

‘Leiden City of Neighbourhood Knowledge’ (Leiden Buurt-Kennisstad)

Neighbourhood-led citizen science activities for policy and social innovation



LEGENDA

- | | |
|---|--|
| Dynamisch | ➔ Recreatieve verbinding naar omliggend landschap |
| Levendig | ➔ Versterken beleving historische route |
| Luw | ➔ Oude Rijn cultuurhistorische drager (onderdeel Limes) |
| ● Innovation District LBSP + Spoorzone | — Hoofdwaterstructuur |
| ● Levendige binnenstad | — Vergroten bestaande watergang |
| ■ Bedrijventerrein | ⊕ (Wijk)sportpark |
| ⊕ Potentiegebied (zie ook kaarten vestigingsklimaat en hoogbouw) | ⊕ Natuurhistorische locatie (locatie indicatief) |
| ⊕ Hart van de wijk | — Spoorweg |
| ⊕ Hoogbouwcluster | ○ Treinstation |
| ▨ Beschermd stadsgezicht | ⊕ HOV R-Net |
| — Groen-blauw raamwerk | ○ Potentieel nieuw treinstation |
| — Ringen en Spaken | ⊕ Gewenste Upgrade OV verbinding |
| — Tweede groene ring | ⊕ Autoluw gebied |

Contents

1.	General project information	3
2.	Problem analysis and impact	4
2.1	Problem analysis	4
2.2	Objectives and aims	7
2.3	Societal impact and/or scientific impact	8
2.4	Relevance to the NWA-Route	9
2.5	Connections	10
3.	Research plan	10
3.1	Research plan and work packages	10
3.2	Budget clarification	12
3.3	Planning	13
3.4	Risk management and contingency plan	14
4.	Data management	15
5.	Ethical aspects	16
6.	Literature references	16
7.1	Cited Literature & Sources	16
7.2	Relevant Publications by Applicants	17
7.3	Relevant Project Experience of Applicants	18

1. General project information

NWA-Route
Smart, liveable cities

Title of the project
Leiden City of Neighbourhood Knowledge (Leiden Buurt-Kennisstad) - Neighbourhood-led citizen science activities for policy and social innovation

Main applicant					
<i>First name, surname</i>	<i>Organisation</i>	<i>Appointment</i>	<i>Position</i>	<i>End date contract</i>	<i>Expertise (in key words)</i>
Margaret Gold	Leiden University,	Fixed Term	Other: Senior Researcher / Coordinator	31/12/2025 (employer statement attached)	Citizen Science, Co-Creation, Collaboration

Co-applicant(s)					
First name, surname	Organisation	Appointment	Position	End date contract ^D	Expertise (in key words)
Lara Ummels	Leiden University, Leiden Kennisstad	Tenured	Other: Coordinator	indefinite	Knowledge Broker, Multi-stakeholder Collaboration
Marieke van Haaren	Leiden University, Leren met de Stad	Tenured	Other: Coordinator	indefinite	Education Broker, Multi-stakeholder Collaboration

Cooperation partner(s)				
First name, surname, title(s)	Organisation	Type	Sector	Expertise (in key words)
Steef Löwik	Gemeente Leiden	Governmental organisation	Government	Governance, Policy, Economics
Anne Marie van Dam	Stichting Ideewinkel	Citizen Initiative	Other	Circularity, Sustainability
Jeroen Schrama	Coöperatie Duurzaam Leiden	Citizen Initiative	Other	Circularity, Health, Sustainability, Energy Transition
Maarten Stoffers	Netwerk Leiden Sneller Duurzaam	Citizen Initiative	Energy	Circularity, Sustainability, Energy Transition
Anja Ditewig	Incluzio Leiden	NGO	Healthcare	Social services, social innovation
Tjitske Veldkamp	Energiek Leiden	Cooperative	Energy	Energy transition
Frederic Lens (Dr.)	Leiden Biodiversity Network (Naturalis)	Academic / societal partnership	Other	Biology, Environmental Sciences

Summary of the project budget	
	Amount in €
Requested from NWO	€ 100,000
contributions co-funders (if applicable)	in cash: € n/a
	in kind: €60,622
Total project budget	€160,622

2. Problem analysis and impact

2.1 Problem analysis

The Global → Urban Problem - Society is faced with complex urgent issues that negatively impact the urban living environment and require multi-stakeholder collaboration to tackle effectively and sustainably.

As a society we are faced with a range of complex interrelated issues that are increasingly urgent (as shown in Fig. 1), which require all sectors of society to be working together in an era of low-cooperation and tough trade-offs that risk eroding climate action, human development and future resilience^[1].

The world is also becoming increasingly urbanised, placing cities at the forefront of the required transitions in how we live, work, consume and play. Within the EU, 75% of European citizens live in cities^[2] and the Netherlands has a high level of urban land cover^[3]. This not only leads to cities containing a disproportionate percentage of the general population, but they also have a disproportionate impact on the environment - the European Commission estimates that cities around the world account for more than 70% of global CO2 emissions for example.^[2] The complex urgent issues facing all of society thus have a heightened impact on the urban living environment, from climate change and the energy transition, to conflicting demands on land-use for housing, industry and recreation^[4].

Global Risks Report 2023

Global risks landscape: an interconnections map

WORLD
ECONOMIC
FORUM

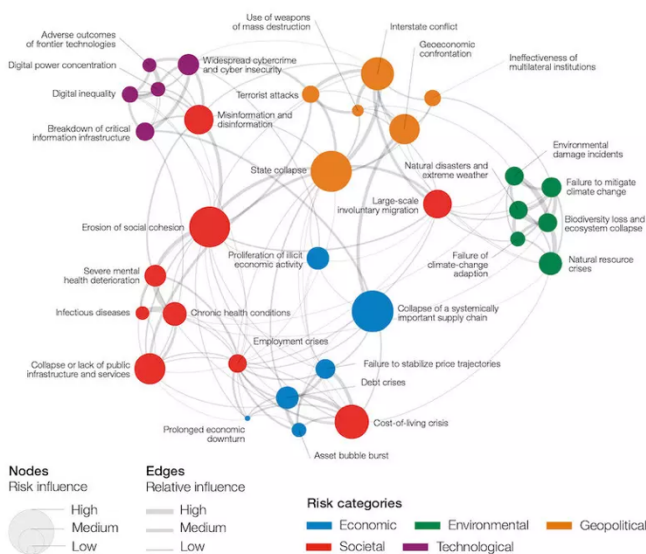


Figure 1: World Economic Forum, Global Risks Perception Survey 2022-2023^[1]

This situation is counterbalanced by the important role that cities play as centres of economic activity, knowledge generation, social innovation and the development of new technologies. Cities are critical to achieving the transition to a low carbon, resource-efficient and ecosystem-resilient society, and have the potential to be healthier, denser, greener and smarter through better urban planning and governance.^[5] Achieving this potential requires a multidimensional approach that embraces new forms of collaboration and partnerships between society, government, academia and industry^[6]. Designing effective policy and actions for achieving the necessary transitions also require the engagement of society with regards to behaviour / consumption pattern changes and local level actions such as citizens' initiatives. It is therefore crucial to bundle knowledge and action from across all domains of science, together with stakeholders from across all sectors of society, with recognition of the environment as a key stakeholder - i.e. the Quintuple Helix model of innovation^[7] (see Fig. 2 below). By operating collectively and collaboratively, the interaction and knowledge exchange between the education system, economic system, natural environment, civil society, and the political system create a win-win situation between ecology, knowledge and innovation^[8].

The Urban → Local Problem: Strengthening and connecting local bottom-up actions in collaboration with other stakeholders across the Quadruple Helix (i.e. Academia, Government, Industry, and Civil Society)

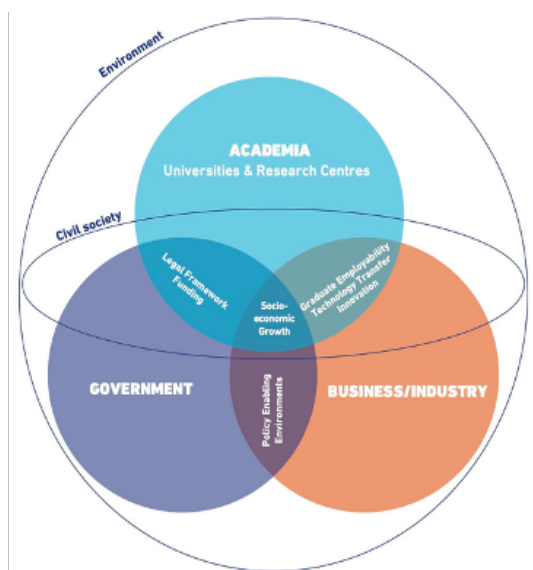


Figure 2: Illustration of The Quintuple Helix. [7] Image Source: Paeridigms

For many people these urgent issues can feel quite large, overwhelming, and beyond their ability to act. Researchers are finding that by reframing climate change issues as directly tangible local issues makes them easier to understand, relate to, and act on^[9]. And instead of large-scale top-down actions which can be met with resistance (such as the reaction of farmers to policies to reduce nitrogen), facilitating and nurturing bottom-up and fully collaborative actions at the local level can lead to small but high-impact interventions that add up over time^[10]. The encouraging countertrend is the increased number of citizen's initiatives and civil society organisations that can be found in many urban areas. By bringing our scope of focus in this project right down to the local level, even to the level of neighbourhoods within the city, we can also scale down our problem statement to focus on the challenges that city residents and citizen-led initiatives face in terms of viability, longer-term continuity, and the scale of impact that they can accomplish on their own.

The Knowledge Gap: Given the urgency and complexity of urban issues such as climate change impacts, the energy transition, and the need for a healthy living environment, paired with the need to act collaboratively across all sectors of society to tackle these effectively, **how can we most effectively establish partnerships between public, civil and academic actors that: (A) engage** with residents on the issues they find most locally relevant, **(B) deepen** this engagement into more active participation in local dialogue, and data and insight gathering (i.e. Citizen Science) **(C) align** aggregated data with policy-making and urban planning processes such that these data and insights can lead to data-informed actions, **(D) establish** a sustained collaborative partnership between residents, citizens' initiatives, civil society organisation, the municipality, and knowledge institutes (i.e. both research and education) that leads to co-created (and implemented) sustainable solutions to addressing these challenges, with attention for the pledge **to leave no one behind?**^[13]

Our overarching research question is: How can we collectively form effective collaborations and partnerships between public, civic and academic actors in the city, that lead to impactful actions and interventions for a sustainable, healthy living environment that are underpinned by citizen-gathered data and insights.

The Opportunity - experiments in participatory governance and citizen science are maturing.

Over the past decade, great advances have been made in applying innovative participatory governance and citizen science research practices across a wide range of domains of research. These have involved increasing numbers of citizens in monitoring, observing and co-researching societal issues such as climate change impacts on the environment and public health, sustainable mobility, and plastic pollution in rivers and oceans. Important outcomes have been achieved, from fundamental scientific discoveries to data that support evidence-informed policy^[11]. The field of Citizen Science as a practice has also been making great gains in understanding multi-stakeholder engagement and participatory dynamics, and effective methods for aligning motivations and objectives in shared actions paths. Recent work conducted by the Citizen Science Lab, the lead applicant for this project, has for example highlighted two key challenges related to the above research question, namely: (1) the government often decides to cooperate with social initiatives based on its own goals, whereas supporting and strengthening social initiatives requires that connections be made with existing initiatives in society and supporting *their* goals with connections back to the policy-making and planning

processes and (2) rather than attempting to scale up social initiatives, which conflicts with the local and decentralised nature of social initiatives, the focus should be on developing and strengthening these initiatives such that they can share insights, knowledge and working structures between each other^[12].

Furthermore, the movements towards participatory democracy and open data are resulting in growing awareness of the value of citizen-generated data towards making better decisions, which can only be truly unlocked if it is re-used, shared, and aligned with decision-making processes. Citizen-generated data can fill in data gaps (both temporal and geographic), add contextual and local-knowledge insights to data, encourage collaborations between data gatherers and data consumers, and create new opportunities to contribute to better decisions with positive social impacts.

The Innovation - The '**Leiden City of Neighbourhood Knowledge**' project has a '**citizen-led**' character that enables residents of Leiden to express which healthy & sustainable living environment issues are most important in their neighbourhoods and participate in **citizen science activities** that provide **data and insights that can inform policy, planning and local actions**. In doing so we seek to embed these activities within the 'Leiden City of Knowledge' partnership (Leiden Kennisstad) between the Municipality and the Leiden Knowledge Institutes (and their students), and expand it to encompass residents, neighbourhoods, existing grassroots initiatives, and civil society organisations, such that all are working collaboratively towards a sustainable, healthy living environment for all residents of the city.

The Context: Omgevingsvisie Leiden 2040 & the Leiden Kennisstad Partnership.

We have chosen the City of Leiden as the focus point for our approach, not only as the home base of Leiden University and our 'Leiden City of Knowledge' partnership together with the other Higher Education Institutes and the city, but also due to the City of Leiden's vision for a healthy and sustainable living environment that includes the residents of the city. Published in November 2021^[14], the Environment Vision (Omgevingsvisie) Leiden 2040 describes the basis for the future of the city structured around four themes: (1) a green blue framework, (2) an attractive business climate, (3) sustainable mobility and (4) "Bodem als Fundament" (referring to the ground itself as the foundation of the city - covering the topics of energy transition and water management). Each theme includes

long-term choices and ambitions for the future of the city, which were contributed to by residents of the city, and are to be further developed in collaboration with residents and businesses in the city (see the Vision goals outlined in Figure 3).



Figure 3: The goals of the Leiden Vision 2040, the 3rd of which is to invite the city, its businesses, developers, residents and societal partners to collaborate on city projects. ^[14]

The Leiden environmental vision uses the same broad concepts as the national Environment Act: defining the natural environment as bodies of water, natural landscapes, and agricultural landscapes, and the built environment as cities, villages, business estates, networks and infrastructure for the movement of people, goods, data, substances and energy, and cultural heritage. Besides the physical living environment, social themes are also included in this environmental vision, as they are inextricably linked.

The City of Leiden has identified a number of specific challenges facing it that are common of many urban areas, namely: increased urbanisation, smaller households, population growth, an ageing population, the elderly remaining longer in their homes ('extramuralisering'), a changing climate, diminishing biodiversity, the

need to transition to sustainable energy and a more circular economy, the move to a sharing economy (such as car-share schemes) that have implications for land-use, increased flexibility of work space and time that have implications for office space and transport, ongoing digitalisation and new emergent technologies such as AI, soil and foundation subsidence, and growing economic inequality and inequality of opportunity. ^[14] Many of these issues are also closely interlinked and inevitably complex.

2.2 Objectives and aims

'Leiden City of Neighbourhood Knowledge' (LCNK) aims to build a collaborative partnership between the city, the research institutes, its residents and civil society organisations through citizen science activities supported by science and expert knowledge. In doing so, our objectives are to:

- (1) Bridge the Gap** between the scale of the globally urgent challenges and the daily realities of working, studying, social and recreational life in the city
- (2) Create new opportunities** to engage, participate, and act on topics of urgent importance at the local level in meaningful ways,
- (3) Gather relevant data and insights** via citizen science approaches that can feed policymaking, planning and citizen-led actions, and
- (4) Increasing the diverse and representative inclusion** of city residents in policy and planning processes that impact their living environment and daily lives, in a more equitable fashion, and as valued partners.

Following on from the knowledge gaps identified in section 2.1 and the need to act collaboratively across all sectors of society to tackle these urgent effectively, **our aims are to:** **(A) engage** with residents on the issues they find most locally relevant, **(B) deepen** this engagement into more active participation in local dialogue, and data and insight gathering (i.e. Citizen Science) **(C) align** aggregated data with policy-making and urban planning processes such that these data and insights can lead to data-informed actions, **(D) establish** a sustained collaborative partnership between residents, citizens' initiatives, civil society organisation, the municipality, and knowledge institutes.

Aim A: ENGAGE with residents on the issues they find most locally relevant	KPI: Min. 4 distinct neighbourhoods engaged in public input-gathering events; min. 15 people per neighbourhood attending, follow-up event in all locations
Aim B: DEEPEN this engagement into more active participation in Citizen Science)	KPI: identify alignment with work of Civil Society organisation, min 4 distinct Citizen Science investigations launched in partnership with min. 1 citizen's initiative each, min. 50 people engaged in data/insight gathering in each
Aim C: ALIGN aggregated data with policy-making and urban planning processes such that these data and insights can lead to data-informed actions	KPI: correct related municipal departments identified, and conversation held to identify data alignment potential, follow-up actions agreed on
Aim D: ESTABLISH & EMBED a sustained collaborative partnership between residents, citizens' initiatives, civil society organisation, the municipality, and knowledge institutes	KPI: min 2 related study programmes identified with 'Leren met de Stad', identify opportunities to 'mainstream' the approach within each of the Leiden Kennisstad partners, identify requirements, and agree on follow-on actions.

2.3 Societal impact and/or scientific impact

Major societal challenges can only be solved if scientists and policymakers work together with wider society. Mutual trust and removal of (perceived) power relations are essential for this. In the '**Leiden City of Neighbourhood Knowledge**' project we do this in a 'citizen-led' way - empowering residents to influence the policy agenda by researching key issues themselves and contributing data and insights to policy design. By actively inviting people within their own neighbourhoods, we hope to remove some of the main barriers to more inclusive and representative participation. To this end, collaboration with the Municipality is crucial.

The Citizen Science approaches that will form the heart of the project activities will make a number of levels of participation possible - from contribution of environmental or biodiversity monitoring data to research and policy processes, through active collaboration and co-design of data-informed actions and interventions led by policymakers, to entirely citizen-led initiatives and innovations. We also aim to deliver (at least in part) on the high potential of Citizen Science to contribute to learning about the processes of scientific enquiry and outcomes, and the complex interactions between humans and our living environment (such as the impacts of our actions on air quality, nature, etc) and to encourage and foster citizen stewardship on these topics. Furthermore, the co-production of both research and interventions can strengthen trust and cooperation between members of society, academia, and governing bodies or authorities. Grass-roots initiatives that are embedded in the local context, can further empower local residents to co-create social innovation and social change. We thus seek community benefits that include a healthier, greener (and bluer) living environment alongside scientific outcomes, broadening the innovation potential from a socially driven community perspective.

Citizen Science can give citizens a greater role in research on pressing urban issues such as climate change and its impact on a healthy living environment - but these practices only have real impact if they are also incorporated into policy and decision-making processes. Our project offers an innovative approach to achieving this by aiming for :

1. an equal partnership between the city, its residents, civil society organisations, and local knowledge institutions;
2. driven by the interests of the residents themselves, on issues of greatest concern in their own living environment;
3. through citizen science surveys that gather insights and data;
4. to better inform and underpin collective actions, neighbourhood decisions and city policies that can address urgent social problems more effectively,
5. with a 'For and By Neighbourhoods' model to remove barriers to participation, and achieve a much more diverse and inclusive participation that better reflects the demographics of the city



De 6 principes van CoAct, voor het implementeren van een participatieve benadering van co-evaluatiepraktijken in de burgerwetenschap, ten behoeve van sociale impact en duurzame sociale transformatie.

CO-EVALUATION during the project. Because collaboration and co-creation with citizens and societal actors is at the heart of our approach, we will iteratively update the project approach based on input and feedback from these key stakeholders. This will be achieved by developing a co-evaluation process together with the participants, based on the CoAct Methodology^[15]. When people engage in research that affects their daily lives, they should be able to define together the expected outcomes of the scientific process and think collectively about how the fulfilment of these expectations can be tracked and measured. We therefore do this in a participatory way to define how success should be defined, actively involving all actors involved as competent co-evaluators

IMPACT-LAB INSTRUMENTS for public engagement with science.

During all public engagement events (from dialogue to co-creation) we will apply the practical impact measurement tools and instruments of the ImpactLab (impactlab.sites.uu.nl/) developed by Science Communication researchers at Leiden University and Utrecht University to systematically and easily map what the public activity has brought about. The results of the co-evaluation and ImpactLab evaluations are directly incorporated into the ongoing project approach in an iterative manner.

FINAL EVALUATION: Researchers from the Citizen Science Lab will note their observations on the different levels of participation and room for co-creative inputs between the various CS approaches, and add these to the co-evaluation results and ImpactLab tool results, focusing on four key dimensions: (1) does dialogue and facilitated co-creation lead to deeper and more diverse engagement on the topics of a sustainable, healthy living environment in the city, (2) do the data and insights gathered in the citizen science activities lead to new policies, planning decisions, or citizen-led actions?, and (3) do participants develop scientific knowledge, skills, interest, curiosity or incentives to change their behaviour in any way?



De ImpactLab Tools bestaan uit een Basisinstrument om goed van start te komen, en Toolbox van templates en methoden, een Beslisboom om de selectie daarvan te helpen, een Handleiding voor analyse & rapportage, en een Impactplan werkblad om het overzicht te houden.

2.4 Relevance to the NWA-Route

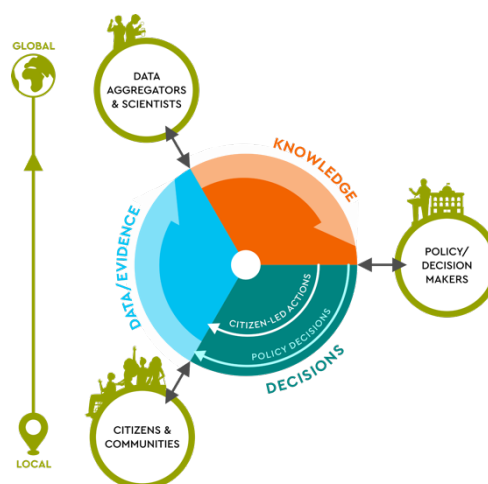
The '**Leiden City of Neighbourhood Knowledge**' project takes a multidisciplinary and multi-stakeholder approach to collaboratively addressing the complex challenges facing cities (especially given the climate crisis and socio-political unrest) by forming a stronger and embedded partnership between societal actors (residents, societal initiatives and civil society organisations), the city, and knowledge institutions (both research and education), working together towards a sustainable, healthy living environment. In doing so, our work aligns with the three game changers identified in the Smart, Liveable Cities programme:

1. Data Commons - data and insights collected by citizens in participatory research initiatives are shared according to FAIR and CARE principles, remain the property of the contributor and follow agreed metadata standards so that they are shareable and interoperable across platforms (both for Citizen Science and policy). Involvement in citizen science activities as co-researchers and co-analysts of the data also strengthens data literacy and digital citizenship.

2. Citizen Empowerment - allowing city residents to determine what to research together not only focuses attention on the issues most important to them, but the data collected can also inform individual action, decision-making, and collective action. Influencing what is researched and what knowledge is collected is a powerful way to put key issues on the agenda.

3. Resilient Design - collecting data and insights locally deepens the understanding of the local context for residents, policymakers and the local business community. New policies and social innovations can respond to local needs based on that data, and be adapted based on changing circumstances, e.g. the effects of climate change.

The substantive innovation in this project entails building a public-civil partnership with well-supported cooperation between multiple stakeholders in the urban context, which is based on common goals, values and a shared language that together create a culture of trust. The intended outcomes of this partnership are that residents and societal actors are engaged in identifying issues and gathering data and insights



that underpin policymaking and citizen-led actions for a sustainable, healthy living environment. By engaging residents, citizens' initiatives and civil society organisations in the collecting and sharing of knowledge via citizen science approaches, on locally relevant topics for a sustainable, healthy living environment, this project aims to build a robust multi-stakeholder collaboration that empowers city residents to generate, share, and maintain specific knowledge about the human and natural worlds that is aligned with processes of academic research at one end and data-informed policy making at the other end. We thus aim to improve agency for residents citizen initiatives and restore the power balance between citizens and governments, in working collaboratively towards achieving improvements to the urban living environment in keeping with the urgent transitions required of society.

2.5 Connections

The **'Leiden City of Neighbourhood Knowledge' project** primarily focuses on making the connection between existing partnerships and initiatives in a more robust way, connecting science and policy with residents, citizen's initiatives and civil society organisations. This not only allows the multi-directional flow of interdisciplinary knowledge and know-how paired with data and local insights, but also aligns these more closely with policymaking, decision making and action taking processes that contribute to a sustainable and healthy living environment.

For the **long-term sustainability** of this approach, we embed the strengthened academic-civic-public relationship within the Leiden Kennis Stad partnership, and thematically related partnerships (depending on emergent themes) such as the Leiden Biodiversity Network. Together with these partners continuity will be sought in terms of governance, knowledge exchange and transfer, finance and resources, social embedding, and policy and planning processes.

The long-term evolution of this approach is embedded in the Leren Met de Stad project within Leiden Kennis Stad, which connects students in various study programmes at the higher education institutes in Leiden (primarily the University of Applied Sciences), with residents and neighbourhoods on topics of local relevance related to their studies, forming an active internship in service to the city.

Unexpected Connections - The project is designed to be responsive to the issues identified by residents in the neighbourhoods in Leiden, leaving room for serendipity, innovation and co-creation in unexpected directions. Connections will be sought between the emergent themes and initiatives across the city at various levels, and different actors brought together in conversation to seek synergies and together define next steps.

Dissemination - Learning captured throughout the project will be shared with the Citizen Science community of practice in the Netherlands via the Citizen Science Nederland network (CS-NL) and the European Citizen Science Association (ECSA) and its knowledge hub platform EU-Citizen.Science. Learning will also be captured in shared with the City Deal Agenda Stad network (<https://agendastad.nl/city-deals/>) and the Dutch municipalities network Vereniging van Nederlandse Gemeenten (VNG) (<https://vng.nl/>)



Leiden
Kennisstad

Samenwerkingsovereenkomst
2023-2027



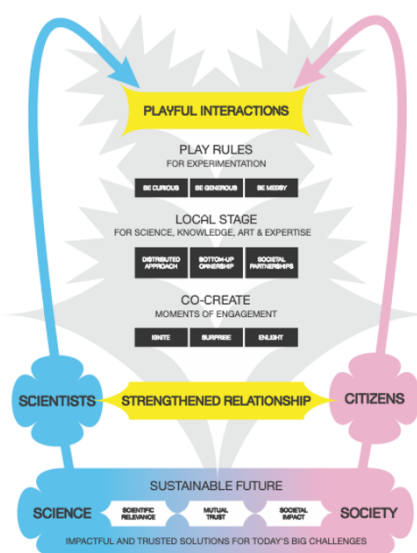
3. Research plan

3.1 Research plan and work packages

Our approach for **collectively forming a stronger collaborations and partnerships between public, civic and academic actors in the city towards achieving a sustainable, healthy living environment (i.e. the research question)** is to break the aims described in section 2.2 above (A. engage, B. deepen, C. align, and D. establish and embed) into the following phases of the project:

1. Planning a 'roadshow' through neighbourhoods and community centres, mapping the goals and interests of citizens through a 'community mapping' technique that visualises the most relevant environmental and living environment issues in their neighbourhood,
2. Linking the emergent themes and topics to the activities of local citizen's initiatives and civil society organisations to seek alignment and better community anchoring,
3. Seeking the alignment of these themes and potential Citizen Science approaches with the Research & Analysis Team and the Participation programme managers of the Municipality of Leiden such that relevant data and insights can make a contribution towards policy and decision-making processes,
4. Also seeking alignment with student programmes in the Leren met de Stad (Learning with the City) programme,
5. Launching the selected Citizen Science initiatives with the partnerships that have developed around them, following co-defined pathways and objectives,
6. Investigate how we can sustainably embed this initiative in existing partnerships together with the City.

OUR METHOD: Building on the Legacy of the European City of Science Leiden 2022



The community-mapping roadshow method described in step 1 invites residents of the neighbourhoods of Leiden to indicate which issues are most important for them to explore themselves, with local partners such as existing grassroots initiatives, civil society organisations, students, the municipality and scientists at knowledge institutions. This method implements a proven community-mapping technique developed over the years by organisations such as Mapping-for-Change in London and the Waag Smart Citizens Lab in Amsterdam to let people be part of setting the policy agenda for the most important nature and living environment issues in their own neighbourhood.

The Citizen Science Lab first piloted this method during the year that Leiden was the European City of Science, with four small community-mapping pilots in different neighbourhoods. These events took place as part of the 365-day 'Knowledge through the Neighbourhoods' programme - a low-threshold, bottom-up method of public engagement with science to create new interactions between scientists and citizens in the 101 neighbourhoods of Leiden and the surrounding region.

The 'Leiden2022 model' delivered not only more connection, but also more appreciation for, interest in and trust in science, by stepping out of the ivory tower and into the city's neighbourhoods - half of the participants of Knowledge through the Neighbourhoods attended scientific activities within walking distance of their homes, 20% had never participated in a scientific activity before, and 55% said that participation had made them more confident in science. Our own experience during Leiden2022 showed us the value of the discussions taking place around the map, and the power of the map itself to show the municipality what matters most to its residents.



The Partners - This project is conceived by the Citizen Science Lab at Leiden University, which is a member in both the Leiden Kennis Stad Partnership and the Leiden Biodiversity Network with the aim of seeking a better alignment between the knowledge institutes (both research and education, via researchers and students) and active citizen-led initiatives on related topics, paired with both policy makers and local Civil Society Organisations. A side effect of the co-creative approach is that we cannot yet say who the most relevant partners will be.

However, our intention is to support and strengthen existing grassroots initiatives and civil society organisations - as these are crucial for a good social anchoring of this project - so linking research themes to practice and knowledge partners is built into our project approach. These intentions to seek a closer alignment and collaboration on topics that we expect will have a high relevance for residents (and have already been identified by the City of Leiden as being core to its Vision 2040) have been brought together in the supporting partnership to the project. These partners are the Stichting Ideewinkel, Coöperatie Duurzaam Leiden, Netwerk Leiden Sneller Duurzaam, and Energiek Leiden.

3.2 Budget clarification

Personnel Budget: €82,500 total

- **LEAD APPLICANT Project Coordinator, Margaret Gold, Citizen Science Lab, Leiden University** (0.1 FTE x 24 months)
 - in-kind value at CAO scale 13 = €26,848
 - **Role** = *Coordination and support of the whole project, overseeing the Citizen Science approaches and dialogue methods, making the connection with existing projects and related scientists, helping develop guidance documentation, supporting co-evaluation & monitoring.*
- **Project Manager / Citizen Science Community Manager, Citizen Science Lab Staff Member, Leiden University** (0.6 FTE x 24 months)
 - **budget = €82,500** (i.e. what is left over of €100k after taking care of material costs and supporting partners first)
 - in-kind top-up value at CAO scale 11 = €116,274 total - €82,500 budgeted = €33,774
 - **Role** = *Managing the project day-to-day, planning and executing events, overseeing all communication with partners, and bringing partners together in joint discussions on next steps.*
- **JOINT APPLICANT Leiden Kennis Stad Coordinator, Lara Ummels, Leiden University** (in-kind)
 - **Role** = *Coordinating the cooperation with the knowledge institutions in the Leiden Kennis Stad partnership, making introductions to relevant projects & initiatives in the city, helping align Citizen Science topics with relevant parties, helping seek long-term embedding.*
- **JOINT APPLICANT Leren met de Stad Coordinator, Piet-Hein van der Ploeg, Hogeschool Leiden** (in-kind)
 - **Role** = *Coordinating the collaboration with students in the Leren met de Stad programme, introduction to relevant study programmes, helping align neighbourhood identified topics with relevant study programmes, helping seek long-term embedding*
- **SUPPORTING PARTNER Gemeente Leiden Coordinator, Steef Löwik** (in-kind)
 - **Role** = *Coordinating the collaboration with the Municipality, making introductions to relevant departments and municipal colleagues, helping align Citizen Science data & insights with relevant policy processes, helping seek long-term embedding.*

Materials Budget: €17,500 total

- **STUDENT STAGIAIRES Leren met de Stad, 'Spreekuur Een Goede Buur'. Hogeschool Leiden** (0.1 FTE x 24 months)
 - **budget = €5,000** (project contribution towards 'stage vergoeding' received by the students)
 - partially in-kind
 - **Role** = *Helping gather the interests, needs, concerns and questions expressed by residents in*

the various neighbourhoods regarding a healthy living environment, inviting residents to join the project's activities, getting involved in the activities themselves where they tie in with their own student projects.

- **SUPPORTING PARTNERS** Inluzio Leiden (Anja Ditewig) and Buzz Leiden (Kirsten Zitman)
 - **budget = €1,000** to cover the costs of booking the Buurthuizen for community-based events, and communication support towards local residents (Inluzio)
 - **budget = €1,000** to cover the costs of communication support towards local residents and alignment with the activities of local societal initiatives (Buzz)
 - **Role of Inluzio and Buzz partners** = *Supporting the event series planning in the neighbourhoods, helping connect with ongoing initiatives, supporting communication to residents and community initiatives, joining conversations about relevant data and insights and how they can contribute to either local or Gemeente actions.*
- **SUPPORTING PARTNERS** Stichting Ideewinkel (Anne Marie van Dam), Coöperatie Duurzaam Leiden (Jeroen Schrama), Netwerk Leiden Sneller Duurzaam (Maarten Stoffers), Energiek Leiden (Tjitske Veldkamp), Leiden Biodiversity Network (Frederic Lens), Platform Leidse Parken (Eduard Groen), Voedselbos Matilo (Walter Schrader), and other citizens' initiatives that may join the project
 - **budget = €5,000** to cover any arising costs for societal or citizen's initiatives such as acquiring monitoring equipment or sensors, communications to members, internal staffing, etc.
- **COMMUNICATIONS AND EVENTS**
 - Communication materials **budget = € 1.000**
 - Neighbourhood Events **budget = € 2.000**
 - Dissemination related travel **budget = € 500**
 - Final event **budget = €2.000**

3.3 Planning

The below GANTT chart illustrates the timeline of the project, including work packages and tasks, with indications of which partners will be engaged in which phases. The project is overseen by the Project Coordinator and tasks are performed by the Project Manager / Citizen Science Community Manager for the full duration of the project. The roles of each partner are described in more detail in the budget clarification section above.

	Year 1												Year 2											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
WP 1: Citizen Engagement Preparations																								
1.1 Communication Planning & establishment of channels, first-draft materials development, inform all potential partners of the project launch																								
1.2 Develop a web-presence and identify relevant CS data sharing platforms																								
1.3 First collaboration meetings with key societal partners and Gemeente																								
1.4 Co-evaluation Framework Design																								
1.5 Ongoing comms throughout the whole project																								
WP 2: Community Mapping Roadshow																								
2.1: Event planning together with neighbourhood initiatives																								
2.2 Inbedding in Leren met de Stad (HL)activities "Spreken met de Buren"																								
2.3 Neighbourhood-based input gathering																								
WP 3: Community Citizen Science Events Roadshow																								
3.1 Prepare Citizen Science tools and protocols for the selected themes, prepare how-to booklets with App QR codes, etc																								
3.2 Match Citizen Science themes with local initiatives and departments / policy-makers within the Gemeente																								
3.3 Prepare and launch Citizen Science engagement communications with partners across all channels																								
3.4 Organise series of CS workshops and events such as bioblitzes according to theme by neighbourhood. This task is repeated in Year 2, sharing interim data for a comparison year-on-year. Programming across both years																								
3.5 Organise data-presentation & community dialogue sessions, facilitate co-creation of local actions. Programming across both years																								
3.6 Seek topical and thematic alignment with Leren met de Stad partners, intergrate into programmes and recruit students/projects																								
3.7 Regular meetings with local initiatives and Gemeente Research & Analysis Team to discuss progress, data alignment and synergies with other actions.																								
WP 4: Dissemination and Scaling																								
4.1 Development of DIY Toolkit & Guidebook for any city embarking on this approach (in both English and Dutch)																								
4.2 Launch of Leren met de Stad student internship projects in relation to the themes and co-created citizen actions																								
4.3 Plan dissemination events with the CS-NL network, the City Deal Agenda Stad network, and the VNG to present the approach, DIY Toolkit, and interim outcomes, and to run workshops introducing the facilitation methods.																								
4.4 Share all resource materials on various platforms: CS-NL, EU-Citizen.Science, Participedia, etc as well as on partner resource hubs.																								
WP5: Embedding & Recommendations																								
5.1 Integrate citizen science approaches to topics investigated into long-term Leren met de Stad programming in partnership with local initiatives and the Gemeente																								
5.2 Integrate citizen science approaches in the work of the citizen initiatives and embed within the related department of the Gemeente, for the ongoing uptake of citizen-generated data in related policy making.																								
5.3 Plan internal event with the Gemeente for presentation of the final report																								
5.4 Plan high-profile public event to present outcomes to the public (to be identified)																								

3.4 Risk management and contingency plan

(1) Engaging with enough residents and/or enough different neighbourhoods: Risk low. Our societal partnerships are key to countering this risk, and given the collaborations, partnerships and networks we already have in place we deem this risk to be low.

(2) Finding enough volunteers/citizen scientists: Risk medium. Our societal partnerships and the number of already-active residents are key to countering this risk, and the communication channels to reach more participants are built into the project partnership.

(3) Planning enough coordination time in the project: Risk medium. This is primarily a matter of budget for personnel to cover the needed coordination capacity, and is countered by the in-kind cover of staffing in the Citizen Science Lab from other sources of funding and the support of the University itself to establish these partnerships with the city and its residents.

(4) Successfully aligning with the relevant departments of the Gemeente: Risk medium. This risk is countered by the involvement of the Gemeente as a supporting partner and the core objective (and shared motivation) within the project itself to find and solidify these synergies and alignments.

(5) Gathering enough Citizen Science Data to meaningfully inform policy: Risk low. The value of this project approach lies more in facilitating discussion and awareness, establishing inter-actor relationships, and multi-

stakeholder partnerships around urgent issues, such that Citizen Science activity can continue to grow beyond the end of the project. In this sense, any data is good data.

4. Data management

1. Will data that is collected or generated be suitable for reuse? YES

The Citizen Science approaches that will be implemented in the project in response to the topics identified by residents in the neighbourhoods will consist entirely of existing practices, such that the data collection tools, mobile applications, insight gathering protocols, data storage and hosting, and data analysis mechanisms will already be in place and supported by: (a) authorities such as RIVM and the Samen Meten platform for air quality monitoring, (b) existing NGOs or Foundations such as Observation International and the waarneming.nl platform for biodiversity monitoring, (c) large-scale funded projects such as Urban ReLeaf and their Heat Stress monitoring initiative^[17], or (d) local citizen initiatives such as the Leiden Open Bomen Kaart^[18]. All of the Citizen Science data collected will thus be openly shared and available for re-use.

All guidance documentation produced in the project for replicating this approach in other cities (e.g., learning or dissemination components) will be available Open Access / CC-BY 0.4 on Zenodo and disseminated via the Citizen Science Nederland platform, the EU-Citizen.Science platform, the City Deal Agenda Stad network, and the Vereniging Nederlandse Gemeenten (VNG) network.

2. Where will the data be stored during the research?

Personal Data

In keeping with GDPR regulations, the only personal data that will be acquired during the project will entail contact information for the purposes of project communication only, following the correct informed consent and permissions procedures. This information will be stored on Leiden University servers that are password protected and will only be made available to staff within the Citizen Science Lab in relation to tasks within the project.

Participant Generated / Gathered Data

Citizen science is a form of research that relies on the voluntary cooperation of citizens, and we will therefore ensure they have unhindered access to any data that they have generated or analysed themselves, as well as any larger dataset of which their data forms part, and from which additional conclusions can be drawn. To ensure that data subjects cannot be identified in any documents (reports, publications) or datasets within the project after executing the “GDPR right to be forgotten”, **only anonymized and aggregated data will be made public.**

All required anonymization procedures will be followed to make sure that the individual who collected the data is no longer identifiable. Consequently, during the process of anonymization, data identifiers need to be removed, generalized, aggregated, or distorted. We note that anonymization is different than pseudonymization (GDPR treats it as a distinct category, see Recital 26). Anonymization is the process of encrypting or removing personally identifiable information from data sets so that the people whom the data relate to remain permanently anonymous, and thus un-identifiable; whereas pseudonymization, as defined in the GDPR (which incentivizes its use in Recital 29,e.g.), means the processing of personal data takes place in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not attributed to an identified or identifiable natural person.

3. How will the data be stored for the long term and made available for use by third parties when the project has been completed? For whom will the data be accessible?

Not applicable. As mentioned above, this will depend on the nature of the Citizen Science task implemented, and the related authority, NGO or Foundation, or project that is providing the front and back-end environment for that task.

4. What facilities (ICT, (secure) archive, refrigerators or legal expertise) do you anticipate will be needed for the storage of data during and after the research? Are they available?

Not applicable.

5. Ethical aspects

	Not applicable	Not yet applied for	Applied for	Received
Approval from a recognised (medical) ethics review committee	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Approval from an animal experiments committee	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permission for research with the population screening Act	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Literature references

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7.2 Relevant Publications by Applicants

Margaret Gold (<https://orcid.org/0000-0003-4853-2463>)

- Janssen, Bogert, **Gold**, Vries. (Preprint, 2024) *Incorporating Participant Perspectives to Refine Citizen Science Evaluation Frameworks*. 2024-04-25 <https://osf.io/preprints/osf/2x97q>
- Fraisl, Hager, Bedessem, **Gold**, Hsing, Danielsen, Hitchcock, Hulbert, Piera, Spiers, Thiel, Haklay. Aug 2022. *Citizen science as a method in environmental and ecological sciences*. Nature Reviews Methods

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- Wehn, Ajates, Fraisl, Gharesifard, **Gold**, Hager, Oliver, See, Shanley, Ferri, Howitt, Monego, Pfeiffer, Wood. Oct 2023. ***Capturing and communicating impact of citizen science for policy: A storytelling approach.*** Journal of Environmental Management. Volume 295. <https://doi.org/10.1016/j.jenvman.2021.113082>
- Hager, **Gold**, Ajates, Wehn, Moorthy, See, Tsiakos, Masó, Woods, Fraisl, Domian, Freytag, and Fritz. Oct 2021. ***Onto new horizons: learnings from the WeObserve project to strengthen awareness, acceptability and sustainability of Citizen Observatories in Europe.*** JCom Journal of Science Communication. Volume 20, Issue 6. <https://doi.org/10.22323/2.20060201>
- Wehn, Gharesifard, Ceccaroni, Joyce, Ajates, Woods, Bilbao, Parkinson, **Gold** & Wheatland. May 2021. ***Impact assessment of citizen science: state of the art and guiding principles for a consolidated approach.*** Sustainability Science, 16, pages 1683–1699. <https://doi.org/10.1007/s11625-021-00959-2>
- Rüfenacht, Woods, Agnello, **Gold**, Hummer, Land-Zandstra, Sieber. Jan 2021. ***Communication and Dissemination in Citizen Science.*** In: The Science of Citizen Science. (Volland, Land, Ceccaroni, Lemmens, Perello, Pinti, Samson, Wagenknecht (Eds.) Springer 2021. 10.1007/978-3-030-58278-4

7.3 Relevant Project Experience of Applicants

- **The Dutch National Citizen Science Network (CS-NL).** The Citizen Science Lab is co-lead of the first national CS practitioners' network in the Netherlands, where Margaret Gold fills the role of National Network Coordinator. <https://www.linkedin.com/groups/8752267/>
- **CitiObs - Enhancing Citizen Observatories for healthy, sustainable, resilient and inclusive cities.** The Citizen Science Lab leads the work in the CitiObs project to consolidate best practice for diversity and inclusion in Citizen Science, and has developed a 'Leave No One Behind' Toolkit to enable citizen observatories to engage a diverse range of citizens, especially those from marginalised communities in community-based environmental monitoring activities in the urban context. CitiObs aims to increase and validate citizen observations of the urban environment as part of the existing in-situ Earth Observation systems, and to enable co-created local actions for sustainability. <https://citiobs.eu/>
- **Handbook Public-Civil Cooperation.** In the Public-Civil Cooperation project, the Citizen Science Lab collaborated with Waag Futurelab to research how social initiatives and governments can build strong collaborations with each other. This work resulted in the Handbook for Public-Civil Collaboration, which contains inspiration, support and design methods that social initiatives, officials and policymakers, as well as funders and local entrepreneurs can use to improve collaboration with each other. https://waag.org/sites/waag/files/2024-02/Handboek_Publiek-Civiele_Samenwerking.pdf
- **European City of Science Leiden 2022.** In 2022, the city of Leiden was the very first European City of Science to present a year-long program aimed at connecting science and society. In doing so, we kickstarted a new European tradition. The Citizen Science Lab was a member of the partnership creating an advanced, practice-based model for Public Engagement with Science that was open-minded, bottom-up, and with a playful 'just do it' mentality. The 'Knowledge throughout the Neighbourhoods' programme built bridges between science and local society by planning a daily programme of approachable, bottom-up activities in the 101 neighbourhoods of Leiden, Zoeterwoude, Voorschoten, Oegstgeest and Leiderdorp on a subject that sparks curiosity. The activities themselves were organised by neighbourhood associations, residents, representatives of social organisations, educators or scientists in the Knowledge Institutes. The Citizen Science Lab filled in four of these days with Citizen Science investigations in the neighbourhoods, piloted the community-mapping technique, and led a major investigation with residents into light pollution during Seeing Stars Leiden. <https://leiden2022.nl/highlights>



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- **Project 444 / Plastic Spotter.** As part of the University 444 years celebrations, the Citizen Science Lab developed an innovative 'radical co-creation' approach to CS with the entire city, with an open call for Citizen Science projects to be proposed by all residents of Leiden, selected by the municipality for their connection with policy pathways, and further co-developed with residents via a range of public engagement events – leading to the launch of the Plastic Spotter project, which has since developed into the highly successful 'Grachtwacht Canoe Clean-ups'. <https://www.degrachtwacht.nl/>
 - **WeObserve - Ecosystem of Citizen Observatories for Environmental Monitoring.** Margaret Gold brings her expertise on Citizen Observatories (COs) to the Citizen Science Lab team, having led the European Citizen Science Association (ECSA)'s involvement in this Horizon 2020 funded project previous to Leiden University. Her work in this Consolidation and Support Action assessed three key challenges facing COs: awareness, acceptability and sustainability, developed tools to address them (including a MOOC), and resulted in recommendations for developing a supportive ecosystem for COs in Europe. The repository of project outputs can be found at: <https://zenodo.org/communities/weobserve>