



DELIVERABLE

D1.6 Project Vision

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Introduction

This updated vision document builds upon Deliverable 1.1 Project Vision version 1 published in November 2021 at the early start of the COMPAIR consortium. The initial vision forms the basis confirmed and enriched through a participative session with the main stakeholders. During the first year of COMPAIR, a lot of new insights as a result of our collaboration gave us new insights and directions to ensure that COMPAIR will reach its initial goals. This updated version reflects these new insights and accents.

“COMPAIR will engage the entire urban value chain in pollution monitoring, analysis and mitigation, with a special focus on measures to increase the participation of people from lower socioeconomic backgrounds and geographic contexts with less developed citizen science culture e.g. Eastern and Southern Europe. Thanks to COMPAIR, local stakeholders will get a comprehensive, accurate and easily accessible view of pollution in places not covered by official monitoring stations. They will be able to see how they are individually exposed to pollution and what its broader impacts are, or will be in case of inaction, on the economy and environment. Leveraging these insights, members of the ecosystem including the quadruple helix will be able to co-create appropriate measures and strategies needed to set smart cities on a more carbon-neutral footing and reduce air pollution to levels that are considered safe for all.”

COMPAIR started with a visioning session organised at the kick-off meeting in November 2021 in Ghent. Two co-design workshops have been organised in each COMPAIR pilot location combined with two stakeholder landscape reviews with a citizen science and policy focus.

This document refines the initial COMPAIR vision, containing the vision building blocks and the vision statement, including the long-term north star vision¹. This vision translates the original EU project call topic “Enabling citizens to act on climate change, for sustainable development and environmental protection through education, citizen science, observation initiatives, and civic engagement” into the COMPAIR Description of Work (DoW) objectives. Based on the DoW objectives, specific tasks have been designed to translate the objectives into societal and ICT-driven tasks and solutions. The report describes the relationship between all these elements to a more tangible project “implementation vision”.

¹ The North Star vision is a long-term vision, one that is always there, provides direction, inspires, is clear and visible, and attained with incredible difficulty. It is not dependent on where you are today; it only exists in the future as a guide. Source:

<https://startgrowmanage.com/how-to-create-your-north-star-vision/>

1. COMPAIR vision

* *Changes related to the project vision version one are underlined.*

1.1 Vision Building Blocks

COMPAIR is a complex project enacting change over a number of different areas. The central defining vision elements are:

- **Urban value chain:** COMPAIR its multi-stakeholder collaboration exhibits high levels of trust and inclusivity, with grassroot communities, researchers, industry experts and policy actors working side by side to make the vision of zero pollution a reality. COMPAIR brings together members of the quadruple helix² actors to co-create effective solutions to mitigate air pollution and other related urban challenges. The pilots play a crucial role in testing how an effective urban value chain using the quadruple helix actors, can be created and maintained throughout the policy cycle.
- **Behavioural change:** COMPAIR stimulates behavioural change by increasing environmental awareness among urban inhabitants. Commuters, car drivers, home owners, business managers and even climate sceptics develop a well-rounded understanding of how their action and inaction contributes to, or helps mitigate, climate change and air pollution in the city. Better awareness encourages people to engage in citizen science initiatives and improve their environment, for example switching to more sustainable everyday practices, and participating in urban policy making processes. A multiple-factor evaluation of each pilot approach, including collective versus individual-oriented instruments and more awareness oriented versus action (e.g. policy) related instruments, will be part of the COMPAIR scientific analysis.
- **Technical change:** COMPAIR uses novel data collection and cloud calibration techniques as well as advanced data management processes to make citizen science data policy-ready³. COMPAIR also aims to realise good practices of connecting citizen science data to the European Data Space initiatives and local data-driven decision-making initiatives like Local Digital Twins. As a result, local and regional administrations have more fine grained information at their disposal to enact evidence-based policies. Moreover, as authorities trust the data quality they can and will use citizen science as an additional datasource for policy making as they know grassroot initiatives are working with, not against, them when it comes to air pollution.

² The Quadruple Helix approach can be seen as a co-creative innovation approach that recognizes four major actors in the innovation system: science, policy, industry, and society. In keeping with this model, more and more governments are prioritising greater public involvement in innovation processes.

³ Policy-ready data refers to the outcome of a data converting process providing the necessary context, relationships and quality assurance granting sufficient qualitative information to reach the required knowledge to answer policy questions and realise related visualisations with adequate reliability. This creation process can vary between reasonably simple to very complex big-data data management processes, including techniques to safeguard privacy.

- **Policy change:** COMPAIR unlocks insights from traditional and citizen science data by making information available through a Local Digital Twin. Not only does this help policy making become more data driven, experimental and forward-looking, it provides cities and regions with an enhanced capacity to monitor and simulate measures required to achieve carbon neutrality and zero pollution objectives within the framework of EU's Green Deal and the 100 climate neutral city missions⁴.

1.2 Vision Statement

The Vision Statement defines purpose and values of the project and will be used to help shape and guide the COMPAIR Consortium culture and delivery processes.

Inspired by its results, cities and regions across Europe are following COMPAIR's approach to tackle one of the most persistent 'wicked' challenges in the developed world: air pollution. Having tried to solve the problem with only public and private sector measures, new adopters are starting to realise that success is unattainable unless the full urban value chain works together. This requires setting up a multi-stakeholder platform where representatives of research and civil society work alongside government and industry to co-define and deliver on a collective approach to the problem.

From COMPAIR's best practice guide on stakeholder engagement, new adopters know that members of the quadruple helix community vary according to level of power and interest. While it might be tempting to dismiss groups with low power and low interest, these groups that are often related to lower SES (Socio Economic Status) absolutely need to be part of the action, otherwise the full urban value chain is present in name only. A truly inclusive space is one where not only high-level categories are represented (policy, industry, research, society), but also groups that traditionally have been excluded from decision making structures either by choice or due to their disadvantaged position e.g. low-income status, migrant background. A successful citizen science initiative would ensure that i) people with low interest, motivation or priorities at the beginning become supportive of project objectives as the initiative develops, and ii) those with low power are connected to and heard by those who can mobilise resources to catalyse change on the ground. COMPAIR will be successful if it can provide the five pilots with tools and skills for all stakeholders to participate and make them feel like they belong in a science project and that their involvement is valued.

COMPAIR will focus on new Citizen Science engagement strategies, cooperating with intermediary players like schools, social organisations, trusted peers and individuals, each with potentially different levels of engagement (e.g. support related to sensor roll-out, adapted education, new innovative tools integrating easy-to-understand and appealing gamification techniques).

Participation in several co-creation workshops with other stakeholders does not guarantee behavioural change. That is why COMPAIR will test a range of techniques and approaches⁵

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<https://op.europa.eu/en/publication-detail/-/publication/822ee360-c9bf-11ec-b6f4-01aa75ed71a1/language-en/format-PDF/source-256649647>

⁵ The techniques and approaches are typically tailored to the specific needs of the pilots. They can comprise co-creation sessions, education packages, and DIY-sensor construction sessions,...

to see which ones work best for different groups. Building on this knowledge, new local and regional initiatives leverage motivation and group dynamics to turn residents into more active citizens. Showing people that their actions matter, that data they collect will ultimately be used by public authorities to make better policies, provides a strong incentive in this regard. Additional measures can be used to convert specific groups, e.g. clear demonstration of privacy and security standards in project tools (people distrustful of tech and digital newbies), community awareness platforms that emphasise local effects of climate change (climate sceptics). COMPAIR believes that a combination of these efforts will increase the level of environmental awareness among city inhabitants substantially.

Armed with a more in-depth understanding of the complex relationship between lifestyle choices, air pollution and climate change, are door openers for people to abandon carbon-intensive activities in favour of greener alternatives gradually. Climate change and air pollution become issues that people hold dear and want to do something about, including by measuring them through low-cost sensors. Special attention will be given to the personal health impact element. However, the link between health and air quality will not be directly scrutinised in COMPAIR; existing scientific work will be used to give participants in CS initiatives the necessary insight into how both are related.

Once frowned upon by public officials, data collected by citizens now carry the policy-ready label. To achieve that, COMPAIR has to introduce several innovations aimed at improving data quality from DIY and portable measurement devices via new continuous evaluation techniques. The main ones include a new cloud calibration pipeline for continuous benchmarking to reference stations, as well as new processes to improve data curation, analysis, filtering and interoperability with third-party systems.

The integration of citizen science into policy making offers cities several advantages. It allows local policy makers to get a more complete view of pollution in urban micro environments. Trends and dynamics of ambient air quality can now be better assessed than before, when only one source of information was used i.e. data from official reference stations. Thanks to more accurate information, decision-makers can make a more precise assessment of its impact on human health, the economy and the environment and then use this information to respond accordingly with appropriate new measures. In addition to responding, a potential exists to strengthen and speed up policy-making cycles. For example, allowing quick assessment and steering of the effectiveness of policy measures.

COMPAIR's legacy lies in its novel monitoring framework, which combines, among other things, citizen science data and advanced decision support tools like advanced free accessible visualisation and policy monitoring and evaluation tools like policy dashboards, including Local Digital Twins. The COMPAIR framework provides a robust digital monitoring and reporting system for public authorities to understand the state of air pollution at different spatial and temporal scales. This information can be leveraged to find out whether KPIs to be achieved as part of the Green Deal, including additional localised objectives and corresponding KPI's, are being met and, if not, where additional progress is needed (pollution types, sources, sectors etc.), and how best to achieve it.

1.2 North Star vision

The North Star vision is a long-term vision, one that is always there, provides direction, inspires, is clear and visible, and attained with incredible difficulty. It is not dependent on where you are today; it only exists in the future as a guide.

The COMPAIR innovation project is designed to bolster citizens' capacity to monitor, understand, and change their environmental impact, both at a behavioural and policy level. It unlocks the power of the wider public, including people from lower-socio economic groups, to provide broad granular data around a central theme of air quality, complementing and improving the quality of official datasets and making new information useful, accessible and understandable to all. COMPAIR sees itself as an essential enabler to all quadruple helix stakeholders to contribute and help meet the overarching EU and global goals and strategies of the green deal, the EU Mission for climate-neutral and smart cities by 2030⁶ and the European Climate pact⁷ towards a carbon-neutral Europe.

COMPAIR leverages more specifically the opportunity provided by citizen science (CS) to:

- Increase the value of CS data through globally-relevant local urban use cases
- Enhance public participation in achieving Green Deal goals and targets
- Foster an open technical and policy environment that drives sustainable change.

2. Vision implementation

Implementing the COMPAIR vision via concrete implementation actions and contributing to the north-star vision at the same time requires an implementation methodology that translates the goals of the EU calls, the COMPAIR DOW and the input of the stakeholders into day to day actions.

2.1 Methodology

Starting from the original EU project call topic “Enabling citizens to act on climate change, for sustainable development and environmental protection through education, citizen science, observation initiatives, and civic engagement” objectives into the COMPAIR Description of Work objectives, a relation diagram was made to translate these objectives into the COMPAIR objectives. Based on the DOW objectives, specific tasks were designed to translate the objectives into societal and ICT-driven activities. The report describes the relationship between all these elements to a more tangible project “implementation vision”. The mindmap is a living document that will be updated during the project.

⁶ https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2591, The pilot cities of Athens, Flanders (Antwerp and Leuven) and Sofia are selected as climate neutral and smart city.

⁷ https://ec.europa.eu/commission/presscorner/detail/en/ip_20_335

The implementation vision consists of a translation into and interrelation between the call objectives⁸ and more detailed project objectives (figure 1). The second set of figures (figure 2 to 5) depicts the relation between the objectives and concrete project activities. Actions that contribute substantially to two or more objectives are depicted multiple times to enhance easy follow-up. The diagrams are the basis for the COMPAIR follow-up tools like the Jira task follow up and ticketing system.

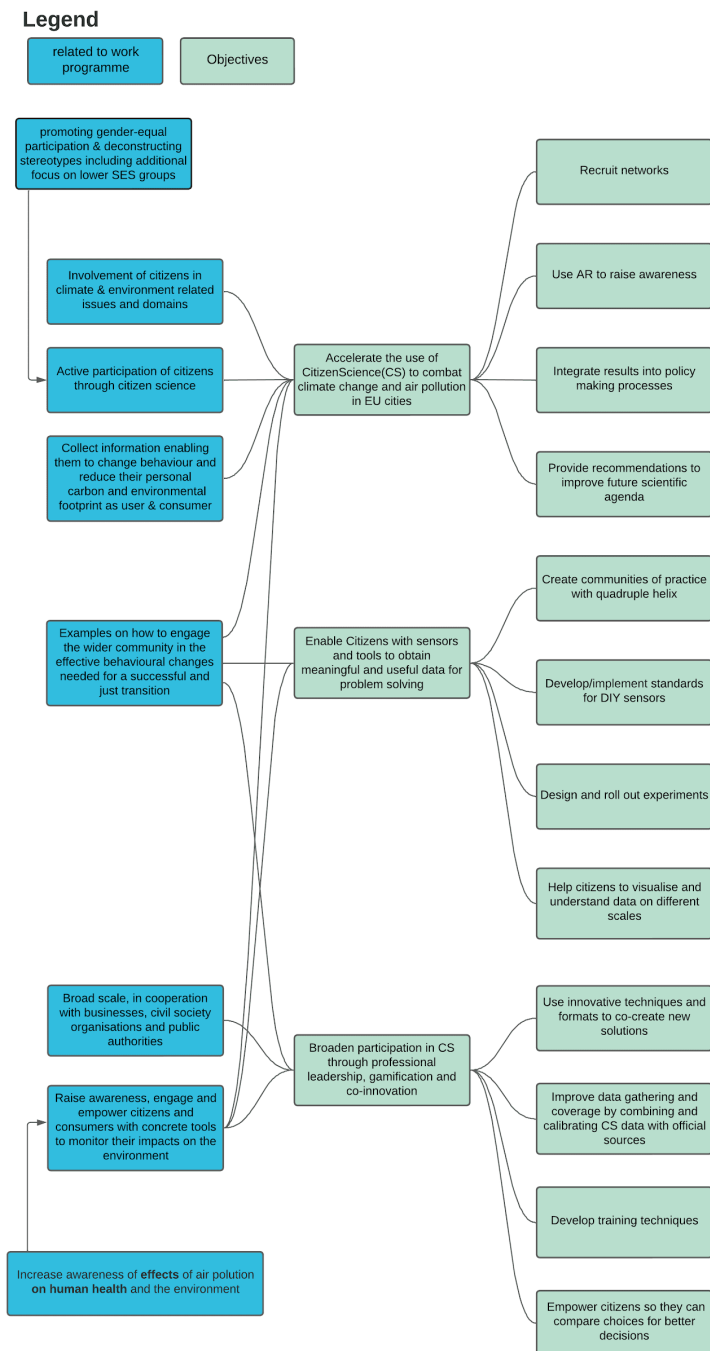


Figure 1: Relationship diagram depicting the call and project objectives and the COMPAIR software tool implementations and activities

⁸ LC-GD-10-3-2020 - Enabling citizens to act on climate change, for sustainable development and environmental protection through education, citizen science, observation initiatives, and civic engagement - https://cordis.europa.eu/programme/id/H2020_LC-GD-10-3-2020

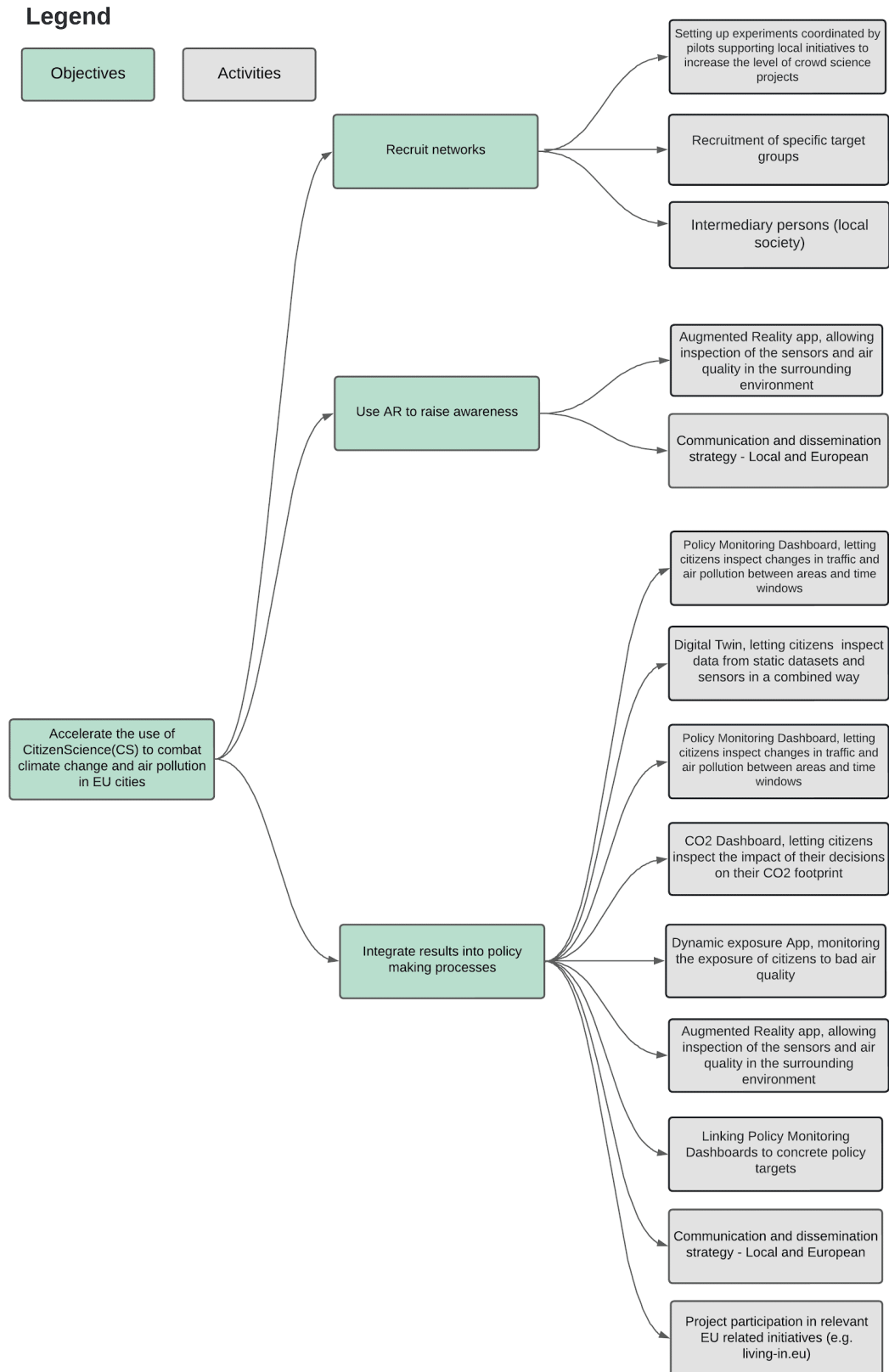


Figure 2: Relationship diagram depicting project objectives and the COMPAIR related activities 1

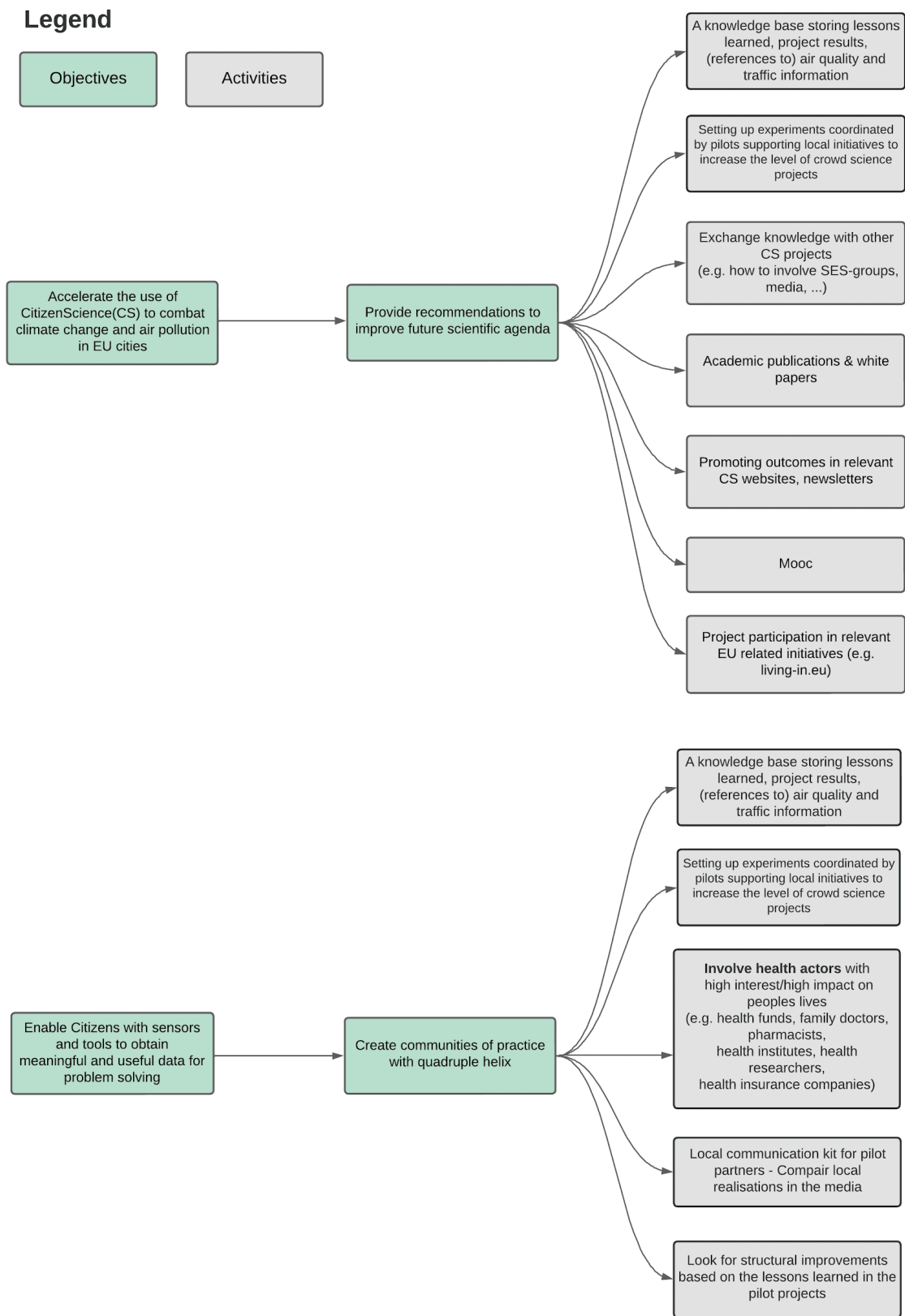


Figure 3: Relationship diagram depicting project objectives and the COMPAIR related activities 2

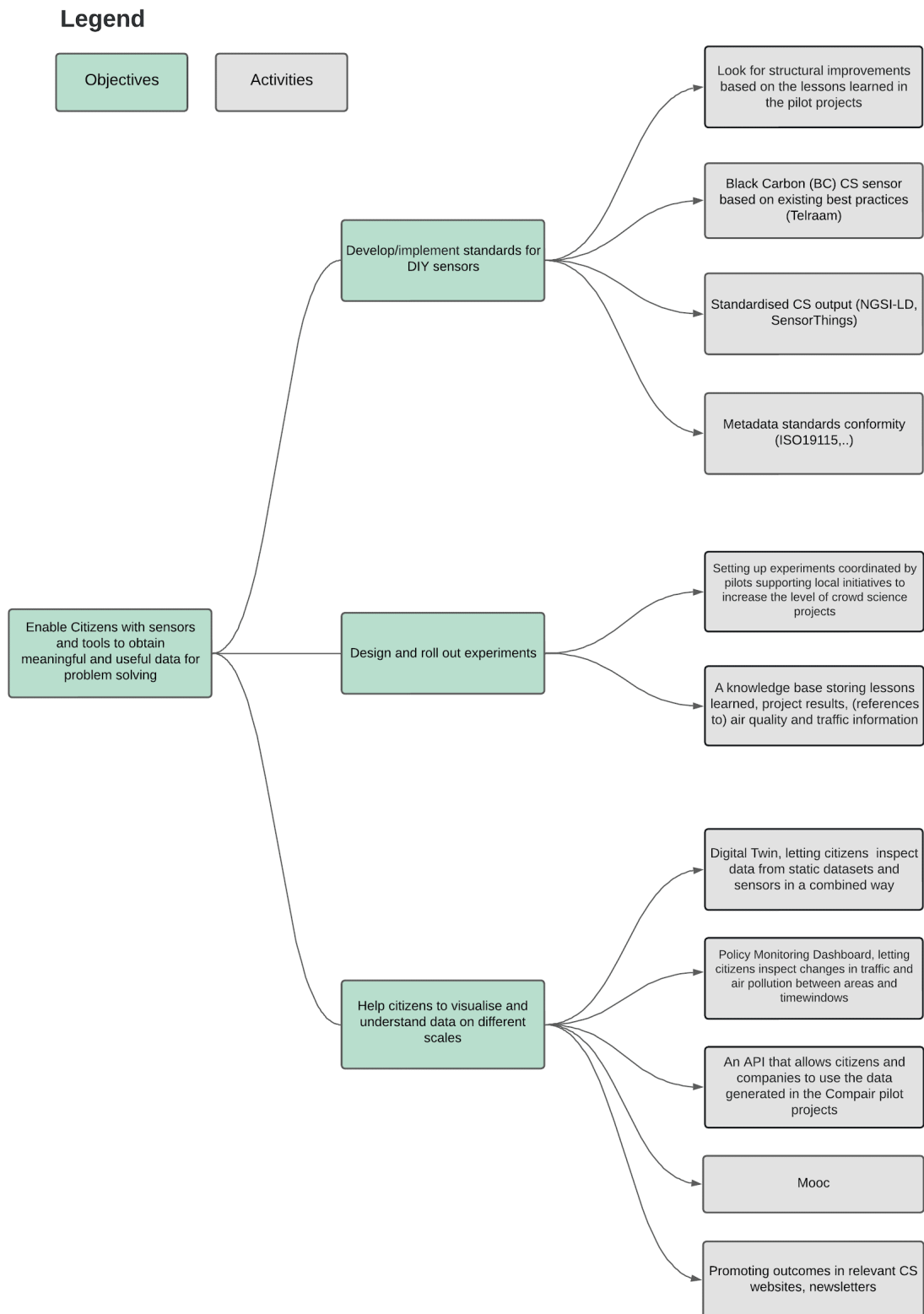


Figure 4: Relationship diagram depicting project objectives and the COMPAIR related activities 3

Legend

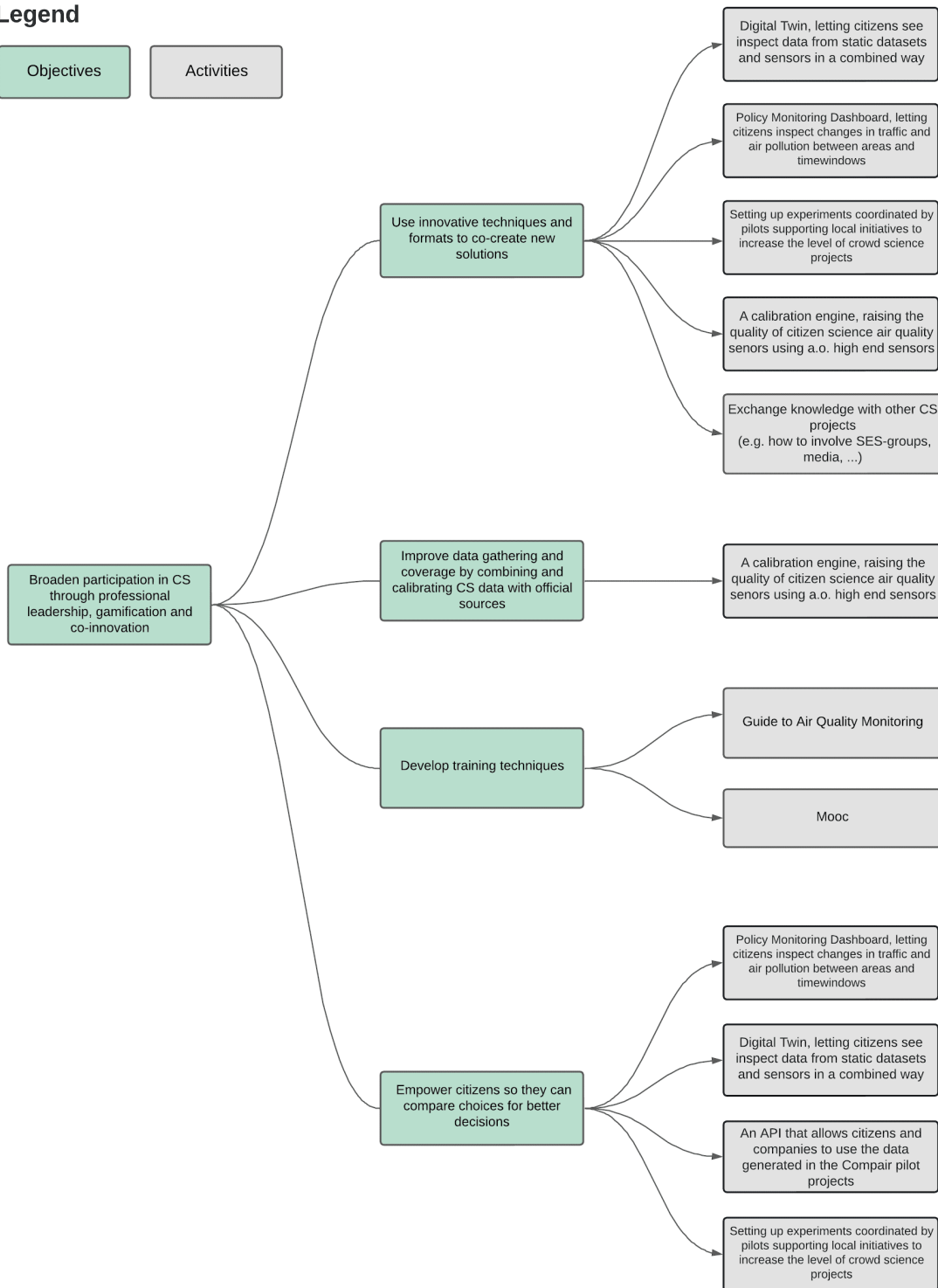


Figure 5: Relationship diagram depicting project objectives and the COMPAIR related activities diagram 4

The results of the above methodology will be further translated and drilled down into concrete actions like business, functional and technical designs refined in an agile way. This will be the case for technological developments and some non-technical developments. The continuous link with the COMPAIR and the call objectives will ensure that COMPAIR meets

its goals. At least two of the five COMPAIR pilots will use each of the COMPAIR developments to assure transferability and replicability (see table 1).

2.2. Product and dissemination activities implementation

The overview table below lists the major results and outcomes of COMPAIR related to the pilots and the moment the first results are expected to be available. If these outputs are directly related to specific pilot locations, this can also be found in the overview. Compared to the DOW, there are some shifts in focus in the different pilot locations towards COMPAIR solutions based on the outcomes of the stakeholder workshops. The yellow lines are new activities/planned outcomes.

Name	Description	Pilot Location					Status	Resp
		All	Athens	Berlin	Flanders	Sofia Plovdiv		
Augmented reality app	App enabling people to explore their surroundings via their smartphone or tablet camera, so they see a visual overlay of environmental information, including air quality	YEAR 2					Continuation	HHI
Improved telraam sensor	Improved connectivity, improved light-sensitivity	YEAR 1					Continuation	TEL R
Improved telraam sensor software	Improving telraam API introducing shorter measurement periods, smarter AI algorithms	YEAR 1					Continuation	TEL R
High quality Low-Cost NoX sensor	Realising a HQ low-cost NoX sensor usable by citizens	YEAR 2					Continuation	IMEC
Wearable HQ Low-Cost low energy air quality sensor	Sensor including GPS tracker to measure dynamic exposure	YEAR 1					Continuation	SODAQ
Citizen Science Black-Carbon sensor	Citizen Science Affordable Sensor measuring Black-Carbon - in cooperation with BC Meter Germany (Mr. Jonas Dahl)	YEAR 2					Continuation	BC Meter / COMPAIR partners
Policy monitoring dashboard	Dashboards (generic) helping users to understand and compare how environmental situations change under different actions	YEAR 1					New	ATC
Schoolstreet dashboard	Specific policy monitoring dashboard visualising impact of implementing a schoolstreet				YEAR 2	YEAR 2	New	ATC
Playstreet dashboard	Specific dashboard to measure the effect of implementing playstreets			YEAR 2			New	ATC
CS DIY sensor platforms support	Supporting and contributing to existing platforms like telraam and sensor.community (practical examples of its use for policy making and support)	YEAR 2					Continuation	All tech partners + 21C
Dynamic exposure dashboard	Dashboard Visualising fixed and dynamic air quality data in a user friendly and comprehensive way					YEAR 3	New	ATC/IMEC
Carbon footprint dashboard	Dashboard designed to support specific experiments around carbon footprints or intended footprint to any chosen air molecule		YEAR 2			YEAR 2	New	UAEG
Digital Twin dashboard	Advanced map/dashboard to connect existing public sector data, private sector data and CS data to support evidence based decision making	YEAR 1	YEAR 1		YEAR 1		Continuation	ATC
Project website	Project website, promoting the project, information about the scientific outcomes,...	YEAR 1					New	21C
CS MOOC	Massive Open Online Course, providing insights in the lessons learned and instructing interested people how to start their own green deal CS initiative	YEAR 3					New	21C/ECSA/UAEG/DV
Trainings	Workshops, seminars, training packages	YEAR 1					New	21C/TEL R/DV
Journals	Scientific articles about the project results	YEAR 2					New	UAEG/ECSA/DV/VMM
Dissimination to CS platforms	Best practice publications on Citizen Science platforms like ECSA, sensor.community, telraam and local CS platforms like Scivil (BE)	YEAR 2					New	21C, DV, PILOTS
Dissimination to Policy platforms	Best practice publications on platforms like e.g. Living-in.eu and network of local communities (e.g. VVSG, VNG in Belgium & The Netherlands)	YEAR 2					New	21C, DV, PILOTS

Table 1: Product and dissemination activities implementation overview

3. Conclusion

Having a clear vision is vital for any project that wants to leave a lasting impact. Within COMPAIR, we use vision to imagine how a better world would look if the project is successful. A picture with four impact areas emerges. It would be a world 1) where grassroots communities, researchers, industry experts and policy actors work side by side to turn the vision of zero pollution into a reality, 2) where people are increasingly aware of their impact on the environment, so much so that they abandon carbon-intensive choices in favour of greener alternatives and become actively involved in environmental monitoring as citizen scientists, 3) where public authorities use data collected by citizens with confidence, and 4) where cities and regions benefit from advanced decision support systems to check and ensure they keep on track to reaching the Green Deal objectives.

The vision statement is a lighthouse that will guide our efforts in the years to come, whether it's engaging with stakeholders, working on project deliverables, or motivating partners to go out of their way to make COMPAIR a success. That said, the original COMPAIR vision was further refined during the first year of the project and translated into practically applicable and relevant solutions. Internal changes within the project, ground-breaking results, major external shocks like the ones we have witnessed since 2020 all lead to necessary changes to the original version. A good example of new opportunities is the cooperation with promising citizen science initiatives like the Black Carbon, Raspberry Pi⁹ based, sensor that will be improved and used in the COMPAIR pilots in Flanders and Berlin as a new tool to support policy making. COMPAIR will strive to ensure its relevance, at least yearly reviewing the vision statement against the progress made, new insights and developments and any trends driving change locally and globally.

COMPAIR is designed to support bolstering citizens' capacity to monitor, understand, and change their environmental impact, both at a behavioural and policy level in the long term. Therefore it unlocks the power of the wider public, including people from lower-socio economic groups, to provide broad granular data around a central theme of air quality, complementing and improving the quality of official datasets and making new information useful, accessible and understandable to all via combined innovative tools and practices. COMPAIR sees itself as an essential enabler to all quadruple helix stakeholders to contribute and help meet the overarching EU and global goals and strategies of the green deal, the EU Mission for climate-neutral and smart cities by 203 and the European Climate pact towards a carbon-neutral Europe.

⁹ <https://www.raspberrypi.org/>