

OUR PURPOSE

Odour is reportedly the second leading cause of environmental complaints across Europe, after noise¹. Odour annoyance affects the quality of life of exposed individuals, therefore the social wellbeing dimension of health. Despite this, there is a lack of Europe-wide definitions, terms and common criteria to establish impact odour thresholds, and ultimately, to determine the related level of annoyance, which would inform common European regulations. This, in-part, is due to the fact that odours are difficult to measure, current approaches do not consider how odours are perceived by affected communities, implementing solutions is costly and regulatory initiatives are frequently opposed by industrial stakeholders.

The **D-NOSES project** aims to investigate how citizen science approaches can empower citizens to take a leading role in tackling odour pollution. Building on Action Research and participatory design², the goal of the project is to support and guide a collaborative journey to tackle odour pollution with the active involvement, in all phases, of key quadruple helix stakeholders (public, industry, civil society, academia).

The project actions will guarantee the implementation of Principle 10 of the Rio Declaration³ by providing access to information through the **International Odour Observatory** (odourobservatory.org), engagement strategies will foster public participation, and the advocacy actions will ultimately allow for access to justice in odour pollution, and are aligned with the SDGs of the UN 2030 Agenda.

OUR METHODOLOGY

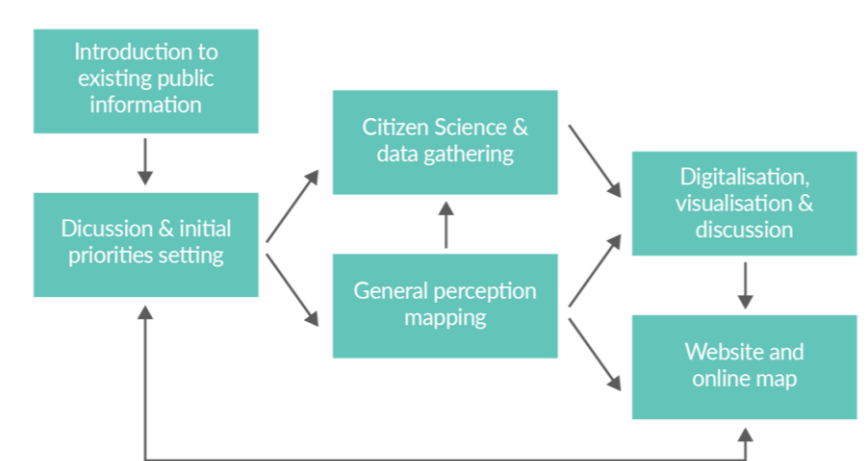
Here we present the first version of the proposed engagement model. It is largely based on previous engagement models by project partners Ideas for Change (The Bristol Approach, Balestrini et al., 2017) and Mapping for Change (Haklay & Francis, 2018), and incorporates the Extreme Citizen Science approach (Haklay, 2013). These models have been previously tested and validated in a wide number of citizen science projects about different topics, ranging from air and noise pollution, damp problems in homes and identifying barriers to accessibility for those with restricted mobility. D-NOSES combines the best practices of both models as well as expands them with the inclusion of tools specific to the domain of odour pollution and the quadruple helix approach.

Our engagement models

The *Bristol Approach*³, as developed by IFC, puts the concerns of citizens at the very heart of the process, helping local communities to co-design and implement citizen science based interventions around matters of concern in their living areas, such as odour pollution, which lead to creative solutions and positive results. This ensures a high level of sustained engagement throughout the duration of the project, as citizens are prepared to give their time and energy to address matters that are relevant to the community.

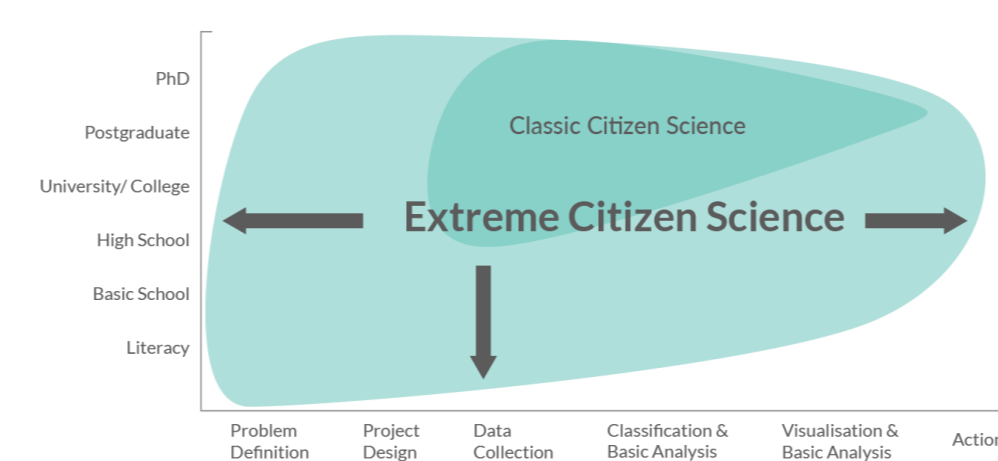


The *engagement model* by MfC⁴ is deliberately flexible to follow different pathways directed by discussions and needs of the local community. Guided by Principle 10, the model starts by introducing already existing and accessible information. Then it follows up with a facilitation process that supports communities to collect and share their own environmental data from citizen science observations. The generated data is then evaluated and improved in an iterative loop so that it can finally support the drive for change.



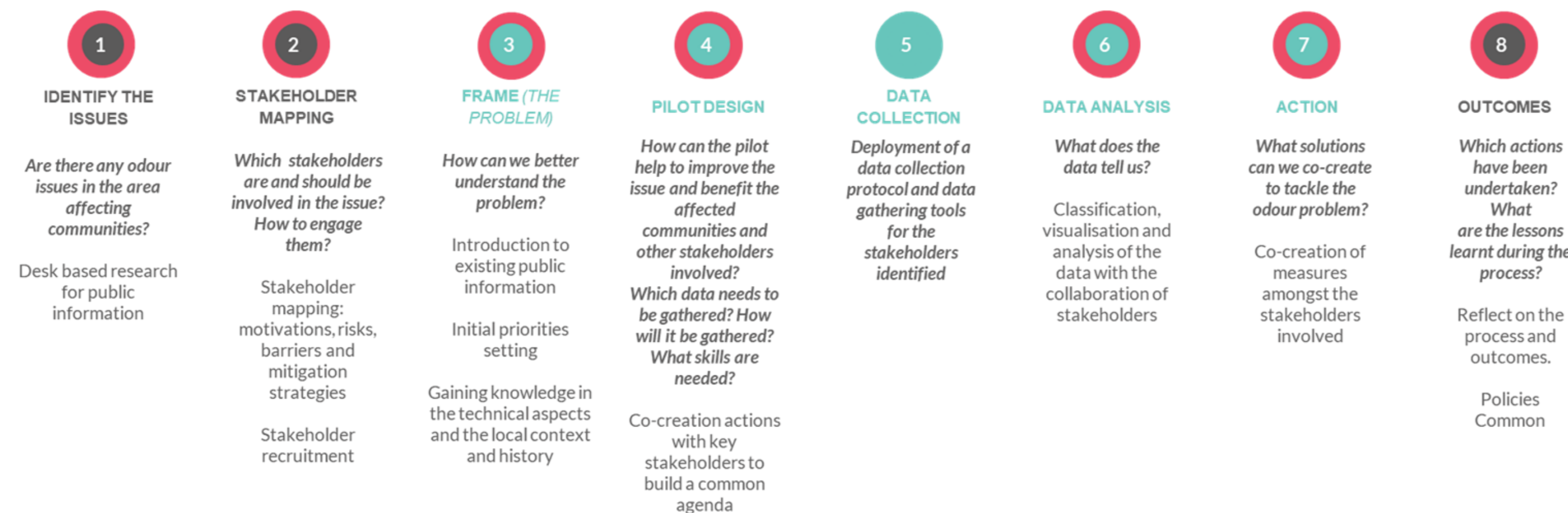
Our inclusive citizen science approach

With local needs and culture at the forefront, the *Extreme Citizen Science approach*⁵ provides communities with a means to not only monitor their surrounding environment and analyse their findings but to also define the problem, co-design methodologies and tools that enable them to own, share, and act on their results. Our citizen science interventions are intrinsically inclusive and apply all the *Responsible Research and Innovation (RRI)* dimensions, with a special focus on the gender and science education aspects.



The D-NOSES inclusive engagement strategy

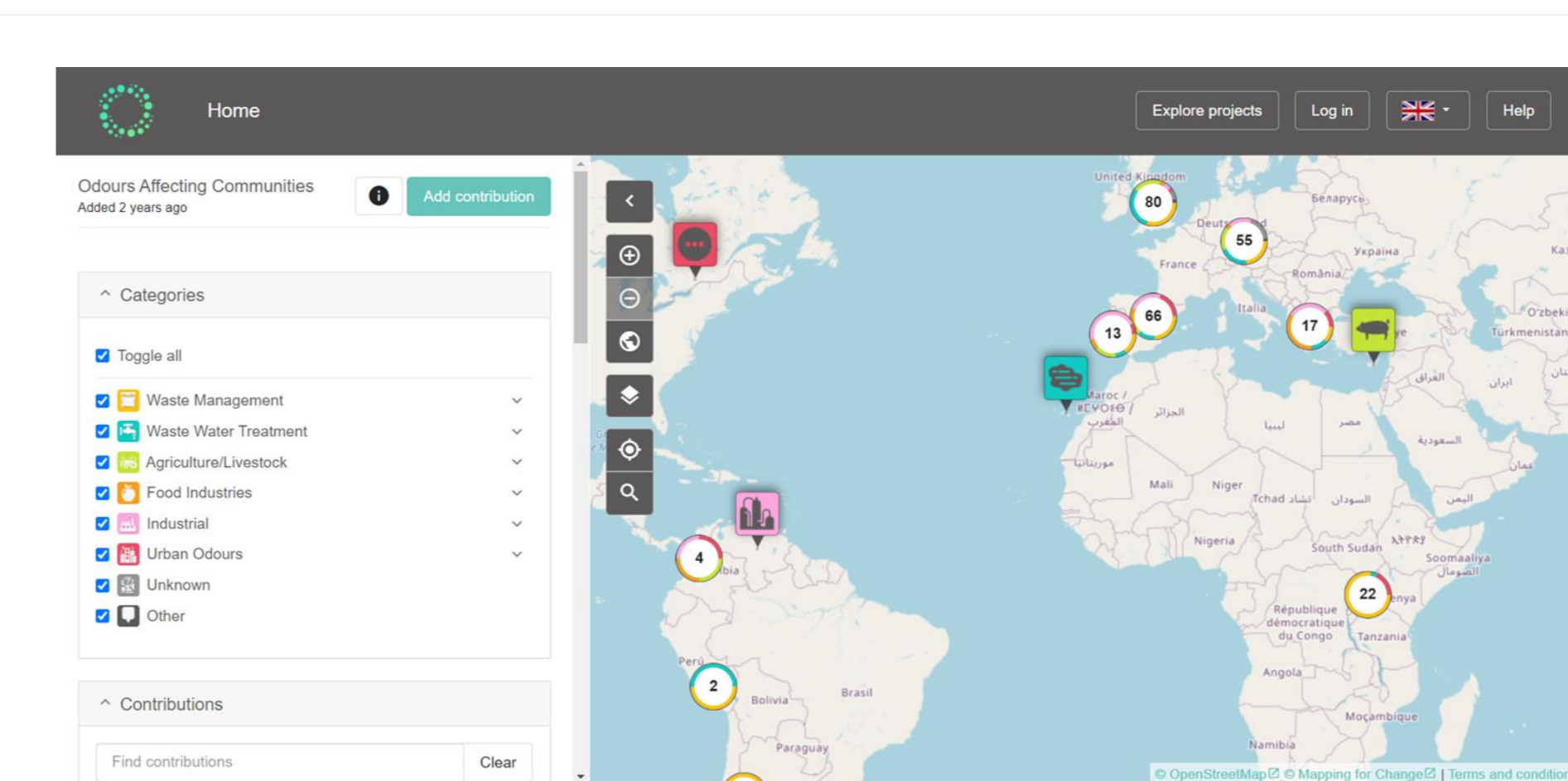
The D-NOSES engagement model, which is built upon the existing engagement frameworks cited, starts with 1) the identification of issues in the affected communities, to then go into 2) stakeholder mapping, 3) framing the problem (if any), 4) pilot design in a co-creation process, 5) data collection, 6) data analysis and 7) proposals for actions to reduce the problem and increase the quality of life of affected communities. The final phase, 8) outcomes, comprises the collaborative assessment of the project results as well as plans for the sustainability and legacy of the pilot actions. While these stages are useful to guide a cohesive process, the model should not be seen as a strict or prescriptive process to be followed step by step. It rather aims to guide and inspire partners in the definition of the main activities to be conducted. Further analysis undertaken identifies where inclusivity factors should be considered throughout the stages and where citizen science can occur.



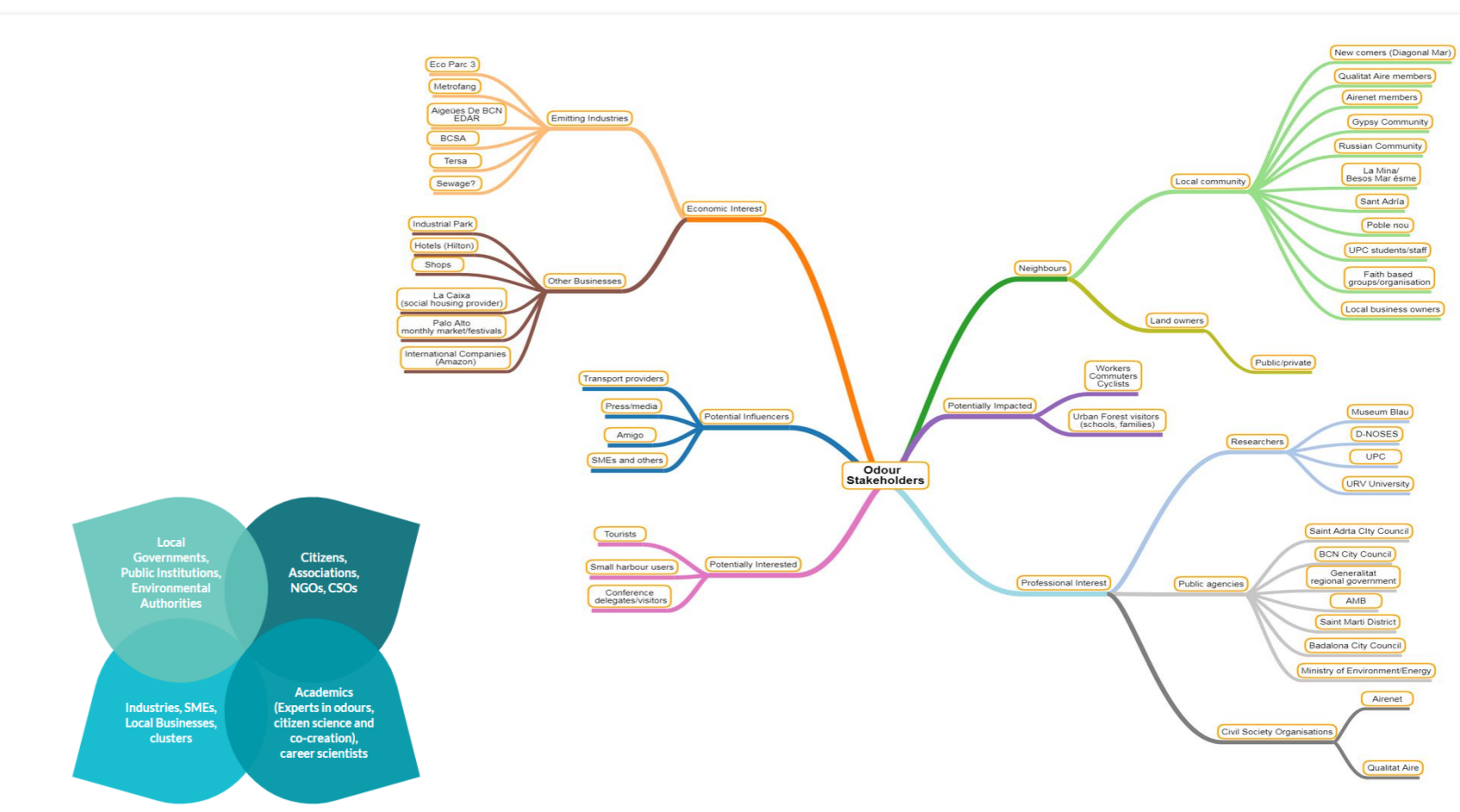
1 Citizen science occurs from stage 3 where the research question is agreed through to 7 where action is collaboratively undertaken.
2 Inclusiveness considerations factored throughout the engagement stages to facilitate participation regardless of socio-economic & socio-cultural background, gender, literacy level, religious affiliation, age, and disabilities, amongst others.

RESULTS

The D-NOSES engagement model, is being deployed in each of the 10 pilot interventions in Chile, Germany, Greece, Italy, Portugal, Spain, Bulgaria, Uganda, and the UK. Here we present the application of the engagement model in the context of Barcelona, which served as a beta pilot to inform the others, and some of the tools used to enact the engagement model.



1 Identification of issues initially through desk research and media analysis in 10 countries culminated in the development of the *Affected Communities Map* in the Community Maps platform. 272 communities have been mapped from the 450 identified, with new ones being continuously added by people from across the globe. The Forum area in Barcelona was identified as having a longstanding history of odour issues.



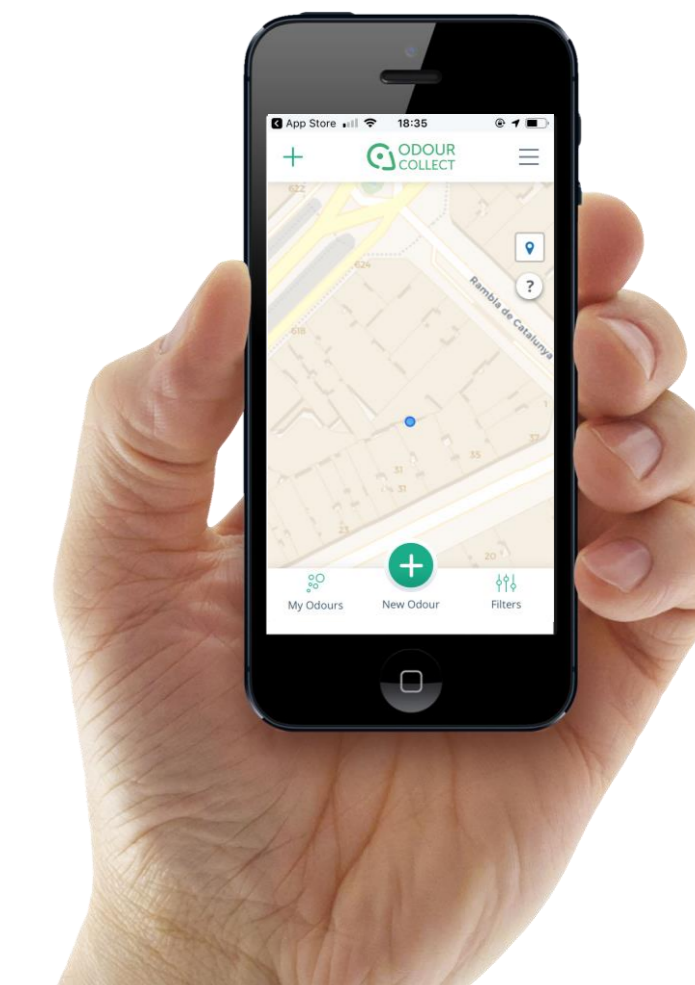
2 Stakeholder mapping was undertaken to identify key actors representing the quadruple helix, whilst mapping out possible motivations and barriers for participation, as well as mitigation strategies for each. Ongoing engagement has seen the iterative development of this stage.



3 Framing the problem through local knowledge was undertaken by carrying out perception mapping activities in the Forum area, ethnographic fieldwork, sensory walks, exploratory conversations, rapid appraisals alongside desk research to understand the extent of the issue and who was being impacted.

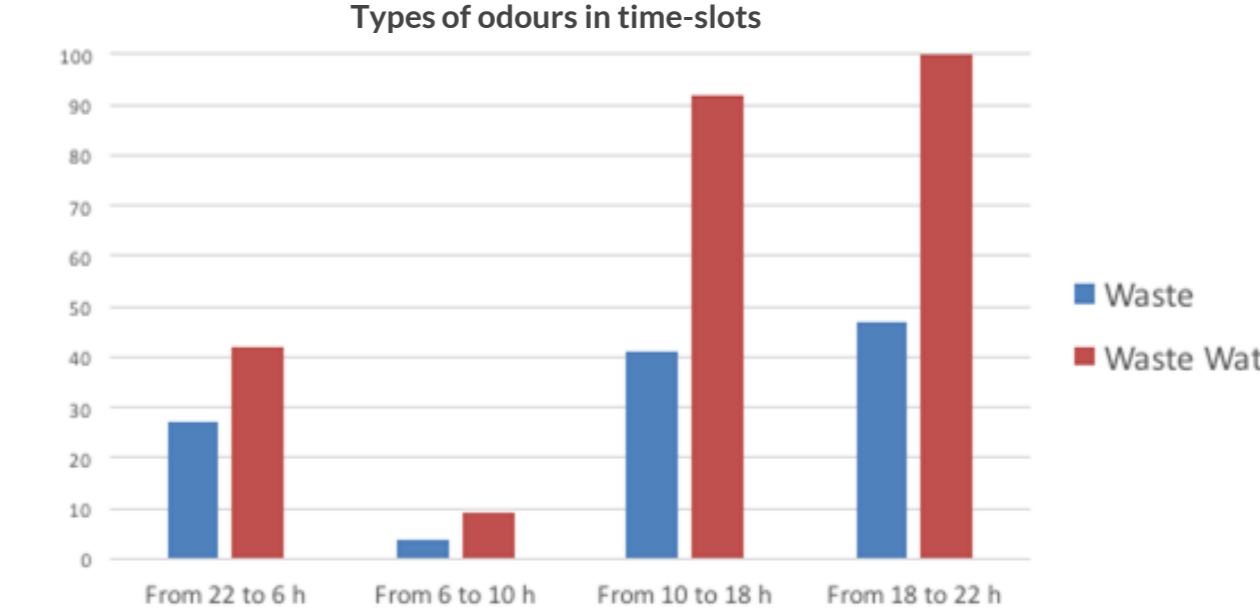
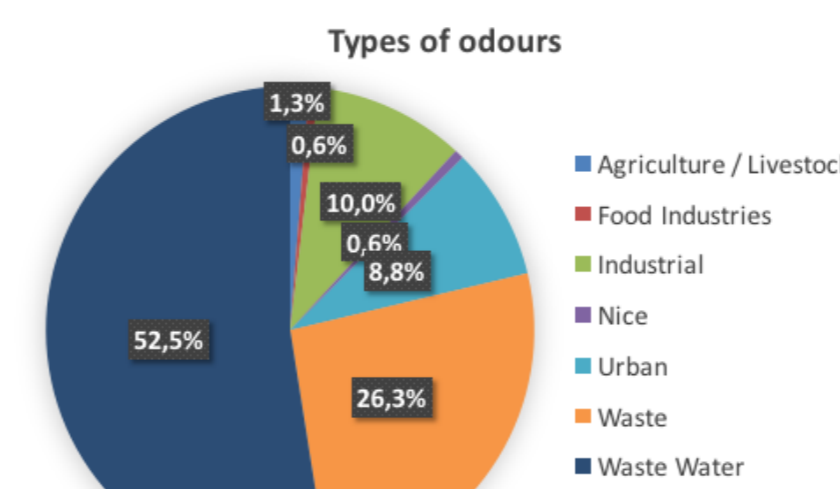


4 Pilot design involved a collaborative process to understand the needs, capacity, appropriate tools, data collection protocols and desired outcome of the neighbours, wastewater managers, regulators and other key stakeholders.



5 Data collection involved the use of *OdourCollect*, a mobile app which geolocalises observations in real time, whilst collecting details on the odour intensity, hedonic tone and episode duration. More than 480 odour observations were made using the app. Training materials were developed to ensure inclusiveness, as a paper based sensory notebook for people with difficulties in using smartphones.

Waste water (51.3%) and waste (25.3%) have been the most frequent odours perceived, in relation with the types of odour emitting activities in the area
 Coincident with traditional odour studies



6 Data analysis from the preliminary results show observations associated to waste water are the most frequent. However, waste smells present higher intensities and lower hedonic tone, which indicates a higher level of overall annoyance to the affected communities. Also, it was shown a concentration of the odour episodes in the night hours. This is due to the fact that odour emitting industries are more active at night.