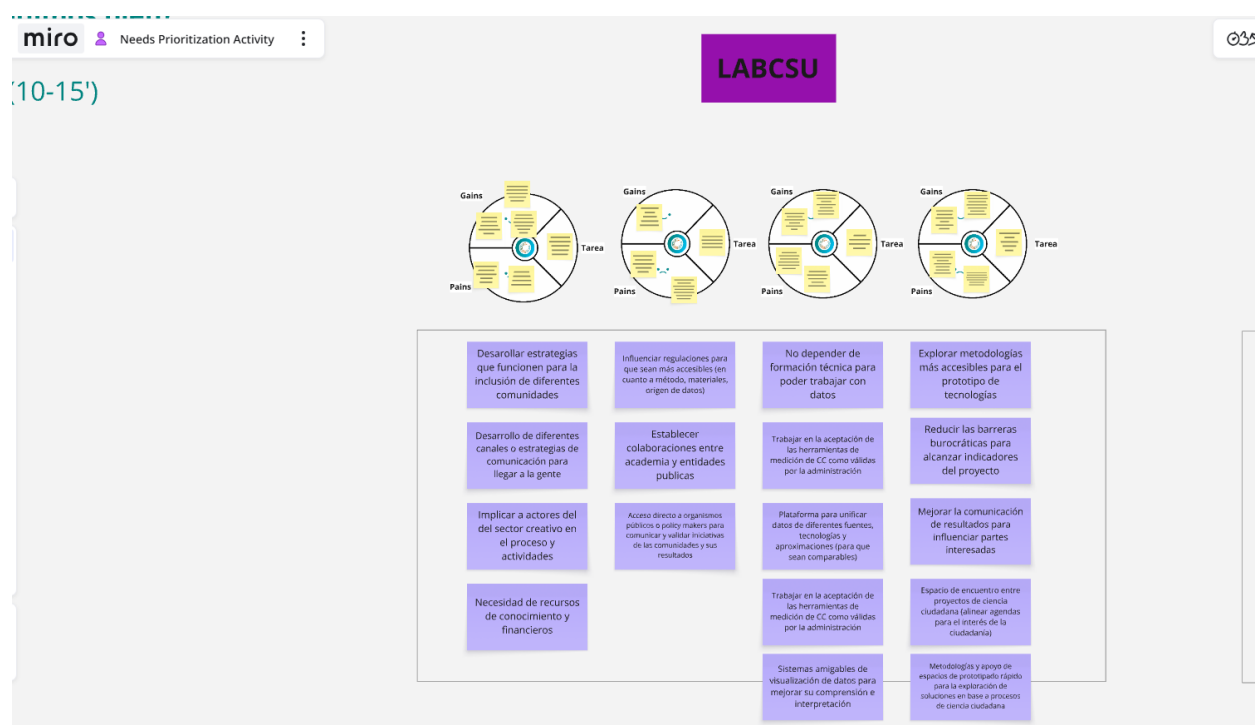


Figure 17 Screenshot of the Miro digital board designed for the Prioritization Workshop in Barcelona (Citizen Observatory: LABCSU)

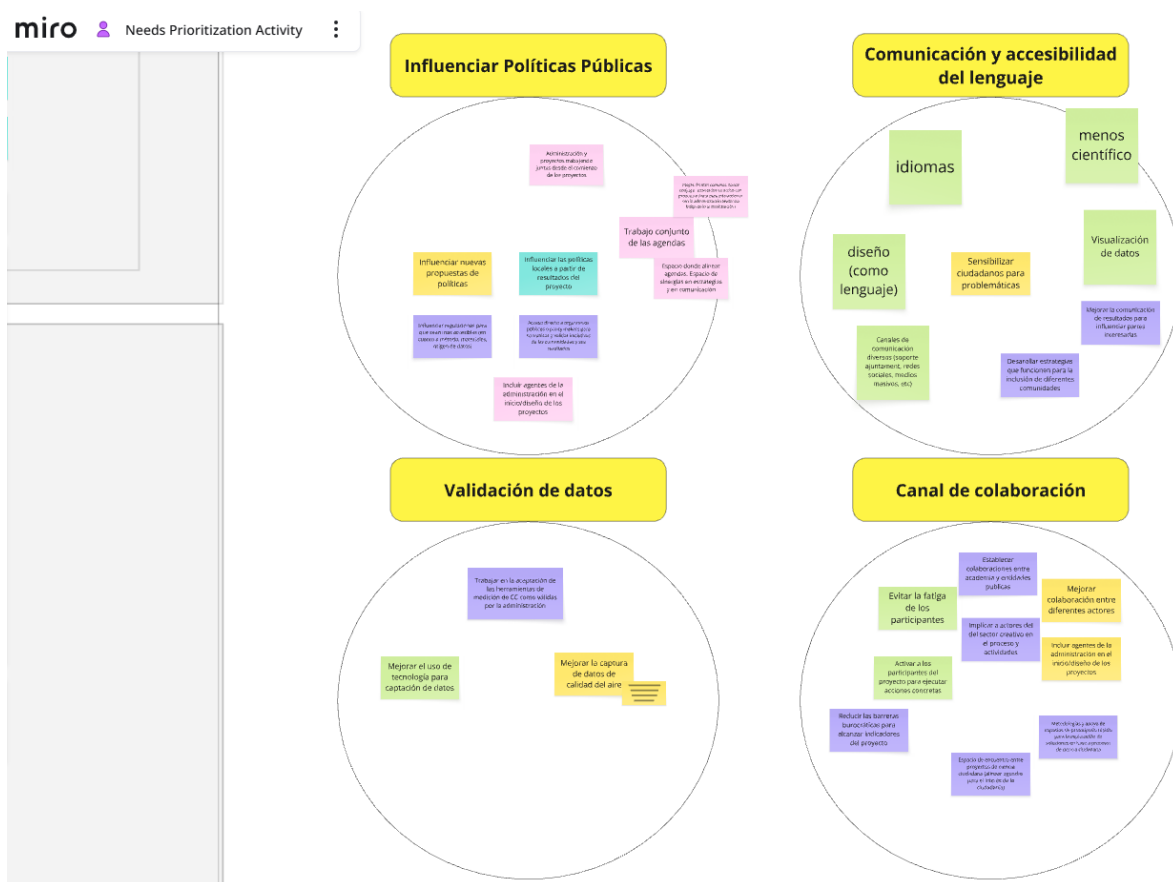


Figure 18 Screenshot of the Miro Board platform designed for the Prioritization Workshop in Barcelona – Cluster of Needs

After the discussion, the meeting was finalised with an overview of the next steps. These include a dedicated CitiObs-internal period to define a pool of tools to address the Needs identified and the formulation of a proposed calendar for mutual learning sessions.

## Preliminary results and next steps

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Workshops Overview</b>                                  | <p><b>Onboarding workshops:</b> 14 representatives from 8 COs including academia, administration, and citizen science organizations. Second workshop with 6 representatives of different COs.</p> <p><b>Prioritization workshop:</b> 7 representatives from 4 COs.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Needs Assessment</b>                                    | <p><b>Improved coordination:</b> Need for stronger connections and communication between citizen initiatives, academia, and municipal bodies.</p> <p><b>Data challenges:</b> Sensor installation, data reliability, and interoperability among various data sources.</p> <p><b>Sustainability and Autonomy:</b> Ensuring COs' sustainability and autonomy beyond initial phases, and improving access to resources.</p> <p><b>Outreach and Engagement:</b> Expanding reach to schools and broader public, inclusive engagement strategies.</p> <p><b>Communication and inclusivity:</b> Including diverse communities, improving communication of results to different stakeholders.</p> <p><b>Collaboration Channel:</b> Involving creative sector stakeholders, fostering collaborations between academia and public entities</p> <p><b>Influencing Public Policy:</b> Influence regulation and improve access to public agencies.</p> <p><b>Platform for Data Visualization:</b> Creating user-friendly systems, unified platform for data integration.</p> |
| <b>Connection Between Needs and Toolkits or Components</b> | <p><b>Coordination, engagement and Inclusivity:</b> CitiObs LNOB Toolkit to ensure inclusivity, accessible communication strategies.</p> <p><b>Collaboration Channels:</b> CitiObs Citizen-led Action Toolkit and CO Participation Toolkit to engage diverse stakeholders and support collaboration.</p> <p><b>Influencing Public Policy:</b> CitiObs Decision Ready Information (DRI) for Evidence-based Policy and Social Dimensions Toolkits to bridge gap between citizen science data and policy-making.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Next Steps</b> | <b>Mentoring sessions:</b> <ul style="list-style-type: none"> <li>- CitiObs LNOB Toolkit for community inclusivity.</li> <li>- CitiObs Citizen-led Action Toolkit for stakeholder engagement through the influence of creative actors in the actions.</li> <li>- CitiObs Citizen-led Action Toolkit for reflecting on interventions' results and foster replicability.</li> <li>- Develop user-friendly data collection and visualization systems.</li> <li>- Facilitate collaboration and shared learning among COs.</li> </ul> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

*Table 4. Barcelona's results summary*

The Initial Needs Assessment phase, composed by the two above-mentioned workshops, was key to better understand the current status and potential Needs of active Citizen Observatory Initiatives in Barcelona. While there was a particular emphasis on selecting a single CO to follow the implementation of CitiObs tools, the events also served as catalysts for fostering ongoing collaboration and preparing the groundwork for the upcoming tailored capacity building program.

### 3.3 Dublin

#### Engagement Preparation

Dublin's FRC focused on leveraging existing relationships with various projects and institutions that the University College Dublin (UCD) Spatial Dynamics Lab (SDL) is involved with. The goal was to connect with, inform, and potentially onboard stakeholders from COs that can benefit from the CitiObs tools and expertise, but also with significant experiences that can be integrated as part of the co-design and mutual learning processes. To achieve this, an initial step involved mapping out the landscape of relevant initiatives and their stakeholders working on community-based environmental monitoring to foster climate action within and alongside local communities.

The selected COs in Dublin collect observations on air pollutants and weather data, involving citizens in managing low-cost sensors. The first CO identified was *the SCORE Dublin Coastal City Living Lab (CCLL)* where UCD researchers and public servants involved in policy making from Dún Laoghaire Rathdown County Council (DLRCOCO) and Smart Dublin jointly manage the living lab. This CO has been active in citizen science and sensor deployment supported by local community groups. Another project, *RESTORATION*, associated with UCD SDL and sharing *SCORE CCLL's* objectives, was also identified.

Additionally, other three COs — *I-CHANGE Dublin Living Lab*, *TwinAir Dublin Pilot* and *GLOBE Ireland Air Quality* — with a similar focus and approach to community-based air pollution monitoring participated. Recognizing their shared challenges and goals, they were identified as a potential cluster of collaborators who could benefit mutually and learn from each other.

### **Needs Capture**

The first Onboarding Workshop for COs stakeholders took place on December 8th, 2023, at the Planning & Environmental Policy Building, in UCD. From the stakeholder mapping efforts, around 30 stakeholders were invited to the Onboarding Workshop, where the majority were linked to *SCORE Dublin CCLL* with the intention of having it as the main CO to work with. 14 stakeholders confirmed their participation in the event, and 10 attended. One more attendee was invited by a confirmed stakeholder, resulting in a total of 11 stakeholders participating.

This last inclusion led to another initiative expressing interest in CitiObs that was not previously identified, the *Smart D8*, a digital innovation hub for Dublin District 8 working with citizens and policy makers on several projects where community-based environmental monitoring is at their core. Table 5 shows the distribution of stakeholders who participated in the workshop.

| CO / Initiative                   | Leading Organizations                                                 | Scientists / data aggregators | Decision / Policy makers | Citizens |
|-----------------------------------|-----------------------------------------------------------------------|-------------------------------|--------------------------|----------|
| <b>SCORE Dublin CCLL</b>          | DLRCOCO/Smart Dublin, UCD                                             | 1                             | 3                        | 0        |
| <b>I-CHANGE Dublin Living Lab</b> | UCD                                                                   | 1                             | 0                        | 0        |
| <b>TwinAIR Dublin Pilot</b>       | UCD                                                                   | 1                             | 0                        | 0        |
| <b>GLOBE Ireland Air Quality</b>  | An Taisce, EPA                                                        | 1                             | 0                        | 0        |
| <b>Smart D8 Hub</b>               | DCC/Smart Dublin, Digital Hub Development Agency, Maynooth University | 1                             | 1                        | 0        |
| <b>RESTORATION</b>                | UCD                                                                   | 2                             | 0                        | 0        |

Table 5. Stakeholder Attendees by CO during the FRC Dublin Onboarding Workshop

In the workshop, the initial focus was on getting to know the various COs, building trust, and discussing their goals, experiences, and activities to grasp their scope, main successes, and challenges comprehensively. Subsequently, the COs employed the Tasks/Pains/Gains tool to explore their intended target actions, the anticipated results and benefits they aim to achieve, and the obstacles and challenges they encounter when working on their tasks. The interactive methods applied during the sessions proved effective in beginning to collect data on the stakeholders' needs for accomplishing their tasks and attaining their desired outcomes.

The workshop met its objectives by facilitating the identification of opportunities for mutual learning. Participants showed a keen interest in co-designing the final toolkits and incorporating their unique experiences and approaches. Through the initial Tasks/Pains/Gains analysis, common themes were identified across the COs, such as technology and data challenges,

organizational and resource management issues, and citizen engagement obstacles. Other prominent themes included the necessity to generate impactful, actionable outcomes from data to effect local changes and influence policy, as well as the importance of evaluating and measuring these outcomes, and fostering knowledge transfer and capacity building among stakeholders. Participants' feedback indicated that the onboarding workshop was well received and met its objectives by providing relevant and useful information about CitiObs, while also supporting high-quality discussions. The workshop was valued as an opportunity to exchange knowledge, share initiative-specific needs, and connect with colleagues beyond participants' usual networks. Feedback on the structure and organization was also positive, with comments noting that the workshop was well designed and well-paced. Future improvements could include deeper coverage of technical and hands-on training materials, such as toolkits and manuals, as well as further opportunities for individual project-level engagement.

### Needs Analysis

After the first workshop, the FRC contact point team analyzed the data collected to formulate a **Need Statement** based on the stakeholders' input. This allowed CitiObs to articulate specific needs as desired outcome statements, including the factors involved in getting a task done. When possible, each need statement included a direction of change, a unit of measure (metric), the object of the need, and clarifying context when needed to convey the precise improvement sought. The second workshop started by discussing with the stakeholders if the identified needs were clearly formulated.

For the **Needs Prioritization Workshop**, it was decided to continue CitiObs' collaboration with the three initiatives that qualify as fully active COs. Additionally, we incorporated the *Smart D8 Hub* due to its team's keen interest in exploring collaborative opportunities and co-designing tools with CitiObs. The first joint workshop, involving *I-CHANGE* and *TwinAir* COs, took place on March 20<sup>th</sup> in UCD. This was followed by online sessions with *Smart D8* on March 25<sup>th</sup> and with *SCORE Dublin CCLL* on March 28<sup>th</sup>.

Thus, during these workshops, after a brief recap of the outcomes of the previous onboarding workshop, the first activity focused on validating the identified Needs and their alignment with its associated tasks, pains, and gains. This exercise generated extensive discussions among the stakeholders to determine whether the needs accurately connect to the problems, obstacles, or the benefits sought by the CO to successfully achieve their objectives.

After the collaborative assessment, the initial needs were updated during the workshop. General themes emerging during the discussions were also captured. From the 28 identified needs, sensor deployment challenges, stakeholder engagement, data quality and validation, and data knowledge augmentation are the main themes that the COs want to work on.

| General Theme                    | I-CHANGE<br>Dublin Living<br>Lab | TwinAIR Dublin<br>Pilot | SCORE Dublin<br>CCLL |
|----------------------------------|----------------------------------|-------------------------|----------------------|
| Sensor Deployment                | 1                                | 4                       | 3                    |
| Stakeholder Engagement           | 1                                | 0                       | 4                    |
| Data Quality and Validation      | 0                                | 4                       | 0                    |
| Data Knowledge Augmentation      | 0                                | 2                       | 2                    |
| Data Access and Interoperability | 0                                | 2                       | 1                    |
| Policy Impact                    | 0                                | 2                       | 0                    |
| Knowledge Exchange               | 1                                | 0                       | 0                    |
| Co-creation of local actions     | 1                                | 0                       | 0                    |

*Table 6. Occurrence of General Themes in the Dublin FRC COs Needs Assessment*

After validating the relevance and comprehensiveness of the needs with all stakeholders, the next activity focused on the prioritization of these needs. The stakeholders collaboratively prioritized the needs for their CO to determine which ones are the most worthwhile, relevant, or urgent to them. Each need was rated by each stakeholder type group assigning a value from 1 to 7 (where 7 indicates more priority, and 1 indicates the less priority). This activity resulted in a prioritized list of the current key needs that the COs want to target first. Table 7 presents these needs, coded for conciseness, showing how each CO rated them.

| CO Name  | Need code | General Theme Main               | General Theme Secondary          | Rating |
|----------|-----------|----------------------------------|----------------------------------|--------|
| I-CHANGE | IC-N1     | Sensor Deployment                | Co-creation of local actions     | 5.5    |
| I-CHANGE | IC-N2     | Stakeholder Engagement           |                                  | 6      |
| I-CHANGE | IC-N3     | Knowledge Exchange               |                                  | 3.5    |
| TwinAIR  | TA-N1     | Sensor Deployment                | Data Quality and Validation      | 7      |
| TwinAIR  | TA-N2     | Sensor Deployment                | Data Access and Interoperability | 5      |
| TwinAIR  | TA-N3     | Sensor Deployment                |                                  | 7      |
| TwinAIR  | TA-N4     | Sensor Deployment                |                                  | 6      |
| TwinAIR  | TA-N5     | Data Quality and Validation      | Data Knowledge Augmentation      | 6      |
| TwinAIR  | TA-N6     | Data Quality and Validation      | Policy Impact                    | 3.5    |
| TwinAIR  | TA-N7     | Data Knowledge Augmentation      | Policy Impact                    | 3.5    |
| TwinAIR  | TA-N8     | Data Quality and Validation      | Data Access and Interoperability | 6      |
| SCORE    | SC-N1     | Sensor Deployment                | Data Knowledge Augmentation      | 5.5    |
| SCORE    | SC-N2     | Sensor Deployment                |                                  | 5      |
| SCORE    | SC-N3     | Stakeholder Engagement           | Sensor Deployment                | 4      |
| SCORE    | SC-N4     | Data Access and Interoperability |                                  | 6.5    |
| SCORE    | SC-N5     | Data Knowledge Augmentation      | Stakeholder Engagement           | 3      |
| SCORE    | SC-N6     | Stakeholder Engagement           |                                  | 4      |
| SCORE    | SC-N7     | Stakeholder Engagement           |                                  | 4.5    |

*Table 7. Needs Prioritization in the Dublin FRC COs Needs Assessment*

During the Needs Prioritization Workshop with the stakeholders linked to the *Smart D8* initiatives, the initially proposed needs were discussed for their validation. The needs were reviewed in detail and substantially updated to better adapt to their obstacles and interests, being able to make progress in the conversation regarding collaboration and expectations with CitiObs. From the reviewed needs of this meeting, some general themes can be identified among them and with great potential to align with the CitiObs approaches and tools.

Most of the identified needs relate to the improvement of collaborative approaches among stakeholders and various programs. There is a clear necessity to enhance the management of participation dynamics, engagement, agreements, trust, credibility, and accountability within their programs. Additionally, there is a significant concern regarding data governance and privacy, that along with issues of data validation, access, and interoperability, are key factors in breaking down data silos and facilitating collaboration.

Addressing these issues is essential for their needs on data knowledge augmentation, knowledge exchange, and co-create cross-sectorial applications. Lastly, evaluating the impact of their initiatives on policies is also identified as one of their needs. It was agreed to continue this

discussion online to complete the Needs Assessment tool and prioritization, which will include input from the city council.

### Preliminary results and next steps

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Workshops Overview</b>                                  | <p><b>Onboarding workshop:</b> 11 stakeholders from 6 COs.</p> <p><b>Prioritization workshops:</b> Three full workshops with the COs: the main CO SCORE Dublin Coastal City Living Lab (4 stakeholders) first, then I-CHANGE Dublin Living and TwinAir Dublin Pilot together (3 stakeholders).</p> <p>Additionally, a scoping meeting was held with Smart D8 Hub (3 stakeholders) to explore possible ways forward.</p>                                                                                                                                                                    |
| <b>Needs Assessment</b>                                    | <p><b>Data Challenges:</b> Sensor data and deployment issues, data quality and validation, complexities in data management as accessibility, interoperability and privacy.</p> <p><b>Stakeholder Engagement:</b> Challenges in maintaining engagement and a collaborative approach, managing logistics, and participation dynamics.</p> <p><b>Communication:</b> Challenges in sharing data outcomes, feedback channels and knowledge exchange with the community and stakeholders for decision making.</p>                                                                                |
| <b>Connection Between Needs and Toolkits or Components</b> | <p><b>Data Challenges:</b></p> <ul style="list-style-type: none"> <li>- COs Data Access and Interoperable Architecture Component.</li> <li>- COs Data Quality and Validation (ARD) Component.</li> <li>- Using Environmental Monitoring Toolkit.</li> </ul> <p><b>Stakeholder Engagement and Communication:</b></p> <ul style="list-style-type: none"> <li>- Leave No One Behind Toolkit.</li> <li>- CO Participation Dynamics Toolkit.</li> <li>- Decision Ready Information Tools for Citizen Observatories.</li> <li>- Hands on Data Analytical Tools for Local Communities.</li> </ul> |
| <b>Next Steps</b>                                          | <p><b>Mentoring sessions:</b></p> <ol style="list-style-type: none"> <li>1. Improving Access and Interoperability of Citizen-generated data.</li> <li>2. Leave-No-One-Behind Reflections for Enhancing Citizen Engagement.</li> <li>3. Analysis Ready Data, Analytical and Decision Ready Information Tools.</li> </ol> <p>Other relevant sessions:</p> <ul style="list-style-type: none"> <li>- Lowering the Barriers on Using Sensor Technologies.</li> <li>- CO Participation Dynamics Toolkit for Engaging Diverse Stakeholders.</li> </ul>                                            |

Table 8. Dublin's results summary

As discussions advanced with the stakeholders, it was possible to identify and analyze the factors involved in doing their tasks to achieve their desired outcomes. This has allowed participants to collaboratively define and begin prioritizing their current needs. Participants' expectations of the

CitiObs project were clarified, resulting in high motivation to learn more about the project's activities.

Once the solution-needs matching is completed, a proposal or action plan will be presented to them for their validation. This will initiate the mentoring of the selected toolkits and their customization for application in their contexts. After the period of application or case studies of any of the tools or technological solutions by the stakeholders in their CO, the next phase will be mutual learning with the project and among the COs themselves, discussing the lessons learned and integrating their insights and experiences into the CitiObs materials. This will also involve co-designing and enhancing the project's toolkits by integrating valuable insights from the community-based environmental monitoring efforts in Dublin.

### 3.4 Kristiansand

#### Engagement Preparation

The FRC in the city of Kristiansand focused on leveraging existing relationships with various projects and institutions that NILU is involved with. The goal was to connect with, inform, and potentially onboard stakeholders from potential COs that can benefit from the CitiObs tools and expertise, but also with experiences that can be integrated as part of the co-design and mutual learning processes. To achieve this, an initial step involved mapping out the landscape of relevant initiatives and their stakeholders working on community-based environmental monitoring within and alongside local communities. These were contacted by email in Norwegian, asking for their willingness to participate and their status of activities.

After internal discussions at NILU, the Contact Point selected The Fiskåtangen Velforening (Vel) [Fiskåtangen neighbourhood association]. It was also decided to focus on enhancing the collaboration with the city officials in the municipality to help in the work with COs. Therefore, the Contact Point decided to have two separate workshops, one with the municipality and one with the Fiskåtangen Vel, allowing for unfiltered discussions. The Fiskåtangen Vel was concerned about emissions from nearby industries. They pointed out the sulphur smell from diffuse emissions and slips or routine failures, and sudden exposure of dust and dirt.

#### Needs Capture

The Onboarding Workshop with city officials of the municipality of Kristiansand, on November 8 (2023), took place in the Kristiansand City Hall. Building up on NILU's previous experience with

the municipality, CitiObs contact points led the workshop. During the workshop, the CitiObs project was presented in more detail. Consecutively, a Needs Assessment activity, using the Tasks/Pain/Gains tool, aimed at identifying the tasks, pains and gains of participants in their activities related to citizen science and environmental issues within the municipality. A discussion was held focusing on their specific experiences with the Fiskåtangen Vel and other stakeholders in relation to the emissions from the industry.

In the discussions following the Onboarding Workshop, it became clear that the municipality is working to achieve a good dialogue and engagement with citizens, is facilitating the implementation of measures, and is willing to give something back to the citizens in order to reach the common goal of clean air in the city. They wished to raise knowledge for all parties to contribute in different ways. The municipality had a goal mobilize action to achieve the Kommune 3.0 [municipality 3.0] – the municipality that “brings together”. This included competence strengthening (increase knowledge) to get “a common understanding and starting point for discussions”. In doing this, they faced challenges such as citizens expectations and involvement being resource demanding for the municipality which is also burdened by many other tasks. Expectations of the citizens may be too high after a dialogue meeting, higher than what the municipality can contribute to which may lead to disappointment among citizens and may reduce interest. They also discussed the municipality's responsibility vs. the responsibility of the citizens, and how they perceived the municipality as a "mediator" between residents and industry.

On December 12, 2023, NILU met with the Fiskåtangen Vel in an online workshop using Teams and Miro board. It was decided to organize this workshop in an online format due to the travel distance to Kristiansand from Oslo, thus making the workshop happen on a convenient day for the participants. NILU had met the two participants before and was able to establish a friendly and welcoming connection online.

The main workshop activity was divided into 2 parts, both aimed at collecting information about the Fiskåtangen Vel. The first one named ‘Getting to know the Citizen Observatory’, consisted of a mapping of the initiative, aiming to collect information about their status, approach, objectives, as well as the data they measure. The second part used the Tasks/Pains/Gains tool, and aimed at identifying the tasks, pains and gains. This provided a better understanding of opportunities for collaboration and thus the name of the activity.

From 'Getting to know the Citizen Observatory', it was identified that their thematic focus is to map air pollution levels in the neighbourhood – primarily from the emissions from the industry- and to find out if the air quality levels are harmful to health. Their goals and ambitions were to reduce emissions from the industry and improve air quality in the area. By placing reports of observations (map/location and photo observations) they wished to make sure that the municipality and politicians have the right decision-making basis. They also wished to make sure that the industry gets better routines on informing the citizens and on reducing emissions.



*Figure 19. Screenshot of a map of the area from the Miro-board used for the 'Getting to know the Citizen Observatory' activity. Information was added to the map (and translated to English) after the meeting, based on oral descriptions of the participants*

From the Tasks/Pains/Gains activity, CitiObs learned that they wish to collaborate and engage in constructive dialogue with and across stakeholders (especially the industry, but also the Norwegian Environmental protection agency and the municipality). In their mapping of effects of emissions, they are missing quantitative data on air quality that could complement other qualitative data as pictures and records of smells, providing better focus and arguments for policies to mitigate air pollution.

Participant feedback showed that the workshop was successful in achieving its objectives, providing valuable information about CitiObs while fostering meaningful discussions among

attendees. Participants particularly appreciated the opportunity to exchange experiences, and discuss initiative-specific challenges and needs. The workshop structure and organization were also positively evaluated, with participants highlighting its clear design and appropriate pacing. Suggestions for future editions focused on expanding the practical and hands-on elements of the toolkits. Participants expressed interest in more detailed guidance on participatory dynamics and engagement methods, as well as additional training on the Environmental Toolkit and related resources. There was also interest in creating opportunities for dialogue with industry stakeholders and in co-designing a citizen-led air quality monitoring campaign, enabling participants to apply the concepts and tools introduced during the workshop in a collaborative and practical setting.

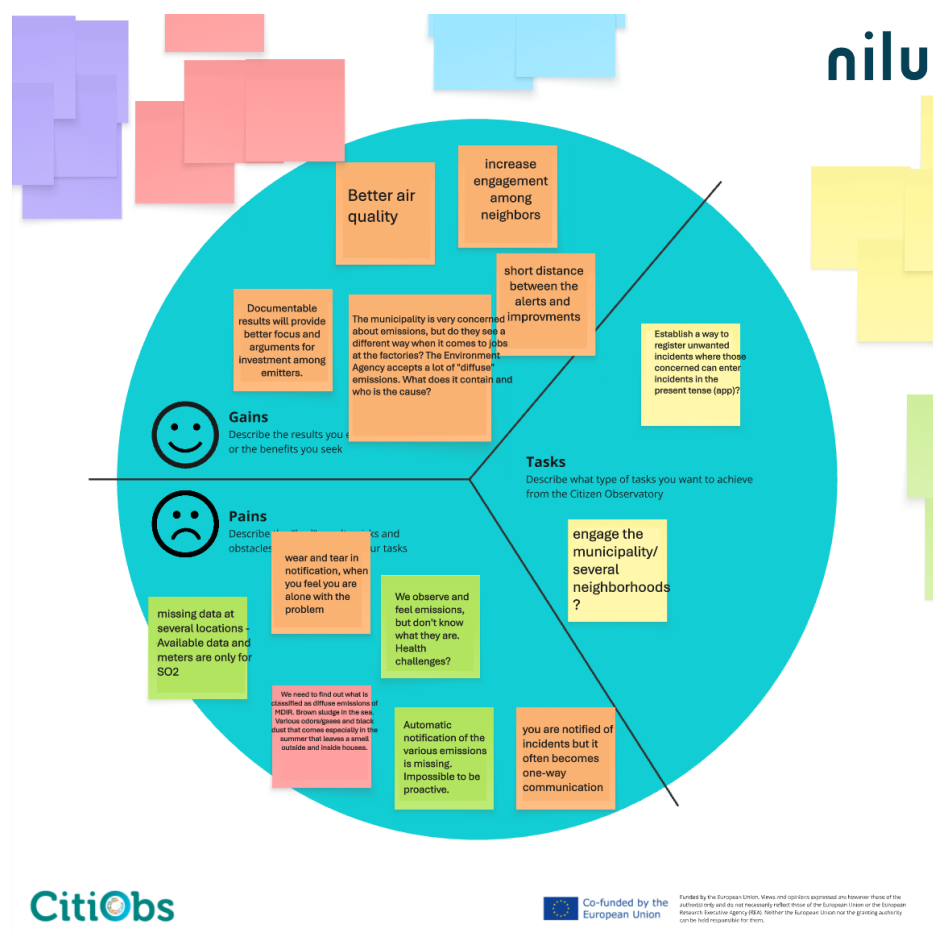


Figure 20. Screenshot from the Miro-board used for the Task/Pains/Gains activity

## Needs Analysis

As an insight from the main workshop activities, it can be remarked that the participant organizations did not meet the criteria of being a fully active citizen observatory as outlined by the project, by not having policy goals among their objectives. During the second activity (*Collaborating with the COs*), most of the tasks, pains and gains identified by the participants were closely related to CitiObs scope. Also, both workshops indicated a will to extend and enhance the collaboration between city officials and the Fiskåtangen Vel.

Due to the insights from the first events, both city officials and the Fiskåtangen Vel were invited to the online **Needs Prioritization Workshop** on March 12<sup>th</sup>, 2024. In total, 2 persons from the municipality of Kristiansand, 2 persons from the Fiskåtangen Vel, and 3 persons from NILU participated in the second online workshop.

The exercise proposed consisted in a methodology of four steps, aiming at reaching a consensus on potential Needs to be prioritized during the capacity building program:

1. Validating the first workshop outcomes by the CO
2. Needs prioritization
3. Needs clustering
4. Next steps

The initial phase focused on validating the Needs description compiled by the local team following the first workshop. Representatives were encouraged to review and edit these descriptions as necessary, and to suggest additional Needs for exploration. Instead of using the Miro board with the Needs assessment presented by NILU members (the contact person), a free discussion started between the stakeholders that led to a deviation in the workshop planning. The CitiObs participants did not intervene in these discussions since they were seen to develop a joint understanding (between stakeholders) about the importance of working together. The deviation from the plan were thus seen to be establishing a stronger collaboration effort between the stakeholders of the emerging citizen observatory.

As a result, clear Needs emerged from the discussion, such as the importance of starting a dialogue with the Industry and the Norwegian Environmental Protection Agency about the nature of the emissions (historical investigations and measurements); and adding sensors from the CitiObs project to measure air pollution in the neighbourhood.

The relatively small number of participants in the Kristiansand workshops reflects a deliberate focus group approach, rather than low engagement. Given the sensitive context - industrial pollution affecting the Fiskå neighbourhood - the priority was to build trust and enable constructive dialogue between key stakeholders. The process was planned with initial separate meetings with residents (Fiskåtangen Vel) and the municipality, followed by joint sessions. This helped reduce tensions and create a collaborative environment. The prioritization workshop included key representatives with a mandate to act and disseminate results within their organisations and networks, ensuring broader reach beyond the workshop itself. This small-group format proved effective in fostering trust, supporting collaboration, and leading to ongoing joint work between the CO and the municipality, as well as engagement with industry. This ensured that the impact of the workshop extended well beyond the individuals present.

In particular, the small-group format proved effective since:

- It enabled open and constructive exchanges;
- It supported the transition from initially separate actors into a functioning, collaborative CO;
- It facilitated ongoing dialogue, including communication with the industry (Elkem Carbon);
- It has led to the planning of a broader meeting involving neighbours, municipality, and industry.

In this context, quality of engagement, trust-building, and representativeness were prioritised over the number of participants. The results indicate that this approach has been successful in fostering collaboration and enabling collective ownership of the process.

### Preliminary results and next steps

|                           |                                                                                                                                                                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Workshops Overview</b> | <p><b>Onboarding workshops:</b> one with 2 city officials and another with 2 Fiskåtangen Neighbourhood Association (Vel).</p> <p><b>Prioritization workshop:</b> 4 participants from the municipality (2) and Fiskåtangen Vel (2).</p> |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Needs Assessment</b>                                    | <p><b>Municipality's Perspective:</b> Importance of maintaining dialogue with citizens, managing high expectations, and acting as mediators between citizens and industry.</p> <p><b>Fiskåtangen Vel's Concerns:</b> Need for quantitative air quality data, addressing emissions from nearby industries. Also need to be prepared when slip emissions occur.</p> <p><b>Collaboration and Dialogue:</b> Enhancing collaboration and dialogue with industries and stakeholders, using citizen-generated data to complement official measurements.</p> |
| <b>Connection Between Needs and Toolkits or Components</b> | <p><b>Common Understanding and Knowledge Sharing:</b> CitiObs CO Participation Dynamics Toolkit and LNOB Toolkit, for enhancing participation and fostering understanding of the environmental issues.</p> <p><b>Collaboration:</b> CitiObs Citizen-led Action Toolkit: Supporting collaboration and action among citizens and stakeholders.</p> <p><b>Automatic Alert Notification:</b> CitiObs technical component (DSS) for setting up an alert system for environmental incidents.</p>                                                           |
| <b>Next Steps</b>                                          | <p><b>Mentoring sessions:</b></p> <p>Facilitate coordination between stakeholders, especially between Fiskåtangen Vel and the industry (and possibly also the Norwegian Environmental Protection Agency).</p> <p>Deploy Smart Citizen Kits for monitoring sulfur emissions.</p> <p>Implement an automatic alert system using DSS tools.</p>                                                                                                                                                                                                          |

Table 9. Kristiansand's results summary

The Initial Needs Assessment phase, composed by the two above-mentioned workshops, was key to better understanding the current status and potential Needs for empowering an active Citizen Observatory initiative in Kristiansand. The events also served as catalysts for fostering ongoing collaboration and preparing the groundwork for the upcoming tailored capacity building program.

## 3.5 Rotterdam

### Engagement Preparation

Rotterdam is the second largest city and municipality in the Netherlands, with 650.000 inhabitants. The local Environmental Protection Agency (DCMR) intensively monitors air quality and other

environmental parameters in the area. Also, citizens have become increasingly interested in contributing to air quality monitoring around their homes.

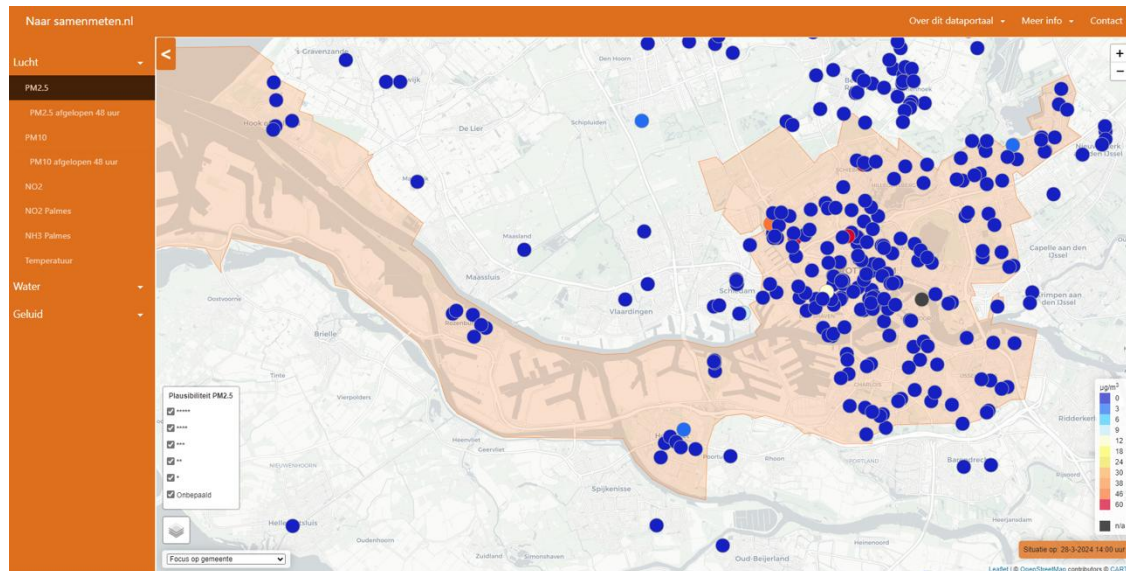


Figure 21. Measurement points in Rotterdam (light orange background) (Source: [www.samenmeten.rivm.nl](http://www.samenmeten.rivm.nl))

In 2021 the municipality set up a citizen science initiative to monitor air quality: the Luchtclub. They distributed 600 sensors in the city, making it the most densely monitored city in the Netherlands. In 2024; however, official support for the project ended. From 2025, the Luchtclub went in a 'transition phase' to becoming self-sustaining.

During 2024, the DCMR, on behalf of the municipality, is supporting the citizens in forming a self-steering community. They could then become part of the regional citizen science community 'Samen Meten Zuid-Holland'. This regional community is managed by the Greenland on behalf of the regional authority (Provincie Zuid-Holland). Both the Luchtclub and Samen Meten Zuid-Holland make use of Samen Meten, the national infrastructure for citizen science and air quality. Samen Meten is organized by the National Institute for Public Health and the Environment (RIVM). All those actors have been involved in the workshops and are therefore introduced here.

The Luchtclub is an interesting case for CitiObs, showcasing how a CO has developed over the years and what results have been achieved. It also provides CitiObs with the opportunity to learn and deliver support with how this CO can become sustainable and self-supporting after project support ends.

## Needs Capture

On November 8, 2023, residents and involved parties of Rotterdam gathered in the Rotterdam City Hall for the Onboarding Workshop. The objective was to reflect on the Luchtclub. What has the Luchtclub achieved so far? What lessons can other CO's learn from the Luchtclub, both in the Netherlands and beyond? And what would be necessary for the continued success of this CO?

There were 15 participants at the workshop: nine citizens and six public civil servants; governmental employees from the municipality, Provincie Zuid-Holland, DCMR and RIVM. There were five CitiObs members present, and the Contact Points hosted the session. The discussion started exploring participants' motivations to join the Luchtclub. Participants shared concerns about local pollution sources (wood burning, marine traffic, highway traffic) and related health effects, alongside the wish for more engagement between citizens and the government. Next, participants were asked to write down their views on the successes and challenges of citizen science in Rotterdam. The significant density of data points was seen as a major success. One of the challenges that various participants noted was: "We measure, and now what? How can we go from measuring air quality to improving air quality?" Also, the wish to involve more youth was highlighted.

The Tasks/Pains/Gains tool was operationalized by using post-its and flip-charts and using the following questions 'Through my participation in Luchtclub, I hope to achieve that...'; 'What is a challenge?'; and 'What is a success?'.



*Figure 22. Fishbowl discussion during the second part of the workshop*

During the second part of the workshop, a group discussion was undertaken, using the fishbowl methodology – a participatory technique used in workshops to facilitate inclusive and dynamic discussions among large groups – between residents, policy officers and data scientists from governmental institutions about the future of Luchtclub. The collaboration between local governmental institutions and citizens was recognized by all parties as valuable. Citizens stressed the necessity for continued support of the Luchtclub. Policy officers noted that it is important to engage with politicians as well in order to maximize the impact of the measurements. Data scientists highlighted that the high density of measuring stations provides useful insights in local air quality.

In reflection, the event was highly informative, with a diverse group of participants connecting during the event. This facilitated extensive exchange of experiences from the Luchtclub and discussions about future endeavors. During the workshop, a local artist, invited by the municipality, was present to capture the main discussion points in a visualization.

At the end of the event, participants were asked to fill in a feedback form. Of the 15 participants, 7 replied. All questions were answered positive to very positive. (>4 on a 1-5 Likert scale). Feedback highlighted the need for sharing more relevant information beforehand, limiting the use of post-its, and organizing two rooms when splitting up the group. When asked what people would like to discuss at a follow-up, answers included how to continue the Luchtclub, the link between measurements and health, and how to go from measurements to actions.

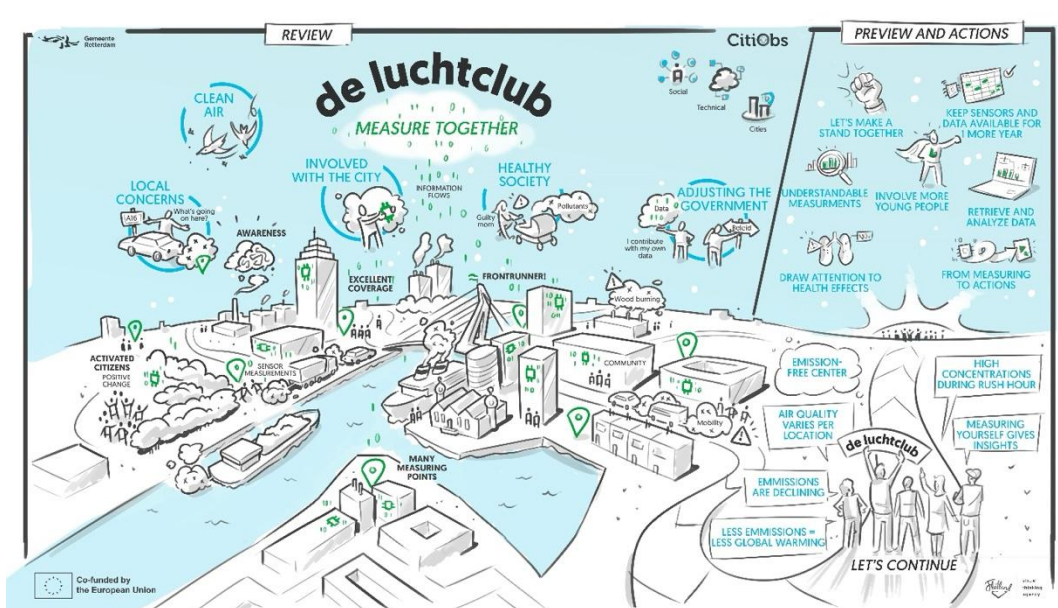


Figure 23. The results of the discussions in Rotterdam FRC captured by a local artist

## Needs Analysis

After the Onboarding Workshop, the CitiObs team had a debriefing meeting to complete the logbook and exchange insights. Afterwards, post-its were digitized in an excel file, dividing the input into task, pain and gains using the Needs Assessment Tool Template. When an issue was addressed multiple times, it was translated into one overarching task, pain and gain. Also, task, pain and gains were written slightly more elaborately to make them understandable to others. Next, each task, pain and gain was matched with a Need. The Needs were derived from the 'Preview and actions'-part of the visualization, so as make them recognizable for the workshop participants. If a task, pain and gain did not match an item of the visualization, an additional Need was added. All outputs were gathered in a digital board (using Miro) so they were ready to be discussed during the Needs Prioritization Workshop (see Figure 24).

On March 14, 2024, an online **Needs Prioritization Workshop** was held with FRC contact points and the Luchtclub. At this time, the Luchtclub was in a transition phase to become a self-steering community. To accommodate this sensitivity, it was decided to have a dedicated discussion with the public servants without the citizens. There were four participants at the online session, one from Provincie Zuid-Holland, DCMR, RIVM and Greenland. The municipality was the only stakeholder that could not be present. The objective was to validate and prioritize the Needs, based on the first workshop.

The relatively small number of participants allowed for an open and honest discussion among people that knew each other. A needs prioritization with the citizens was considered, but decided against, as it was unsure what could be delivered to a project in this sensitive, fragile phase. It was therefore better to let the municipality organize its own meetings with citizens, and to step in upon request (subsequently done twice). A report back to the citizens was given by presenting the CitiObs project and the Onboarding Workshop at the official closing event of the Luchtclub.

In the Needs Prioritization workshop, first the results of the first workshop were discussed. Some additional comments were made, but in general the participants recognized the inputs they gave in the Needs assessment. Second, participants prioritized the Needs.



## Preliminary results and next steps

61 Page

|                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Needs Assessment</b>                                    | <p><b>Community Building:</b> Need to transform the Luchtclub into a self-steering, independent community of citizens that can continue being a CO without municipality funding.</p> <p><b>Collaboration and Trust Building:</b> Enhancing trust and collaboration between citizens, governmental institutions, and other stakeholders. Citizens know how to find and present their data to stakeholders.</p> <p><b>From Measuring to Actions:</b> Desire to move from data collection to actionable steps addressing local pollution sources. The first step is knowing how to analyse the data.</p> <p><b>Sensor Availability and Maintenance:</b> Need for continuous availability and maintenance of air quality sensors. This need cannot be addressed in CitiObs.</p> |
| <b>Connection Between Needs and Toolkits or Components</b> | <p><b>Community Building:</b> CitiObs LNOB Toolkit can help the Luchtclub to foster community development.</p> <p><b>Collaboration and Trust Building:</b> CitiObs Participation Toolkit can support participants in building and sustaining trust among diverse stakeholders.</p> <p><b>From Measuring to Actions:</b> CitiObs Citizen-led Action Toolkit in combination with the ARD and DRI tools, such as the RIVM Analyse Together Tool, can support participants to translate data into concrete actions and influence policy decisions.</p> <p><b>Sensor Availability and Maintenance:</b> CitiObs Environmental Monitoring Toolkit can provide SmartCitizen Kits.</p>                                                                                               |
| <b>Next Steps</b>                                          | <p><b>Mentoring Sessions:</b></p> <p>Support the transition of the Luchtclub into a self-steering community, enhancing collaboration and trust among stakeholders.</p> <p>Important is to be aware of this delicate position of the Luchtclub with changing stakeholder positions, and to act accordingly.</p> <p>Use Citizen-led Action Toolkit and ARD/DRI tools to drive actionable change. The RIVM Analyse Together Tool will be implemented specifically.</p>                                                                                                                                                                                                                                                                                                         |

Table 10. Rotterdam's results summary

The prioritization activity provided important insights to participants and CitiObs team. Central elements identified so far are: i) the Needs prioritization of the citizens of the CO should be central to how the CO develops; ii) a CO should be demand driven rather than supply driven; iii) a CO is more effective when citizens are asked what problem they want to address, rather than just handing out sensors.

Furthermore, it was discussed that 'Inclusivity' can mean different things. It can mean a demographic diversity in participants, but can also mean that people with different (non-technical) talents or limited amount of time should still be able to participate in a CO. The latter was identified

as more relevant. Also, the Need for collaboration and dialogue between governmental institutions and citizens was discussed, since it was ranked as a high priority by the participants. It may be interesting to explore this further with them.

## 4. CONCLUSION: CURRENT STATUS AND NEXT STEPS

|                                                            |                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Workshops Overview</b>                                  | Onboarding workshops: 19 COs, 55 participants<br>Prioritization workshops: 10 COs, 29 participants                                                                                                                                                                                                                                |
| <b>Needs Assessment</b>                                    | Community building through citizen engagement, participation, and inclusivity.<br>Data challenges, such as sensor installation, data reliability, interoperability and visualization.<br>Influencing policy-making by leveraging data analysis.                                                                                   |
| <b>Connection Between Needs and Toolkits or Components</b> | Leave No One Behind Toolkit<br>Participation Toolkit<br>Citizen-Led Action Toolkit<br>Environmental Monitoring Toolkit<br>Technical components such as Decision Ready Information (DRI) tools.                                                                                                                                    |
| <b>Next Steps</b>                                          | <b>Mentoring Sessions:</b><br>Engagement, participation and inclusivity workshops<br>Analysis Ready Data, Analytical and Decision Ready Information tools<br>Sensor data collection, validation, interoperable data storage, and visualization<br>Lowering the Barriers on Using Sensor Technologies<br>Deploy Smart Citizen Kits |

*Table 11. Aggregated results summary*

This report has presented the current engagement of the CitiObs FRCs which has followed a consistent methodology adapted to fit the specific conditions of each FRC context. Thus far, 2 rounds of workshops (one in-person and one online) have taken place in all five FRCs. The workshops have been appreciated by the participants both in terms of content, organisation and structure, with opportunities for learning both about new tools and from others COs' experiences being highlighted. This engagement process that resulted in transparent, traceable, and participatory data collection and analysis, identifying, and prioritizing the main Needs of the FRCs.

These insights are central for the development of self-assessment tools that are scalable through a coherent and accessible structure that is also adjustable to different contexts.

In the pursuit of enhancing COs, workshops across Athens, Barcelona, Dublin, Kristiansand, and Rotterdam revealed a dynamic landscape of engagement and challenges. Across cases, the drive for assessing COs' Needs by CitiObs was matched by the commitment to inclusivity and collaboration by COs. Although participation in terms of numbers varied across the workshops and FRCs, the depth of engagement has been consistent, with carefully selected participants who are able to reach other relevant stakeholders and citizens in the continuation of the project. Building mutual understanding and trust have been in core focus for the initial engagement stages, which has in some cases required a deliberately small group approach.

The next step for advancing towards the application of self-assessment tool builds upon the lessons learnt so far. CitiObs explored the use of the MICS impact assessment platform to report and monitor impacts of their CO in distinct domains (society, governance, economy, environment, science & technology).

In our efforts to integrate CitiObs with the MICS tool, we conducted an internal assessment to evaluate its potential connection and applicability. We held meetings with Earthwatch, the project behind the creation of the MICS tool, to understand its functionalities and suitability for CitiObs.

As part of this process, we organized an internal trial run with our partners and the Earthwatch team to thoroughly assess the tool's feasibility. During this trial, we encountered key challenges that led us to reconsider its use. The MICS tool proved to be highly time-consuming, with partners needing more than 3 hours to complete the exercise. This complexity poses a significant challenge in scaling the tool to other COs without direct support from CitiObs or Earthwatch. Additionally, the tool is not designed to be used by COs and would need fine tuning to be used in this project, and, at this moment, Earthwatch cannot make any changes in the structure of the tool.

Given these considerations, CitiObs has decided not to proceed with the MICS tool. Instead, the project is focusing on developing a **Self-Assessment Tool** inspired by the [Leiden Competencies Framework](#). This framework provides a structured approach to evaluating competencies across various domains, ensuring a comprehensive assessment of COs' capabilities and needs. By leveraging this well-established model, we aim to create a user-friendly and scalable self-assessment tool that aligns with our CitiObs toolkits and technical components.

The self-assessment tool aims to be flexible and adaptable, including a matrix that will be tested and refined in collaboration with our partners. This new self-assessment tool is designed to be

intuitive and efficient. Its simplicity ensures that COs can engage with it independently, reducing the need for extensive support.

By rolling out this self-assessment tool, CitiObs will be able to scale-up this process to 30 Alliance and 50 Fellow Cases. The results of the self-assessment will also refine the engagement between Frontrunner and Alliance Cases in upcoming stages of **Clustering** (focused on common learning and capacity building requirements) and **Twinning** (where each FRC will engage with an Alliance cluster to share their practical experience with using the CitiObs Cookbook for their CO).

Finally, deliverable D3.1 (due in month 24 of the report) will report on the Needs Assessment of the Alliance cases.

## REFERENCES

Osterwalder, A. Pigneur, Y., Bernarda, G., Smith, A. and Papadakos, T. (2014), Value proposition design, Strategyzer series, Wiley, New Jersey.

Pfeiffer, E., Wehn, U., Gharesifard, M., & Al Momani, A. (2016). *Initial Stakeholder Analysis of the Demonstration Cases* (Deliverable D1.1). Ground Truth 2.0. European Union's Horizon 2020 research and innovation programme under grant agreement No. 689744.

Wehn, U., & Pfeiffer, E. (2020). *Guidelines for Citizen Observatories and Future Recommendations* (Deliverable D1.13). Ground Truth 2.0. European Union's Horizon 2020 research and innovation programme under grant agreement No. 689744.

## ANNEXES

### ANNEX 1

## INVITATION LETTER

---

Dear **[MR/MS/DR Recipient's Name]**,

Within the **CitiObs project** we have begun the process of collaboration, mutual learning, and joint work with citizen observatories (COs). The objective of this project is to promote COs for healthy, sustainable, resilient, and inclusive cities. Given your experience with **[CO's Name]** and expertise in **[X depending on type of stakeholder]**, we would like to invite you to participate in the first **Mutual Learning Workshop** of the project.

### What is CitiObs?

**CitiObs** is a Horizon Europe project that aims to enhance COs in European cities by working on its social and technical dimensions. We want to work with you and learn how we can amplify inclusive citizen participation in urban environmental issues and how we can better integrate citizen-generated data into research, decision-making processes, and policy development.

We know that citizen participation can be a challenge and we want to invite you to work together.

### Why are we doing this?

CitiObs is meant to be a mutual learning process, where CitiObs project partners learn from those who live in and use urban spaces – and the other way around. The citizens can learn from our methods, about how to collect and manage data, and about how they can use our tools to their advantage. Our goal is to use knowledge from former experiences to build new tools that can be used by other cities as well. The project partners of CitiObs see a lot of potential in asking the citizens about the society they live in.

The **Mutual Learning Workshop** is a **face-to-face half day** session designed to nurture collaborative conversations between CitiObs and leading COs in **[City]** such as **[CO's name]**.

### Together, we will:

**Share and reflect:** Dive into stories about our experiences with citizen science and COs, drawing lessons and insights from our collective experiences.

**Engage in dialogues:** Explore together, through shared and diverse challenges that encourage interactive discussions, how to support COs to enhance participation, inclusion, technological innovation, and policy impact.

**Learn side-by-side:** Co-develop tools and approaches, allowing us to collaboratively strengthen our CO initiatives.

### Why your input is useful:

We value and seek to learn from your experiences and insights with citizen science and citizen observatories in [City/location]. Your contribution is key to the co-design of tools and approaches that will later be used by at least 80 cities in Europe.

**What are you and [CO's Name] getting out of it?**

Together, we'll explore and address relevant topics and issues critical to COs and [CO's Name] such as inclusivity, data quality, citizen-generated data integration into research, policy frameworks and decision-making processes, citizen engagement and driving impactful environmental actions. When using the tools and approaches from CitiObs, our project partners are ready to collaborate and co-design with you. We hope to share and enrich the application of CitiObs tools and the knowledge and insights we have gathered about them.

[CO's name] can benefit from the extensive resources gathered and developed by CitiObs, including access, and mentoring to tools designed to improve citizen science processes in urban environment monitoring, including the technological and data management tools that support them (e.g., data collection, quality and interoperability, data analysis and visualisation).

**How can you get involved?**

To start the mutual learning about citizen science and COs we will organise a first workshop. During this workshop, we would like to discuss what we would jointly like to achieve in [City/location] and how we will approach this.

This workshop will take place on [date] at [hour] at [location venue].

We are happy to provide further details or answer any queries you may have. We look forward to receiving your response by [date] whether you or an appropriate colleague from [CO's name/ organization] can participate. We look forward to embarking on this exciting experience together.

Kind regards,

[Sender name]

On behalf of the entire CitiObs team

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**Contact**

Nuria Castel, Project Coordinator, NILU, [ncb@nilu.no](mailto:ncb@nilu.no)

Alexios Chatzigoulas, Dissemination Leader, DreVen, [alexios.chatzigoulas@dreven.be](mailto:alexios.chatzigoulas@dreven.be)

## ANNEX 2

### WORKSHOP DESIGN

Workshop design – First Mutual Learning Workshop

Total session length: 4h

Main objective: Build trust among CO participants, secure their commitment, and jointly explore how CitiObs can co-create solutions to support and enhance their COs.

Moderator/panellists/support: FRC contact point, WP1 mentors, WP2 mentors

High level session structure:

- Welcome (5 mins)
- Introduction: Understanding Citizen Observatories (20 mins)
- COs Outlook – Getting to know the COs (60 mins)
- Break (5 mins)
- COs success and challenges (60 mins)
- Break (15 mins)
- CitiObs Alignment and Setting Up a Mutual Learning: Technical Dimensions (25 mins)
- CitiObs Alignment and Setting Up a Mutual Learning: Social Dimensions (25 mins)
- Break (5 mins)
- Closing and Next Steps (20 mins)

| Session item | Activity                                                                                                                                                    | Targeted outputs/<br>understanding                  | Lead              | Materials/ support | Timing |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------|--------------------|--------|
| Welcome      | <ul style="list-style-type: none"> <li>• Welcome everyone and provide an overview of the workshop.</li> <li>• Explain the goals of the workshop.</li> </ul> | Clarity on the goals and structure of the workshop. | FRC contact point |                    | 5 min  |

|                                                                     |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                                                  |                                                                                                                 |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Introduction:<br>Understanding<br>Citizen<br>Observatories<br>(COs) | <ul style="list-style-type: none"> <li>Intro about COs, their trends.</li> <li>Icebreaker activity: Participants briefly introduce themselves and what do they like most about COs?</li> </ul>                                                                                                                  | <ul style="list-style-type: none"> <li>(light) Introduction and understanding of the context, background and future of COs</li> <li>Presentation of the participants to get to know their COs</li> <li>(light) General understanding and clarity on the perspective and scope of CitiObs within the COs landscape</li> </ul> | WP expert   | <p>Detailed notetaking of conversations.</p> <p>BCN case: map and profiles to see representation of the COs locally (could be input to T1.1)</p> | 20 min                                                                                                          |
| (Interactive Session)<br>COs Outlook – Getting to know the COs      | <ul style="list-style-type: none"> <li>Structured activity to get each CO to complete a poster about their CO (key sections: thematic focus, goals &amp; ambitions, stakeholders involved (triangle), data collected &amp; infrastructure)</li> </ul> <p>Plenary presentation of each CO using their poster</p> | Identification and understanding of the COs                                                                                                                                                                                                                                                                                  | WPs mentors |                                                                                                                                                  | <p>60 min</p> <p>Preparing poster: 15-20 min</p> <p>Presenting poster: 5-10 min/CO</p> <p>Feedback session.</p> |
| Break                                                               |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                                                  | 5 min                                                                                                           |
| CO successes and challenges                                         | <ul style="list-style-type: none"> <li>Use jobs/successes/pains/gains tool to identify needs (social/technical)</li> </ul>                                                                                                                                                                                      | Understanding of the COs                                                                                                                                                                                                                                                                                                     | WPs mentors |                                                                                                                                                  | 60 min                                                                                                          |
| Break                                                               |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                                                  | 20min                                                                                                           |

|                                                                              |                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                          |             |  |        |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--|--------|
| CitiObs Alignment and Setting Up a Mutual Learning: Technological Dimensions | <ul style="list-style-type: none"> <li>Reflect on the main insights and CO needs from interactive sessions and how CitiObs can co-create value to enhance COs.</li> <li>Start aligning the technological dimensions areas of opportunities with the expertise of WP2 to foster collaboration and mutual learning.</li> </ul>               | <ul style="list-style-type: none"> <li>Introduction to WP2 tools, systems, services and experience.</li> <li>Show value in collaborating with CitiObs</li> <li>Understanding potential areas of mutual learning and collaboration.</li> <li>Understanding how to improve COs and CitiObs data infrastructure.</li> </ul> | WPs mentors |  | 25 min |
| CitiObs Alignment and Setting Up a Mutual Learning: Social Dimensions        | <ul style="list-style-type: none"> <li>Reflect on the main insights and CO needs from interactive sessions and how CitiObs can co-create value to enhance COs.</li> <li>Indicate which successes &amp; challenges of the COs in the social dimensions connect with the WP1 toolkits to foster collaboration and mutual learning</li> </ul> | <ul style="list-style-type: none"> <li>Introduction to WP1 toolkits and experience.</li> <li>Show value in collaborating with CitiObs</li> <li>Understanding potential areas of mutual learning and collaboration.</li> </ul>                                                                                            | WPs mentors |  | 25 min |
| Break                                                                        |                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                          |             |  | 5 min  |
| Conclusions and Next Steps                                                   | <ul style="list-style-type: none"> <li>Summarize the main points discussed during the workshop.</li> <li>Discuss and outline the next steps: follow-ups, using data gathered, plan to co-design mutual learning activities.</li> <li>Call to action.</li> </ul>                                                                            | <ul style="list-style-type: none"> <li>Clarity on CitiObs' next steps with CO stakeholders.</li> <li>Clarity in the mutual learning and mentoring process of COs.</li> <li>Clarity on the next actions COs should take.</li> </ul>                                                                                       | WPs mentors |  | 20 min |

## ANNEX 3

### WORKSHOP DESIGN

Workshop design – Needs Prioritization Workshop

Total session length: 60 mins

Main objective: Identify and prioritize the main needs from COs, using this information to the subsequent development of capacity building sessions.

Moderator/panellists/support: FRC contact point, WP1 mentors, WP2 mentors

High level session structure: (60 mins)

- Welcome and Introduction (5 mins)
- Review of Identified Needs (25 mins)
- Prioritization Activity (25 mins)
- Closing and Next Steps (5 mins)

| Session item               | Purpose and Activity                                                                                                                                                                                               | Targeted outputs/ understanding                                                                                                                                                                                   | Lead              | Materials/ support | Timing |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------|--------|
| Welcome and Introduction   | <ul style="list-style-type: none"> <li>• Briefly recap the goals and outcomes of the First Mutual Learning Workshop.</li> <li>• Outline the objectives and agenda of the Needs Prioritization Workshop.</li> </ul> | <ul style="list-style-type: none"> <li>• Clarity on the goals and structure of the workshop.</li> </ul>                                                                                                           | FRC contact point | PPT                | 5 min  |
| Review of Identified Needs | <ul style="list-style-type: none"> <li>• Presentation of the key needs identified during the First Mutual Learning Workshop.</li> <li>• Review needs and clarify jobs, pains and gains.</li> </ul>                 | <ul style="list-style-type: none"> <li>• Validated needs: statement formulation, completeness, and accuracy of identified needs.</li> <li>• We also want to identify any CO interest in new sensors to</li> </ul> | FRC Contact point | PPT<br>Miro Board  | 25 min |

|                                                  |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                    |                   |            |         |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------|---------|
|                                                  | <ul style="list-style-type: none"> <li>Group reflection on these needs to ensure they are still relevant and comprehensive.</li> </ul>                                                                                                                        | <p>enhance AQ tracking, emphasizing key sensor-related needs.</p>                                                                                                                                                                  |                   |            |         |
| (Interactive Session)<br>Prioritization Activity | <ul style="list-style-type: none"> <li>Use tools like prioritization matrices or dot voting to rank the needs based on criteria like impact, urgency, and feasibility.</li> <li>Facilitated discussion to merge these into a consolidated list.</li> </ul>    | <ul style="list-style-type: none"> <li>Needs prioritized: list of ranked needs to target, considering their significance, urgency, and associated key tasks or jobs-to-be-done.</li> </ul>                                         | FRC team          | Miro Board | 25 mins |
| Conclusions and Next Steps                       | <ul style="list-style-type: none"> <li>Summarize the main points discussed during the workshop.</li> <li>Discuss and outline the next steps: follow-ups, using data gathered, plan to the next capacity building sessions</li> <li>Call to action.</li> </ul> | <ul style="list-style-type: none"> <li>Clarity on CitiObs' next steps with CO stakeholders.</li> <li>Clarity in the mutual learning and mentoring process of COs.</li> <li>Clarity on the next actions COs should take.</li> </ul> | FRC Contact Point | PPT        | 5 mins  |