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GREENGAGE-BASED CITIZEN OBSERVATORY WHITE BOOK

2025

HOW TO USE THIS DOCUMENT

Throughout this White Book, we use a set of icons to help you quickly identify key elements.



Chapter Icons

These icons help you navigate through the document by showing the current chapter at a glance. Click one to jump to a section.



Important Facts

Highlights essential information or considerations you should not miss.



Use Case Highlights

Marks examples, workflows, or practical scenarios that illustrate how methods or concepts are applied across real-world cases.



Recommendations

Indicates suggested actions, good practices, or guidance for implementation.



External Links

Points to supporting material such as project deliverables, documentation, or downloadable tools.

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GREENGAGE

ENGAGING CITIZENS - MOBILIZING TECHNOLOGY - DELIVERING GREEN DEAL

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THE WHITE BOOK

This White Book is structured according to **the sequential steps involved in co-creating a Citizen Observatory:**



WHAT IS GREENGAGE

A brief introduction to the project.

HOW TO START



What do we understand by the terminology of “citizen science” and “Citizen Observatory”?
What challenges might we encounter during the process of establishing an observatory?



BUILDING STRONG FOUNDATIONS

This is the first stage of planning and preparation. What actions do we need to take prior to launching a Citizen Observatory?

These include establishing an open and participative model of governance; formulating robust plans for ethics and data management; ensuring that the technology to be used is ready and useable; and training both the managers and citizen observers.

PILOTING THE EMERGING CITIZEN OBSERVATORY



This is the second stage of planning and preparation. What do we need to do to test the structures and processes of the Citizen Observatory prior to its formal launch? How do we identify issues and problems, strengths and weaknesses, to ensure the Citizen Observatory works as intended?



IMPLEMENTING THE NEW CITIZEN OBSERVATORY

This is the launch and operational stage of the Citizen Observatory. How do we ensure that planning and preparation has been successful, that citizens are fully engaged, along the whole process, in gathering and analysing data, and applying it to co-production of new actions and policies with public authorities?

LEARNING & EVALUATING

How do we measure outputs and outcomes, and identify what needs to be improved? Has the Citizen Observatory been successful in meeting its aims and objectives?



REFERENCES & GLOSSARY



INTRODUCTION

This White Book is a step-by-step manual designed to teach public authorities, organizations, and citizens how to build Citizen Observatories from the ground up. It provides the necessary framework to co-create these community platforms as a primary tool for tackling problems such as climate change adaptation and mitigation.

The White Book draws on lessons from the GREENGAGE project (www.greengage-project.eu), a three year pan-European Innovation Action funded under the Horizon Europe Framework Programme, alongside the UK and Swiss funding partners.

The consortium, led by AIT Austrian Institute of Technology, consists of 17 research and industry partners from 8 countries, and aims to leverage citizens' participation and equip them with innovative digital solutions, providing the basis to co-create innovative solutions for monitoring environmental problems at local level.

CO-CREATING A CITIZEN OBSERVATORY

Setting up and running a Citizen Observatory means coordinating across different domains: technology, data management, community involvement, ethics, and policy.

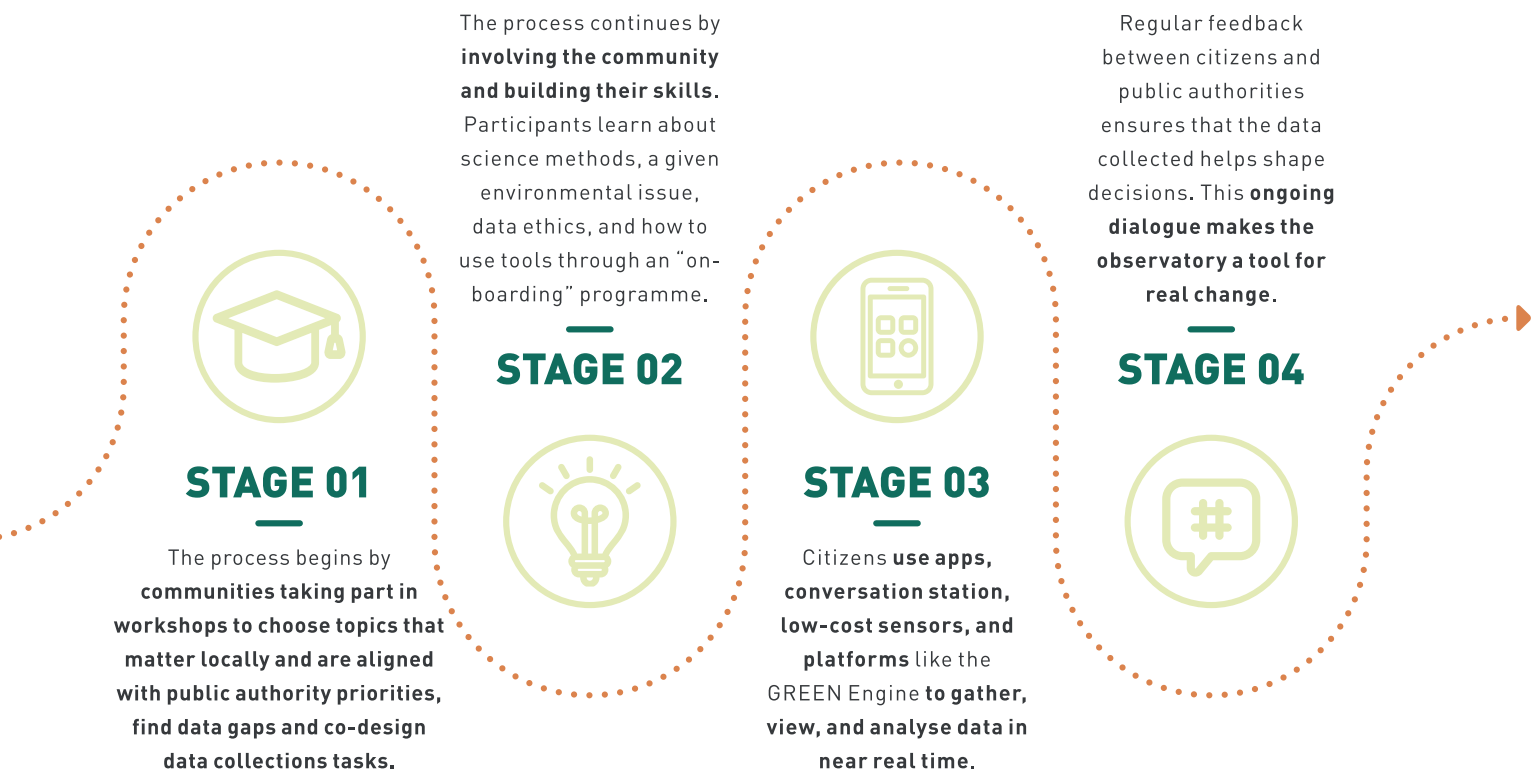
This document offers a practical guide to setting up and running a Citizen Observatory. It outlines the main steps and activities needed to co-create a Citizen Observatory. It is both a practical guide and a governance tool.



Each individual observatory is shaped by its local context, socio-economic conditions and/or local politics. It is important, therefore, to adapt the general approach set out below to fit local needs and priorities.

By demonstrating key actions, decision points, and how and where stakeholders should be involved, it helps public authorities, other organisations, as well as, citizens, to build effective Citizen Observatories based on clear and accountable systems.

A TYPICAL CITIZEN OBSERVATORY “JOURNEY” INVOLVES MULTIPLE STAGES



Co-creating a Citizen Observatory can be challenging, balancing the tension between top-down decision making and bottom-up contribution in a democracy.

However, it can also spark local involvement and collaboration across sectors. Success depends on having the right tools and training that match the needs of different groups, but also on the level of involvement and engagement of the local community.

Over time, the observatory becomes more than just a way to collect data. It becomes a shared space for open conversation, trust-building, and joint responsibility in local decision-making.





WHAT IS GREENGAGE



At the heart of GREENGAGE was the idea that citizens can play a key role in creating greener, healthier cities. Through innovative digital tools, the project empowers people to take part in observing, understanding, and improving their own urban environments. By doing so, citizens help cities move closer to the European Green Deal's vision of carbon-neutral living.

The GREENGAGE project is part of a Europe-wide Innovation Action funded by the Horizon Europe programme. Its goal is to support public authorities in shaping smarter climate policies — both for reducing emissions and adapting to the effects of climate change.

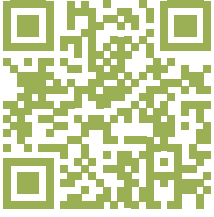
Together with local communities, GREENGAGE helps co-create new green initiatives and sets up Citizen Observatories — spaces where residents and city officials come together to investigate environmental challenges and design practical, innovative solutions.

The project combines two dimensions: strengthening data-driven decision-making in city governance and promoting citizen engagement in environmental monitoring. It develops new governance models and decision-making tools that make city planning more responsive and inclusive.

GREENGAGE is already active across Europe, with five pilot projects in Bristol (UK), Copenhagen (Denmark), Turano and Gerace (Italy), and North Brabant (the Netherlands). These pilots show how citizen engagement and co-creation can lead to better data, smarter policies, and ultimately, more sustainable cities for everyone.



Focusing on mobility, air quality, and wellbeing, GREENGAGE inspires people to explore and “sense” their surroundings. The data and insights gathered by citizens complement and enrich official information from public authorities, creating a more complete picture of what’s happening in our cities.



Scan the QR code for
detailed information
on the GREENGAGE
project

BRISTOL

LIVEABLE NEIGHBOURHOODS



DISTRICT

COPENHAGEN

LIVEABLE NEIGHBOURHOODS & LOCAL TRAFFIC PLANS



DISTRICT

NORTH BRABANT

TRANSITION TO SUSTAINABLE MOBILITY



REGION

TURANO VALLEY

RURAL REVITALISATION & PARTICIPATORY REGENERATION



REGION

GERACE

PARTICIPATORY REGENERATION



MUNICIPALITY



HOW TO START

This section clarifies where a Citizen Observatory begins by introducing the basic terminology of citizen science and Citizens Observatories, outlining how to identify the essential characteristics of your own observatory, and highlighting the key challenges involved in co-creating one.



A simplified example of a GREENGAGE Citizen Observatory is available as a separate document [★].



WHAT IS CITIZEN SCIENCE?

Citizen science is the active participation of the public in scientific research. Citizens can shape the methodology, collect data, help analyse it and interpret results. Citizen science has grown quickly in recent years, mostly because of new technology being available. The internet, smartphones, and apps make it easy for people to access projects, platforms, and databases from anywhere. These tools allow large groups of people together with scientists collect and share data, to work faster and on a bigger scale.

It brings citizens, scientists, and decision-makers closer together. People can explore their surroundings, make discoveries, and feel more connected to science and society.



The essence of citizen science is summed up in an old Chinese saying:

“Tell me and I’ll forget. Show me and I may remember. Involve me and I’ll understand” (Liu et al, 2017).

1

Citizen science is seen as a useful way to solve complex problems in society (Hodgkinson et al., 2021; Weaver et al., 2023). When governments use data from citizens, their decisions have the potential to be more acceptable and equitable. Projects that are co-designed with communities have the potential to help identify real-world problems and create practical solutions. This makes policies potentially more trusted and relevant to the people they affect.

2

Citizen science has the potential to help people understand how policies work and lets them have a say in decisions that impact their lives.

3

In other words, when people are actively engaged, they learn more deeply and feel more meaningfully involved.



WHAT ARE CITIZEN OBSERVATORIES?

Citizen Observatories are established through collaboration between local authorities, research institutions, civic/social innovators, and communities. They bring citizen science into policymaking by connecting people's observations with public decisions. More than just collecting data, they give citizens a real voice in shaping policies, making choices, and assessing results. Citizen Observatories act as formal structures that allow citizens to participate in governance, helping make decisions more democratic and based on real-life experience (Wehn & Evers, 2015; Esposito et al., 2024).

Citizen Observatories use modern technology, like mobile apps, sensors, and online platforms, with well-defined protocols to collect and share environmental data. This data can be then analysed to help policymakers make better decisions and raise public awareness. What makes Citizen Observatories different from other citizen science efforts is their focus on influencing governance and driving social change. They aim to empower communities, not just gather information.

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ACTIVE PARTICIPATION

Citizens can take part in every step - from identifying the issues that matter to them, to collecting data, to making decisions.



DATA COLLECTION & TECHNOLOGY

Observatories gather environmental and urban data from sensors, mobile apps, and open data, using digital tools and platforms for analysis and sharing.



CAPACITY BUILDING & INCLUSIVITY

Citizens receive training to collect and interpret data, with special efforts to include marginalised and underrepresented groups.



COLLABORATION AT ALL LEVELS

Observatories balance top-down (government-led) and bottom-up (community-led) approaches, foster cooperation between citizens, researchers, policymakers, and actors across sectors and government levels.



TRANSPARENCY & ETHICS

Clear rules define data ownership, access, privacy and security, ensuring open and ethical practices.



ACCESSIBILITY

Citizen Observatories make validated data and findings openly available to citizens, policymakers, and researchers, ensuring that everyone can benefit from the information.



SCALABILITY

Observatories are designed to be flexible and transferable to different places, contexts, and policy stages - from monitoring to co-creating and evaluating policies.



POTENTIAL CHALLENGES OF CO-CREATING A CITIZEN OBSERVATORY

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Setting up and running a Citizen Observatory comes with several challenges (Rathnayake et al (2020)). These are given below.



SUSTAINABILITY

Keep people engaged over time is important. A platform alone is not enough—the citizens must see clear value in participating. Ongoing outreach and communication of benefits is key to building a community that stays active in the mid- and long-term.



DATA ACCURACY

The information collected must be trustworthy. Challenges arise from scientific methods and limitations of sensor accuracy. Strong validation methods are needed, and these must be clearly explained to the Observers. Crowdsourced data should be compared with official measurements to reduce uncertainty.



In North Brabant, public authorities used a Citizen Observatory to help calibrate provincial policies. Even though the data collected by participants was not fully representative, citizens still felt their contributions had real influence and were taken seriously—showing that observatories can create meaningful engagement even with smaller datasets.



POLICY INFLUENCE



Technology alone does not give citizens influence. They need to be involved in decision-making, but political structures often limit how much citizen-generated data can shape policy. To avoid misunderstandings, it is important to manage expectations from the start and to create real opportunities for citizens' contributions to have an impact.

EDUCATION & USABILITY



Citizen Observatories can raise awareness about environmental and societal issues, but overly complex technology or required expertise can discourage involvement. Simple tools, clear guidance, and efforts to close digital and knowledge gaps are essential.

SOCIAL INCLUSION



Marginalised communities are often less able or likely to participate in participation activities. Inclusive design, targeted outreach, and accessible training help make participation more appealing and equitable.



Bristol participants actively shared their lived experiences of planning interventions and their impacts. These insights revealed both positive and negative outcomes, identifying what works, where engagement gaps persist, and areas requiring further attention - providing valuable evidence to support the council's monitoring and evaluation of the liveable neighbourhood trial scheme.





BUILDING STRONG FOUNDATIONS

This section covers the initial planning and preparation stages of co-creating a Citizen Observatory. It outlines what is needed to build trust, ensure data protection, and prepare participants for successful collaboration and long-term impact.

Before formally launching a Citizen Observatory, a Citizen Observatory management team should:

- Establish an inclusive governance model
- Create robust ethics and data plans
- Ensure that technology employed for gathering, analysing, and visualising data is ready and easy to use
- Provide training for both Citizen Observatory managers and Citizen Observers
- Define the overall goals of the Citizen Observatory and criteria for measuring its success.

This initial stage, building strong foundations, provides a structured assessment of the context, objectives, and feasibility.

It begins with an exploration of thematic areas and research questions, grounded in local issues or political priorities that may shape the direction of Citizen Observatory.

Once the area of interest is selected, clear objectives and goals are defined to ensure a shared understanding of purpose. Citizens must be fully involved in this foundational stage; it is not a “top-down” or desk-based exercise.

This stage also involves identifying data gaps and developing a stakeholder engagement strategy to build support needed for community mobilisation and the effective use of GREENGAGE and other tools. These digital solutions play a key role in enabling evidence-based decision-making.



In Bristol, the pilot showed the value of investing in early outreach through paid community ambassadors. By engaging people who already understood the local context—who lives there, how the community operates, and what issues matter—they were able to connect more effectively and build on actions already underway.

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Following this, appropriate **GREENGAGE technologies** and/or external tools are selected to ensure alignment between the Citizen Observatory's objectives and participants' needs and the digital solutions for data collection, analysis, and visualisation.

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The process culminates in the development of an **onboarding and training strategy**, including ethical considerations – such as consent forms,

information sheets, privacy policies, and training materials – as well as motivational elements to keep participants engaged and aware of the value of their contribution. All materials are prepared and shared with participants to ensure transparency and compliance.

As a foundational step, this process informs and shapes all subsequent stages of the pilot journey.

OPEN (INCLUSIVE) GOVERNANCE

Managing sustainable cities isn't just about policies, it's about people, collaboration, and smart use of technology. Here's how to make governance inclusive and effective:

SHARE KNOWLEDGE, DON'T WORK IN SILOS

Urban challenges are too complex for one group to solve alone. Create spaces, physical or digital, where officials, experts, and citizens can exchange ideas and collaborate toward achieving policy-specific KPIs. Think of it as building a city-wide brain that learns together and achieves common goals.

BRING PEOPLE IN EARLY

Don't wait until decisions are made to involve communities. Invite citizens into the planning process from the start. When people feel heard, they contribute better ideas and trust the system more.

CONNECT THE DOTS ACROSS POLICIES

Cities aren't just roads or parks, they're ecosystems. Make sure social, economic, environmental, and spatial policies work together. Poor coordination wastes resources and slows progress.

BUILD TRUST THROUGH TRANSPARENCY

Open up decision-making. Share why choices are made and how they affect people. When citizens see honesty and clarity, they're more likely to support change.

USE TECHNOLOGY AS A BRIDGE

Digital tools can turn governance into a two-way street. Use open data platforms, apps, and online forums to connect services and let citizens co-design solutions. Technology isn't just efficiency, it's empowerment.



EMBRACE THE THREE PRINCIPLES OF MODERN GOVERNANCE

- **Openness:** Share data and decisions publicly.
- **Collaboration:** Work with partners, not just deliver services alone.
- **Technology:** Use digital tools to innovate and involve people.



In the Turano Valley, the pilot showed that the observatory worked best when the community understood the idea and felt ready to participate. Before anything began, the team spent time building trust and explaining the purpose of the project. By involving residents directly in shaping each step, the observatory became something the community felt was truly theirs.

A ROBUST ETHICAL FRAMEWORK

A Citizen Observatory invites the public to help with scientific experiments and observations. It is, therefore, crucial to have a strong ethical foundation. The observatory must make sure that people understand what they're agreeing to (informed consent), that their personal data is protected, and that the research respects the places and people it affects.



A Citizen Observatory should aim to make knowledge and policymaking more democratic, treating cities as places where political action begins. They should challenge existing power structures and work to make knowledge more openly and accessible.

In so doing, the observatory should seek to include people from all backgrounds by bridging the digital divide and making sure everyone can influence local decisions. It should promote the idea of commons; shared resources that continue to benefit communities after the project ends.

A Citizen Observatory might, as a matter of principle, choose to adopt an overall ethical approach. Two examples are shown on the right.

ARCHITECTURE OF TRUST

Rasmussen et al., 2020

This approach asks project partners to think about which citizens need to trust the project, what builds that trust, and how the observatory can provide it.

9

CARING ETHICS

Groot & Abma, 2022

This method focuses on working together with local people in a respectful and thoughtful way. It includes being aware of political issues and how they are framed; understanding the identity and role of the researcher; making ethical choices and taking responsible actions; adapting to different roles as needed; showing care, empathy, and compassion; building trust and open, non-judgmental relationships; and, demonstrating these values through actions.

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In practice, a Citizen Observatory may also encounter several ethical issues, such as conflicts of interest; getting informed consent; avoiding exploitation; ensuring data quality, meaningful quantity, and access; sharing data and managing intellectual property; and handling data responsibly.

Each of these challenges **MUST** have a specific plan to reduce risks and ensure ethical standards are met. To meet ethical standards, several key documents must be prepared for an independent ethical scrutiny.

But don't worry, for your convenience [a list of exemplary files](#) created for the Observatories within GREENGAGE is available below.

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CITIZEN OBSERVATORY JUSTIFICATION

Explains why the citizen observatory is important and how it supports broader goals.

PARTICIPANT INFORMATION SHEETS

Give clear details to participants about the study and what their involvement means.

12

ROLES AND RESPONSIBILITIES

Clarifies what each institution involved in the project is responsible for.

PARTICIPANT CONSENT FORMS

Allow participants to give informed consent after understanding the study.

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DATA MANAGEMENT PLAN

Describes how data will be collected, stored, shared, and protected across different time periods.

PRIVACY NOTICES

Explain how personal data will be used, withdrawal or access rights, and how to get help if there are concerns.

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A ROBUST DATA MANAGEMENT PLAN

Citizen Observatories use different tools and methods. However, the basic principles should remain the same: transparency, accountability, and ethical handling of data. A shared governance framework makes sure everyone follows consistent rules, even if their approaches differ. One of the first steps is a Data Protection Impact Assessment (DPIA), which checks for risks when handling personal data. This process helps prevent issues like data breaches and shows a strong commitment to privacy and security.

A good data management plan covers several key areas. First, all data sources, such as sensors, apps, surveys, and community activities, should be documented in a register that explains where the data came from, why it is needed, and how it will be used. Roles and responsibilities must be clear, including who owns the data, who manages it, and who can access it. Data should be categorised by type, such as personal, non-personal, or sensitive, and sensitive data must be handled with extra care.



Collection methods should follow ethical standards, including informed consent and secure tools. Data should be well-organised and documented with metadata that explains its source, purpose, and ownership.

To make data useful, it should follow the FAIR principles: Findable, Accessible, Interoperable, and Reusable. Security measures like citizen observatories collect and reuse many types of data, so it's important to have a clear plan for managing it responsibly. Good data governance ensures compliance with laws like GDPR, protects privacy, and builds trust with communities. It also helps keep data accurate and secure from the moment it is collected until it is shared.



A ROBUST DATA MANAGEMENT PLAN

LESSONS & RECOMMENDATIONS

START PLANNING DATA MANAGEMENT EARLY

It is important to start planning data management early and engage with all parties from the beginning to fully understand the Citizen Observatory data lifecycle. Setting up shared procedures for data privacy, storage and access helps keep things consistent. Agreeing on a common data model early on makes it easier to manage and share data later.

DISCUSS FAIR PRINCIPLES EARLY

The GREENGAGE project also found that discussing FAIR principles early helps prevent problems and supports the long-term sustainability of citizen science data.

IDENTIFY PERSONAL DATA TYPES EARLY

Identifying personal data types at the start and putting protections in place is key to maintaining privacy.

Overall, early planning, clear communication, and shared guidelines are essential for successful data governance.

TECHNOLOGY READINESS AND AVAILABILITY

For Citizen Observatories to function properly, the technology they rely on must be available and fully useable from the start. It is crucial to focus on developing and testing tools early in the project to make sure they meet the needs of users like citizens, scientists, and policymakers.

5 In GREENGAGE, the central technology system, called the **GREEN Engine**, includes tools for collecting, analysing, visualising, and sharing data. To ensure everything worked smoothly, GREENGAGE used two rounds of testing: alpha testing by project partners, who explored how well the tools fit different themes; and beta testing by real users in pilot projects, who gave feedback that helped fix issues quickly.



A Citizen Observatory should be built around what local people want to achieve, with engagement grounded in real issues about place rather than abstract ideas of science or technology. Digital tools can then be introduced gradually and only when needed (Bristol Pilot).



Technology is a tool, it should not guide the process. It is important that respondents are permitted to find the issues they wish to address. Technology is an enabler, no more (North Brabant Pilot).

The key action points are listed below.

CO-DESIGNING TOOLS & FEATURES

A co-design approach is vital, meaning tools are built and improved with input from the people who will use them. This includes citizens, scientists, and decision-makers. Their feedback helps shape the tools, so they are useful and easy to use. For example, the mobile app and visualisation dashboards from the GREENGAGE project were designed with direct input from stakeholders. This ensures the tools are simple enough for people without technical backgrounds to use effectively.

COMPLETE WORKFLOW INTEGRATION

A Citizen Observatory should provide tools that support every step of its work, from gathering data to creating insights and influencing policy. This includes: data collection using **IoT sensors**, **mobile apps**, and **Conversation Station**; data processing tools; data analysis with tools like Large Language Models, and data storage platforms; visualisation dashboards, which help users understand and share results.

5

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USABILITY, SCALABILITY, & REPEATABILITY

Citizen Observatory tools should be easy to use for people with different levels of technical skill. Using cloud services allows the system to grow and be used in many places, but this also means ongoing costs, so stable funding is needed. Public authorities should consider forming public-private partnerships or securing diverse funding source to keep the tools running. Tests in different locations show that the tools can be adapted to local needs while keeping the main approach the same.



Clear communication about how data will be used, and making data easy to understand and visualise, are essential. Tools like DigiTwin and Superset help provide accessible “before and after” views, and comparing citizen-generated data with official datasets can boost interest and motivation (North Brabant Pilot).

Using clear and accessible visualisation tools—including video, performance, art, and sound—helps present results simply and enables citizens to imagine how their neighbourhood might change. These elements should be co-designed with local residents (Bristol Pilot).



TECHNOLOGY READINESS AND AVAILABILITY

LESSONS & RECOMMENDATIONS

IMPORTANCE OF ITERATIVE CO-DESIGN

Acknowledge the importance of iterative co-design in ensuring tool usability, the value of transparent data workflows in building trust, and the need for modular, scalable technology to support diverse Citizen Observatory applications.

ACCESSIBLE TOOLS

Once deployed, tools should always be accessible, with reliable technical support available when needed.

TRAINING ENCOURAGES BROADER USE

For broader use, self-paced training materials, such as video tutorials that explain how to use each tool, are essential.

TRAINING

Training is a vital part of ensuring Citizen Observatories function properly. For this to happen effectively, participants need to understand the goals of the observatory, how to use the technology involved, and what their role is in the process.

Training helps participants feel confident and informed, making them more likely to stay involved and contribute meaningfully.



Training is not just about teaching facts. It is also about creating a space where people’s local knowledge and experiences are valued.

This approach helps build trust and encourages collaboration between citizens, scientists, and public authorities.

When people feel that their voices matter and that they can make a difference, they are more likely to take part in data collection and discussions that influence public policy.

Training also helps to ensure the sustainability of the project. The objective is to create a self-sustaining process in which each cohort of new observers learns from the last, so knowledge is transferred within and between Citizen Observatories.

Training also plays a big role in getting people engaged at the local level. When people learn more

about a topic and feel capable of taking action, they are more motivated to get involved. That is why training should be easy to understand and enjoyable. It should help build a sense of community around the observatory and make people feel like they are part of something important.

Drawing on lessons from the GREENGAGE project, a two-part training programme is recommended to support Citizen Observatories. Each stage targets a different group of people and has different goals.



PHASE 01 TRAINING THE TRAINERS

This first stage is aimed at the leaders of the observatories; people from public authorities, NGOs, universities, private companies, or community groups. These leaders are responsible for setting up and running the observatories, so they need to understand how everything works.

ETHICS

Research must be done in a way that is fair, safe, and respectful. This includes protecting people's privacy, following data protection laws (like GDPR), and making sure everyone understands their rights. The training explains how to use consent forms, provide clear information to participants, and set up ethical review boards or committees.

DATA & TECHNOLOGY

Observatories use different tools to collect, store, and analyse data. The training helps leaders understand what kinds of data they might work with, how to use the tools, and how to connect the data to the themes and goals of their observatory.

CITIZEN SCIENCE & COLLABORATION

Observatories should be built with input from the people who will use them. This means working together to design experiments and research activities that are meaningful to the community. The training teaches how to co-create these activities and how to make sure they answer real questions that matter to local people and policymakers.

To support this training, GREENGAGE created [lectures and video guides](#). These were shared online weekly, with speakers from different organisations bringing their expertise. After each session, participants were asked to give feedback to help improve the training and make sure it was useful.



PHASE 02

TRAINING THE CITIZEN OBSERVERS

The second stage focuses on training the citizens who will use the observatories. This training needs to be practical, easy to understand, and tailored to the local context. The goal is to help people feel confident using the tools, collecting data, and taking part in discussions with local authorities.

MAKING THE TRAINING RELEVANT

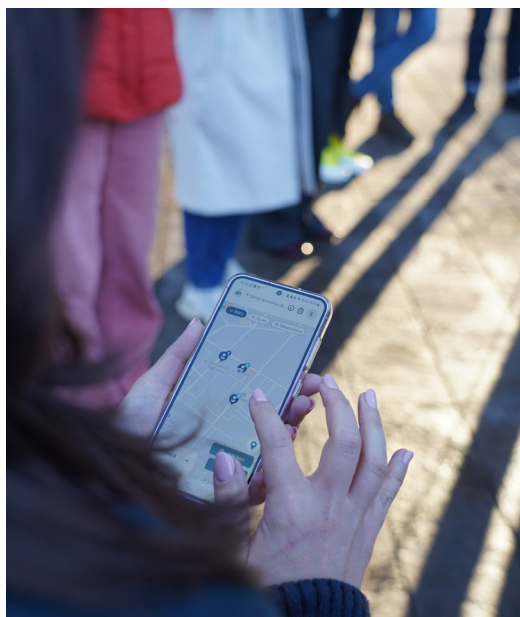
This stage is all about making the training relevant to each community. Since every place is different, socially, culturally, and politically, the training materials need to be adapted to fit. This means using local examples, translating materials into local languages, and making sure the content speaks to the real-life experiences of the people involved.

MAKING THE TRAINING APPLICABLE

The training should be hands-on and focused on real actions people can take. While some background theory is helpful, it's more important to show people how to apply what they learn in their own communities. Using examples from the pilot projects helps make the training more relatable and easier to understand.

MAKING THE TRAINING ENGAGING

Interactive materials, like guides, HOW-TOs and task-based activities, are especially useful. They help people remember what they've learned and apply it in real situations. These materials should be designed so that people can go back to them later if they need a refresher.





LESSONS & RECOMMENDATIONS

MAKE TRAINING EASY TO UNDERSTAND

To reach more people, training should use simple language, visuals, and real-life stories. Relatable infographics and storytelling make complex ideas easier to understand. Interactive and hands-on activities keep learners engaged and help them connect the training to their own lives and communities.

TAILOR CONTENT FOR DIFFERENT AGE GROUPS & BACKGROUNDS

Training should be designed for people of all ages. For example, younger audiences need simpler content with examples that match their interests and experiences. This approach helps include more people and encourages young citizens to care about the environment and get involved in their communities.

HELP PEOPLE UNDERSTAND THE DATA

Many citizen observers care more about interpreting and visualising data than doing technical analysis, wanting to understand what the data means for their neighbourhoods. Interactive dashboards make exploration easier. Public authorities should invest in tools that help citizens use data meaningfully.

USE TECHNOLOGY WITH PURPOSE

People enjoy using new gadgets, especially those that monitor their environment. However, technology should be a tool to answer important questions, not the focus. Training should teach participants how to design good experiments, collect reliable data, and understand the limits of the tools they're using. This helps build trust in the data and its use in decision-making.

WORK WITH LOCAL PARTNERS

Working with local community leaders made training more effective. These "core teams" helped adapt the training to local needs, while addressing real issues. Public authorities and NGOs should build partnerships with local organisations to improve training and community engagement.

OFFER FLEXIBLE, ONGOING LEARNING

The GREENGAGE Academy is an online platform that lets people revisit training materials and keep learning over time. This kind of flexible learning is important for long-term engagement. Public institutions should consider creating similar platforms to support citizen science and environmental education.

KEEP IMPROVING THROUGH FEEDBACK

Training should be a continuous process. Collecting feedback before and after sessions helps improve the content and delivery. This ensures the training stays relevant, practical, and accessible to different audiences.

PROVIDE PILOT-SPECIFIC TRAINING

Each pilot project is different, so training should be tailored to local needs. Training materials should be developed through consultation with the intended recipients, ensuring that content is relevant, practical, and aligned with local expectations.



DEVELOPING THE EMERGING CITIZEN OBSERVATORY

This section explains the second planning and preparation stage of co-creating a Citizen Observatory and the key tasks needed to ensure it functions as intended. Before its formal launch, the management team should test the observatory design with representative users to simulate processes, gather feedback, and assess usability, governance, and data workflows, but also evaluate its effectiveness.

The Citizen Observatory developing stage is focused on establishing a robust operational framework for the pilot. This includes formulating a robust business model which provides for meeting the costs of setting up and running the observatory. It is crucial to establish, from the outset, who is involved and what the costs of sustaining the observatory will be. Which partners and skills are required? The budget will need to provide for the costs of technological infrastructure and human resource requirements on the part of the public authority, but also the additional costs of citizen participation, paying community intermediaries, hiring meeting space, etc.

It begins by inviting selected stakeholders and users to participate, aiming to identify strengths

and limitations that can be addressed prior to the full-scale rollout.

Participants who express interest undergo an onboarding process that includes ethical procedures such as providing informed consent. These procedures adhere to data management standards for handling personal data, including pseudonymisation or anonymisation, and a data registry is maintained to track the types of data collected at this stage.

Participants also receive multiple training sessions on both the concept of a Citizen Observatory and the practical use of GREENGAGE or other available tools. The piloting campaign then proceeds to collect data through various practical exercises using the chosen technologies.

This is a continuous process, with several activities running in parallel to allow new observers to join at different stages. Participant feedback, preliminary evaluations, and lessons learned offer valuable insights that help refine the GREENGAGE tools and, where necessary, adapt the thematic focus. This stage is critical to ensuring the success and effectiveness of the full-scale piloting effort.

PILOTING

Piloting means testing new technologies, improving methods, and making sure communities are involved. Piloting is not just about technology. It is a way to build trust, test feasibility, and get ready for broader implementation.



STEP 01

CREATING A SUPPORT STRUCTURE

Citizen Observatories need a strong support system to guide their development and daily operations. In the GREENGAGE project this support comes from two main groups described below.

INNOVATION ACTION BOARD (IAB)

The IAB is a strategic group of GREENGAGE partners. It meets on weekly basis for updates from PSTs and makes key decisions about how the observatories should work, ensuring that everything aligns with the overall vision. It also encourages collaboration and learning between different observatories.

PILOT SUPPORT TEAMS (PST)

Observatories use different tools to collect, store, and analyse data. The training helps leaders understand what kinds of data they might work with, how to use the tools, and how to connect the data to the themes and goals of their observatory.

Public authorities can adapt this structure to suit their needs. For example, they might form committees that take on the strategic and operational roles of the IAB and PSTs. They can also invite universities, civil society groups, and private companies to join the effort through formal partnerships.



STEP 02

IDENTIFYING WHO SHOULD BE INVOLVED

Two main groups of people participate in observatories: the core team and citizen observers.

CORE TEAM

The core team leads and manages the observatory. They are responsible for engaging the community, organising data collection, ensuring data quality, and communicating findings. They also help set up governance structures and guidelines.

CITIZEN OBSERVERS

Citizen observers are community members who collect and analyse data. They monitor local events or changes, verify data accuracy, raise awareness, and advocate for change based on their findings. Their involvement is central to the observatory's success.



STEP 03

UNDERSTANDING WHAT IS “ONBOARDING”

The GREENGAGE project uses the term ‘situational onboarding’ instead of ‘recruitment’ to emphasise a more inclusive, ethical approach. Onboarding helps people understand the observatory and how they can participate. It is a continuous, context-sensitive process that builds communities of practice and empowers citizens to become planning agents in their own communities.



Tasks for observers should be simple, manageable, and easy to understand. When there are too many steps or demands, participants tend to take part only once and then disengage (North Brabant).

SITUATIONAL ONBOARDING

Situational onboarding considers people’s time, skills, and circumstances. Its goal is to meet participants where they are and make involvement accessible and meaningful. Participants need clear information about available roles and expected time commitments. Matching tasks to their interests and availability helps ensure that their contributions are valuable and sustainable. Understanding participants’ motivations and concerns further supports informed decisions about their involvement.

The onboarding process begins with forming the core team that brings together the necessary skills and perspectives. Citizen observers should be able to choose how they participate based on their motivation, interest, and capacity.

To identify target groups, the GREENGAGE project used the Quintuple Helix model (Carayannis et al., 2012), which explores the potential for policy innovation by focusing on how government, industry, academia, civil society and the natural environment interact and influence each other. Each group has different motivations, so outreach strategies must be tailored accordingly. Generic approaches such as open calls rarely attract diverse participants. Personalized communication and targeted outreach tend to be more effective.



The GREENGAGE project uses a mix of strategies, including open calls, workshops, events, and direct invitations. Special attention is given to marginalized groups. Working with local partners like community centres or libraries can help reduce barriers to participation.

Some useful questions to guide onboarding include:

WHAT SKILLS ARE
REQUIRED?



HOW WILL
COMMUNICATION HAPPEN?



WHAT TASKS NEED
TO BE DONE?



WILL ONBOARDING BE
ONGOING OR DONE IN STAGES?



WHAT ROLES ARE
AVAILABLE?



STEP 04

UNDERSTANDING CO-DESIGN AND EXPERIMENTATION

PILOTING

Piloting is where planning becomes reality. The first step is defining “**use cases**” - specific scenarios that illustrate an urban or environmental challenge. A use case tells the story of how specific tools connect to real-world needs. These use cases evolve over time and guide the design of experiments and data collection.

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Use cases are investigated through “**thematic co-explorations**”. These are collaborative research projects focused on a specific theme. They combine public datasets with data collected by citizens. The goal is to create indicators and visualizations that are easy to understand and useful for advocacy. Each co-exploration tackles a specific theme/problem/area by a thematic co-exploration specific community. When designing a thematic co-exploration, it is important to consider several elements: the challenge being addressed, the people involved, the objectives, the timeline, the locations, the resources needed, and the methods for data collection and analysis. Fundamentally, a Citizen Observatory should be considered as an incubator for such activity.

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STEP 05

UNDERSTANDING PROTOCOLS AND CAMPAIGNS

PROTOCOLS

A “protocol” is a set of guidelines for collecting and analysing data. It ensures that the process is consistent, reliable, and scientifically credible. Protocols help citizens produce high-quality data that can be used in policy and decision-making.

Protocols are especially important in participatory data collection. They bridge the gap between informal citizen involvement and formal scientific standards. They help address challenges like bias and limited resources, and they allow citizen data to complement professional studies.

Protocols should be developed by interdisciplinary teams that understand the local context, the technology, and the subject matter. They vary depending on the topic (such as air quality or traffic) and the tools used (such as sensors or satellite data).

CAMPAIGNS

“Campaigns” are planned activities to collect data over a specific time and place. For example, a campaign might involve collecting traffic data for several weeks. Time-sensitive features require repeated measurements. ‘Standing’ campaigns mean staying at one location to collect data consistently.

Campaigns and protocols also serve as training materials. They explain what to do, where, and when. If technology is involved, instructions for use and maintenance must be clear.



STEP 06

DESIGNING HIGH-QUALITY EXPERIMENTS

Good experiment design ensures that data is reliable and useful. It should align with research questions and be reproducible. Each urban challenge needs a tailored approach. For example, studying air pollution with mobile sensors requires understanding how different conditions affect measurements and determining the necessary calibrations to ensure compliance with air quality monitoring standards.

EXPERT KNOWLEDGE

Expert knowledge is essential. Make sure your core team includes people who understand the topic and the tools.



PILOTING

LESSONS & RECOMMENDATIONS

PILOTING IS A LEARNING PROCESS

The GREENGAGE experience suggests the need to plan for at least two rounds of piloting. The first round is exploratory and helps identify areas for improvement. The second-round builds on those lessons to create a more refined and effective observatory.

MANAGING PARTICIPANTS' EXPECTATIONS IS VITAL

People may expect more than the observatory can deliver. Be honest about limitations, such as gaps in existing data or challenges in decision-making. This helps avoid disappointment and builds trust.

USE CASES SHOULD REFLECT REAL SOCIAL & POLITICAL NEEDS

They must be shaped by input from stakeholders and participants, not just technical requirements. Finding the right balance may take several iterations.

NOT EVERY USE CASE NEEDS ITS OWN THEMATIC CO-EXPLORATION

Combining use cases can lead to richer insights. A Citizen Observatory incubates/realises diverse thematic co-explorations, where a thematic co-exploration may encompass several use cases. For example, GREENGAGE project merged air quality and mobility data, interlinking mobility and pollution use cases, to explore how traffic affects pollution. This helped inform urban planning and produced meaningful results.

RUNNING CITIZEN OBSERVATORIES IS A COMPLEX BUT REWARDING PROCESS

It requires thoughtful planning, inclusive engagement, and flexible experimentation. With strong support structures, meaningful use cases, and reliable protocols, observatories can generate valuable data and empower communities to influence policy and improve their environments.

IMPLEMENTING THE NEW CITIZEN OBSERVATORY

In this section, the initiation and functioning stage of the Citizen Observatory is explained, focusing on how to confirm that planning and preparation have been effective. Throughout the lifetime of the Observatory, the management team should ensure that citizens are meaningfully involved in collecting and analysing data, and that this data is actively used to co-produce new actions and policies in collaboration with public authorities.

The full-scale implementation process marks the operational stage of the Citizen Observatory. It begins with the official launch, using a variety of communication channels tailored to the specific local context such as social media, local news, community posters, and messages to local organisations. Onboarding and ethical procedures are applied to ensure proper consent documentation and data management practices are in place. Participants also receive training on the Citizen Observatory concept and the use of the GREEN Engine, equipping them to begin data collection activities.

Observers are engaged through multiple methods, including workshops, focus group discussions, surveys, local walks, interviews, and the use of GREENGAGE and other tools. The latter may be used to avoid potential bottlenecks, for example, when users are already registered on another platform, or when core teams are leveraging tools

from existing initiatives. As these activities unfold, the data registry is continuously updated to reflect ongoing contributions. Collected data is uploaded to secure storage systems for further analysis and visualisation, with privacy safeguards in place to ensure data is pseudonymised or anonymised as required.

GREENGAGE and other tools may be used to interpret the data, which is then compiled into dashboards, storylines or reports. These reports offer valuable insights into the performance of the Citizen Observatory and support the evaluation process.

This stage represents the operational core of the pilot journey, directly reflecting the effectiveness of the planning and preparatory stages.



PUBLIC PARTICIPATION

In the GREENGAGE project, planning authorities work with various communities that care about fair and sustainable transitions to net zero. They use evidence-based methods to help these communities create local solutions. These agents collaborate with groups interested in using



CITIZEN OBSERVATORIES & CITIZEN ENGAGEMENT

REACHING OUT TO THE ONES WHO ARE OFTEN LEFT OUT

To get more people involved and supportive of their goals, the GREENGAGE observatories focus on reaching those who have traditionally been left out of local policymaking. They design citizen science campaigns by listening to these communities from the beginning of the research process to the end. This ensures that the communication materials and strategies are relevant and engaging for them.

Thematic co-explorations held within Citizen Observatories aim to build public support for specific policies or cases, to evaluate existing policies, or to contribute to policy agenda setting. They use technology-supported citizen science to gather data that backs up community stories. This data is then used to influence decisions like laws, regulations, programmes, and resource distribution that affect people's lives.

The GREENGAGE project has sought to make policy-making more fair, inclusive, and diverse. It also aims to help observatories, with the thematic co-exploration incubated within, become a lasting part of local governance, so communities can continue to speak up about shared concerns even after the project ends. To do this, GREENGAGE emphasises the importance of understanding the political and social context of each observatory. Thematic co-explorations should tell stories that connect with a wide range of people and use data to support those stories. Effective communication, through visually appealing materials and participation in various platforms is key.

20 The GREENGAGE project tests different **advocacy tools** like workshops, public events, Datathons

Citizen Observatories to co-produce changes with civil society. Their goal is to tackle urgent urban challenges, like environmental, social, and economic issues, by encouraging inclusive participation and civic innovation. They do this by finding new ways to involve people in local decision-making and policy development.



that encourage discussion and playful interaction around the issues in pilot areas. For example, in GREENGAGE pilots, **Ideathons** and **Datathons** were organised to generate ideas for the observatory and to initiate data collection campaigns.

Additionally, community engagement events featured the innovative GREENGAGE '**Conversation Station**', a tool that records discussions among up to four participants at a time. Using multiple channels (website, social media, print) helps spread the message and reach a wide audience. For these messages to succeed in influencing powerful decision-makers, they need to follow proven digital advocacy strategies.

The Bristol GREENGAGE Datathon brought together about 50 participants, including citizens, community ambassadors, researchers, and technologists, to explore data from the East Bristol Liveable Neighbourhood trial. Held at Wellspring Settlement, the event combined collaborative data analysis, visualisation, and storytelling to inform policy innovation and co-design approaches for liveable neighbourhoods. Participants worked with diverse datasets via GREENGAGE tools, conversation stations, AI analysis and dashboards. A key outcome was the strong interest in continuing the Citizen Observatory model, reinforcing transparency, inclusivity, and collective sensemaking.



LESSONS & RECOMMENDATIONS

UNDERSTAND STAKEHOLDER MOTIVATION

Getting people to join the Observatory required knowing what motivates them. Just asking them to collect data is not enough. Offering different ways to participate based on their interests help make the observatory more inclusive and effective.

CLARIFY COMMUNICATION EARLY

It is important to have a clear communication plan from the start. Focusing only on data collection won't attract participants or policymakers. The observatory's purpose and benefits should be clearly explained, and adaptable to local needs. Having a strong "sales pitch" early on helps speed up preparation.

ENSURE DATA QUALITY

Citizen-collected data must meet standards like being representative and valid. Since volunteers collect the data, expectations around quantity, quality and focus areas need to be discussed and agreed upon with both observers and policymakers.

UNDERSTAND POLICY CONSTRAINTS

To make a lasting impact, stakeholders need to understand the limits of what policymakers can do. If expectations are too high, policymakers may avoid participation. Ongoing dialogue between all parties is essential to keep things realistic and collaborative.

PHYSICAL MEETINGS

Having observers physically attend meetings can boost motivation and collaboration. But since participation is voluntary, it is hard to guarantee attendance and, even harder, continuous engagement. To encourage involvement, start with a real and meaningful issue that people care about. This builds intrinsic motivation and can spark productive discussions.

PLAN FOR DELAYS

When designing projects with observers, expect delays in data analysis. Keeping participants engaged requires timely communication. If there is a long wait after data collection, interest can fade. Planning for this helps maintain momentum. In the Turano/ Gerace pilot, portable air quality sensors were used effectively, supported by workshops and training sessions. However, more efforts were required to improve data analysis and interpretation so that the collected information leads to meaningful insights and actions.

MAKE TECHNOLOGY ACCESSIBLE

Giving volunteers access to technology right away helps them focus on the value of their observations.

DATA ANALYSIS & VISUALISATION

Raw data alone may not be useful for most participants and policymakers. Delivering clear analysis and insightful visualisations build trust and motivates engagement.



LEARNING & EVALUATING

In this section, the final evaluation stage of the Citizen Observatory is explained. How can the outputs and outcomes be assessed, and determine what requires enhancement? Has the Citizen Observatory achieved its goals and targets?

The Evaluation and Impact Assessment process focuses on measuring the outcomes of the pilot and identifying opportunities for improvement. Running in parallel with the piloting stage, it begins by reviewing the mission objectives and Key Performance Indicators (KPIs) in relation to the results achieved.

The first step is to define Key Performance Indicators (KPIs) and metrics. These are split into two types, as given below.

OUTCOME KPIs

These measure short-term results, like how many people joined a Citizen Observatory? Digital tools help track these numbers, such as through online registration systems.

IMPACT KPIs

These look at long-term changes, such as improvements in public awareness or policy influence.

The evaluation process adopted for the GREENGAGE project uses methods called **Criteria Indicators and Metrics (CIM) and ACTION method**, which help identify what should be measured and how. The focus is on understanding the real-world benefits and impact of GREENGAGE, especially for public services and citizens. Additionally, software testing was carried out, and continuous bug tracking was implemented by deploying an issue tracker system (Redmine). A thorough **privacy impact assessment** was performed to assess privacy concerns to ensure collected data and processing is compliant to GDPR and other Data Protection regulations.

Participants, and also CO managers, are invited to take part in various evaluation activities, including questionnaires, surveys, interviews, and usability testing. The collected data is analysed to assess the status before and after the implementation of a project, offering a comparative view of impact. Insights from this analysis are documented.

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LESSONS & RECOMMENDATIONS

USE COMMON TERMINOLOGY

Words like “engaged” or “involved” need better explanations, and definitions may not work the same for all observatories.

IMPACT KPIS OFTEN NEED QUALITATIVE METHODS

These may be interviews, focus groups, or open-ended survey questions, that help capture contextual insights, participant experiences, and nuanced changes that quantitative metrics alone may miss.

AVOID SPECULATIVE QUESTIONS

Some questions are too speculative, especially those asking managers to guess political impacts.

AVOID COMBINING MULTIPLE IDEAS

For example, asking whether science makes life healthier, easier, and more comfortable could be split into separate questions.

THE QUESTIONNAIRE NEED TO TAKE THE LOCAL CONTEXT INTO ACCOUNT

It is difficult to develop standardised questionnaires especially if citizens are involved, thus it is recommended to adapt the questions according to the targeted audience. For instance, questionnaires should be specific to Citizen Observatory context to ensure they are relevant and meaningful for participants.

TIME CONSIDERATIONS

Be mindful of the time participants volunteer to complete surveys, as lengthy questionnaires can lead to loss of interest and lower participation.

TAILORING THE QUESTIONS

Questionnaires should be tailored to the target audience to ensure relevance and inclusivity. Consider factors such as age group (e.g., young people or older adults), educational level, and language needs.

THINK ABOUT ACCESSIBILITY

To improve accessibility and participation, offer multiple formats for completing the questionnaire, such as paper-based, online, or mobile-friendly versions.



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TRAINING MATERIALS

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- GREENGAGE YouTube channel "GREENGAGE PROJECT"
<https://www.youtube.com/@GREENGAGE-project/videos>

GREENGAGE TECHNOLOGY

7

1





Sign-up for GREENGAGE Observatory

<https://me.greengage-project.eu/>


2

GREENGAGE App


Apple Store Google Play

GREEN Engine




<https://www.greengage-project.eu/green-engine>

GREENGAGE Dashboard



<https://superset.greengage-project.eu/>

GREENGAGE Backend



<https://console.greengage.dev/>

GLOSSARY

CONVERSATION STATION

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The Conversation Station is an assemblage of hardware, software and performance. It is applied to meet people where they are, invite them into an intimate auditive space where deep conversations can happen. With their consent, these are recorded to be turned into data and material for art. The first prototype was developed for and tested with Bristol Civic Observatory to bring community voices into research, campaigning and policy making.



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USE CASE

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A use case is simply a real life situation or challenge that a Citizen Observatory wants to explore together with the community. It describes what the issue is, who is involved, what citizens might observe or record, which tools help them do it and what will be the impact.

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THEMATIC CO-EXPLORATION

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Thematic co-exploration is a collaborative approach where citizens, scientists, and other stakeholders jointly explore a specific environmental monitoring theme by gathering, sharing, and analysing data (often using digital tools). Instead of experts working alone, everyone involved helps shape the questions, share observations, and contribute knowledge based on both scientific methods and everyday experience. The aim is mutual learning and shared understanding. Citizens become more informed and engaged, scientists gain local insights, and the results are often more relevant for communities and decision-making.

https://greengage-project.github.io/Documentation/thematic_coexploration_example/

DATATHON & IDEATHON

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IDEATHON

A facilitated “ideas marathon” where citizens, experts, and local authorities co-design innovative sustainability/regeneration solutions, supported by methodological/scientific expertise and often paired with hands-on monitoring/app testing.

DATATHON

A Datathon is a collaborative, one- or multi-day event where diverse participants analyse data, derive insights, make sense of analytics, and co-create ideas (similar to an Ideathon) to tackle challenges such as urban planning and civic innovation.

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GREENGAGE

ENGAGING CITIZENS - MOBILIZING TECHNOLOGY - DELIVERING GREEN DEAL

THE GREENGAGE CONSORTIUM



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