SNIFFIRDRONE

UNIVERSITAT DE BARCELONA

DAM Depuración de Aguas del Mediterráneo

Lancaster University

IBEC

GSS Gas Sensing Solutions

SINTEF

ATTRACT

FusionPoint
Where innovation begins

esade

UPC

IED Barcelona Escola Superior de Disseny

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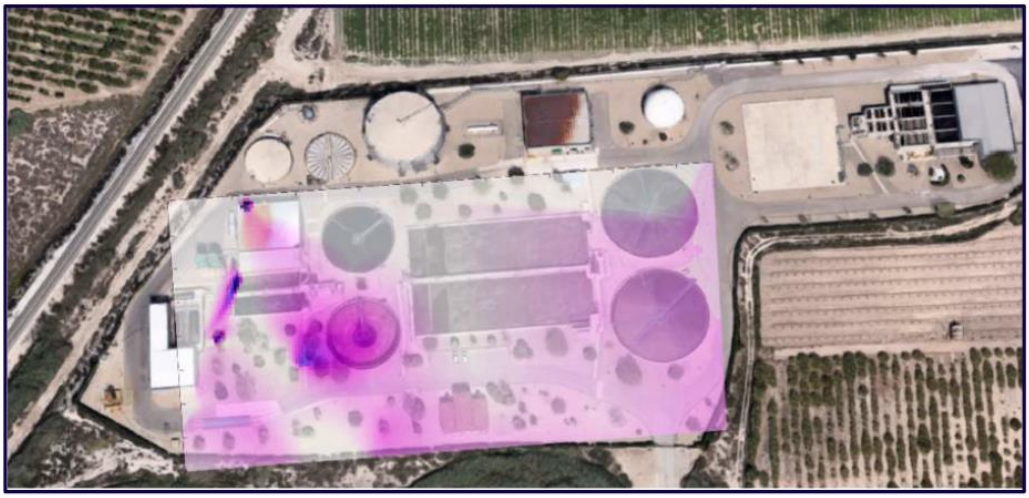
Introduction

The awareness of the public towards air quality has risen during the last decade. As eco-friendly and health cautious mentalities are rising and the technologies turns towards more and more data, the need to collect reliable and exhaustive information on air quality has become more and more urgent. Cities have implemented costly static sensors in multiple locations.

SNIFFIRDRONE is an ATTRACT EU project which attempts to build a drone-based air pollution mapping for environmental monitoring and the improvement of quality of life. The cutting-edge technologies that this project incorporates are the equipped NDIR (Non-Dispersive Infra-Red) gas sensor and odor detection by AI algorithm. Supported by their partners, the current target is to build and demonstrate a drone-based system to monitor the air pollution emitted by waste water treatment plants.

- Original SNIFFDRONE project: https://www.sniffdrone.eu/ ATTRACT



Challenge

Technology for Social Innovation is a project in which different teams design, develop and test alternative solutions to the challenge by exploring possibilities for new products and services and finding ways to significantly improve existing products and services.

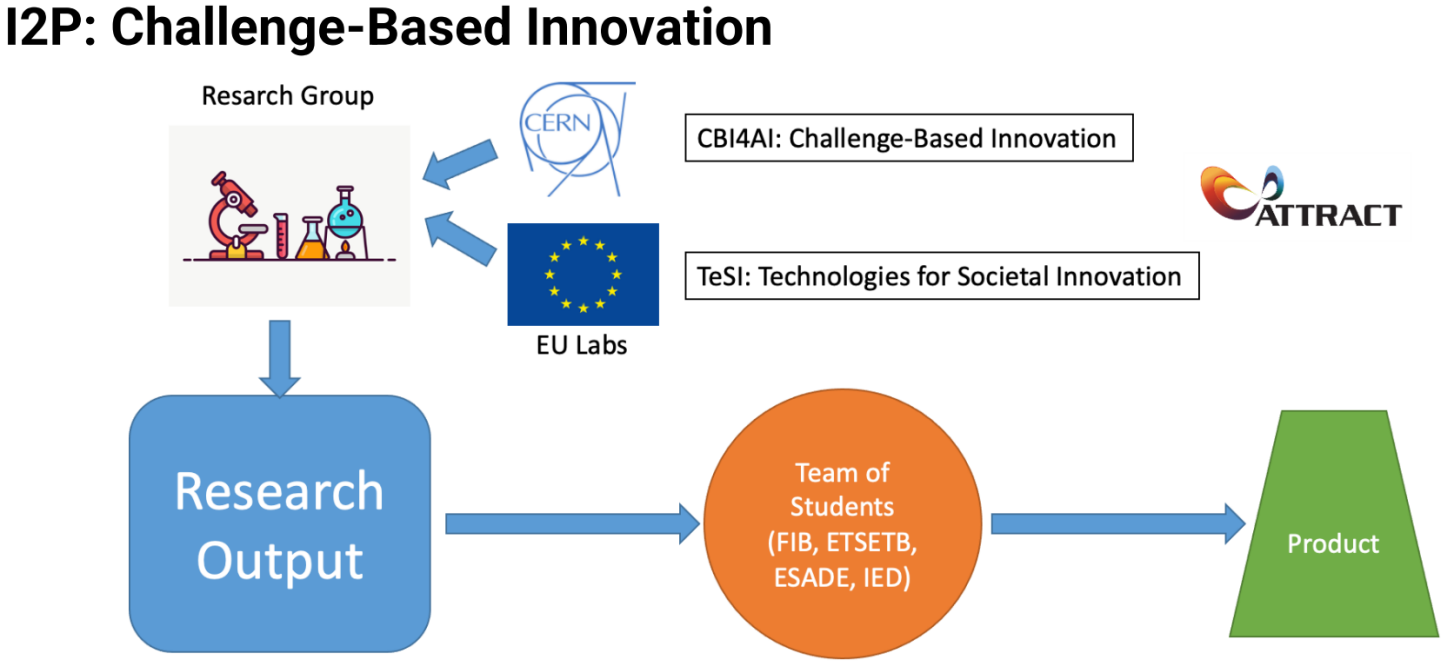
The ultimate objective is creating a deeper understanding of customers in a certain area of business through developing the concepts to a level that they can be initially tested with potential customers, and running the first test. Each team has two 4/6-people student teams working on the challenge, supervised by an academic coach.

UNDERSTAND THE PROCESS OF DEVELOPING A NOVEL IDEA

Validating early ideas with relevant stakeholders and build on that with iterative testing and development.

CONTRIBUTE TO THE VALUE OF EARLY STAGE TECHNOLOGY

Working with scientists to close "the gap" between scientific research and the business world.



Our team

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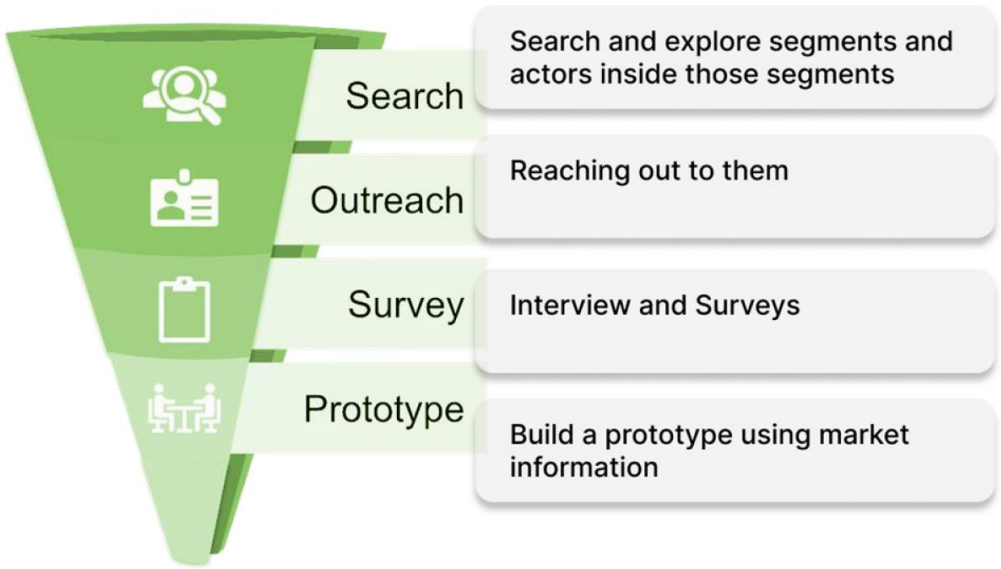
Design process

We as a team attended a series of workshops to sharpen our innovation skillsets and focus our mindsets correctly for the challenge. The main initial objective was to come up with new ideas for possible alternative applications for the SNIFFIRDRONE technology. This process had to be methodological and based on societal needs. We knew that we would have to interview possible customers in order obtain key insights and understand the real problems they encounter in their industries.

We had an initial meeting with the research team to further understand the technologies and any limitation that we were not sure about, even after all our research on publicly available information. We also wanted to manage their expectations and the state of their project. That is when we were informed that it would start in June, basically after the end of our process. This would make us not be able to work much together and have a constant feedback loop, therefore we decided to seek more alternative routes to come back with valuable information that could help them understand possible interesting application outside of their initial scope. During the final presentation with them, they showed appreciation for all our effort and were quite pleased with our methods and research results.

The time to develop our project was limited, so as instructed by our coaches, we had to keep moving forward constantly. After much brainstorming and ideas, we had to contact people and test our hypothesis, we could not afford to get stuck in a thinking loop. As in any science field, all data and insight were valuable, even negative confirmations. We had to back up our solutions with proof and testing. The main parts of out project were:

- Market research, including customer needs and societal challenges.
- Reaching out, making surveys, having interviews… Understanding what are the people needs, not just having hypothesis but also testing them.
- Prototyping solutions based on all our acquired key insights and testing them.



Market research

We had a large range of ideas for possible markets, but we had to choose a limited number to be able to explore them in depth. We had the hypothesis that the following sectors might have issues that could be addressed or improved with the SNIFFIRDRONE technology. We split the team to research, contact and interview people related to the identified sectors:

- **Landfills:** We managed to have 3 interviews with people working in the field of waste treatment. They were not interested because their waste plants had no complaints about bad odor emissions. But in their opinion some public landfills could improve their odor management. Unluckily we could not contact the administration to arrange a meeting with them.

- **Air Quality:** Our approach was to contact air quality companies in order to know how do they currently deal with the problem (what kind of sensors do they use, how do they acquire and analyze the data, …) and also to ask them if they would be interested in odors information as well (the principal value proposition that our technology brings). We found a great interest in this sector. Lobelia Air was even interested in a collaboration if our sensors are deployed in Barcelona and we can have a real time mapping of the Air Quality Index (AQI) and odors of the city.

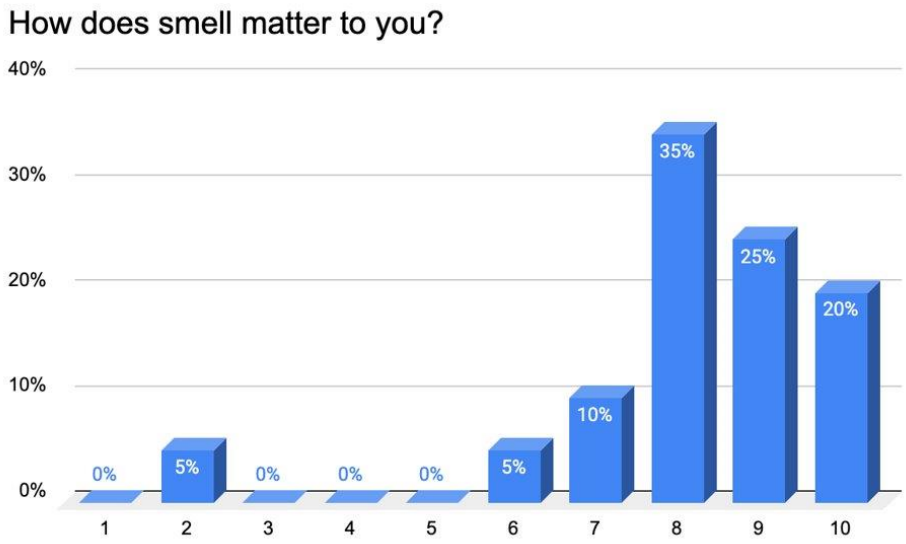
- **Technical Consultancy:** The primary idea here was to approach big consulting firms with technical focuses in order to better understand the potential market and current demand in for our technology in it. For this purpose, we spoke with consultants from Accenture, Deloitte and BCG and the key takeaway from our conversation with these consultants is that they felt that the major distinctive feature of the SNIFFIRDRONE project lies not in its drone technology but rather in its sensors and backend Machine Learning algorithm. They also further spoke about the growing importance of such technologies to gather data that can then be used for a wide array of purposes.

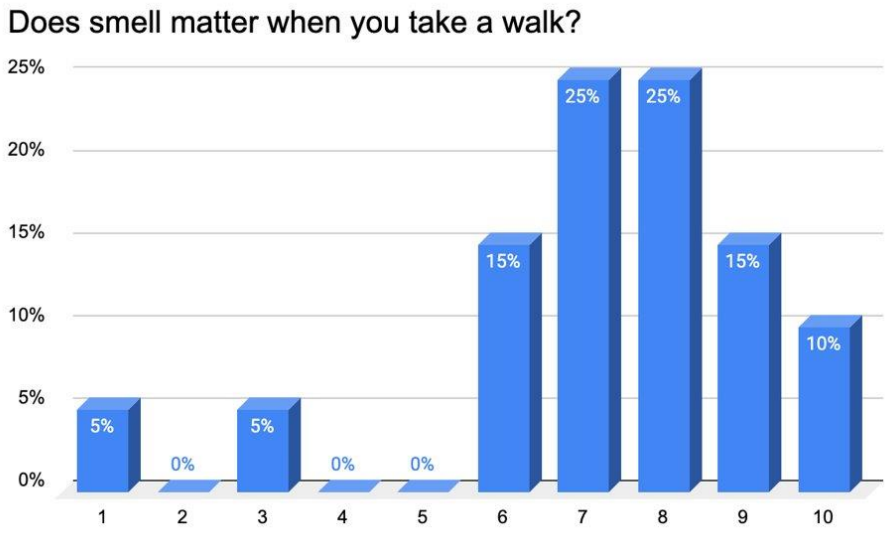
The water treatment sector was another sector that clearly benefits from the SNIFFIRDRONE, as the initial target is water treatment plants monitoring. But with our limited time budget we decided to not explore it because we felt like the research time already have all the information they need on it from their main partner DAM. Other industrial facilities are worth being researched but we wanted to take a more alternative approach, so only one of the sub-teams investigated landfills. We feel like the data and insights we could get on other markets would be more valuable for the research team.

Survey: Air quality interest

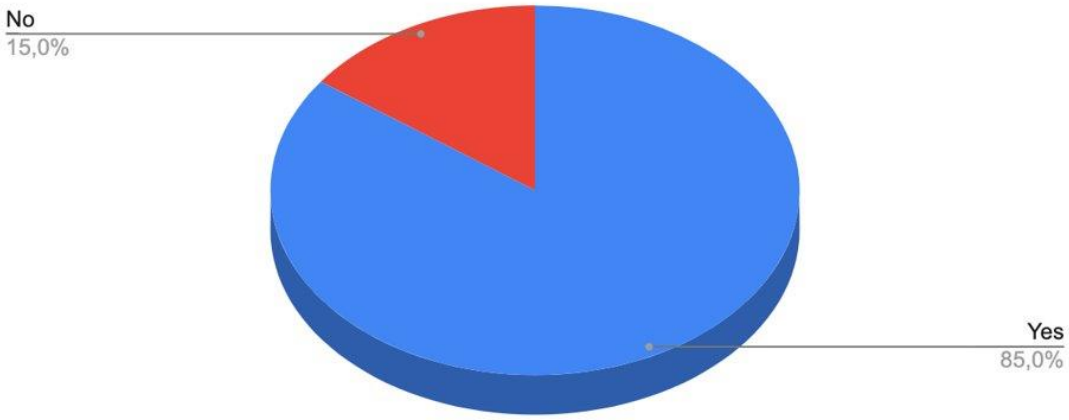
Based on the results obtained in the market research phase, we decided to focus on air quality and test more its potential by obtaining more information based on surveys.

The objective of our designed survey was to assess the level of awareness of air quality and odor in the city of Barcelona, as well as the interest in a possible solution. We were able to sample 47 people from a range of different cultures and nationalities. The results show an increasing awareness among the population, mainly due to health and life quality concerns.

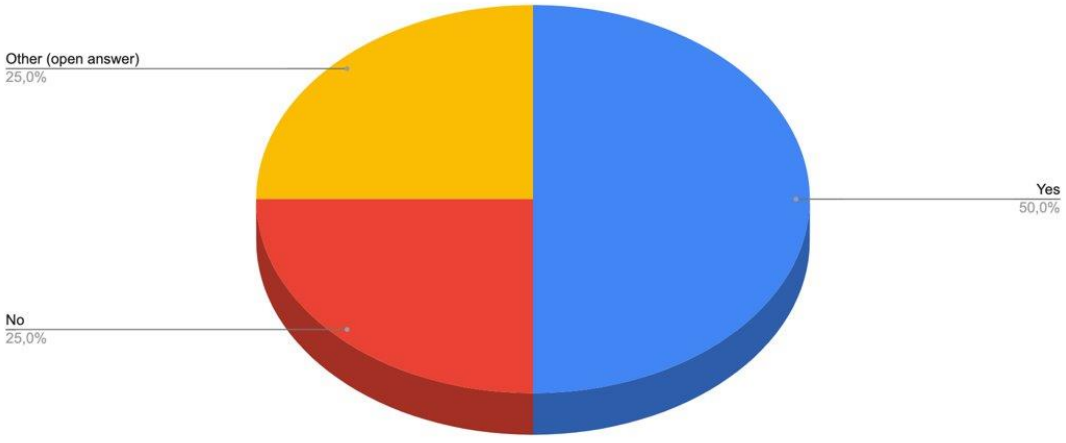




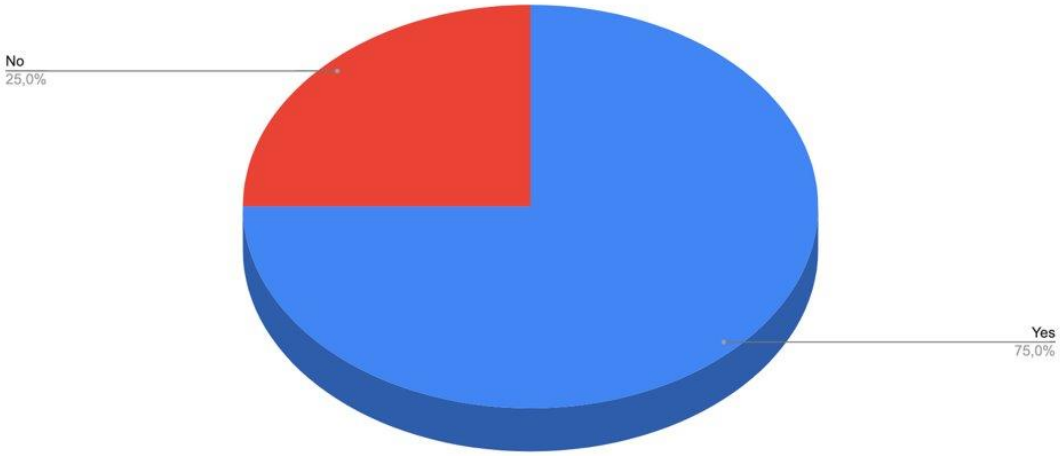
Would the cleanliness of the air affect your route or transportation choice?



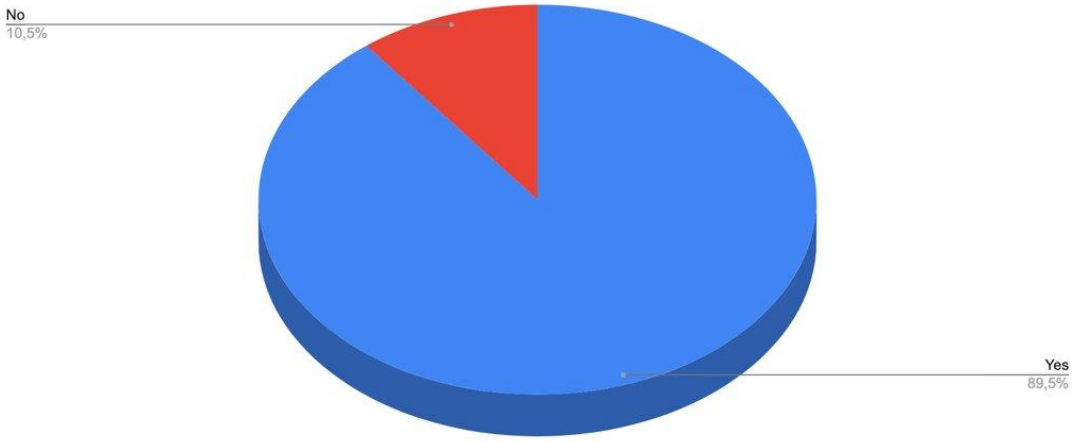
If there was an application or filter in google maps that finds the optimal route reagrding air quality and odours, would you use it?



Would you like to get informed when there is a problem regarding air quality or smell near you?



Would air quality / smell quality affect your accomodation choice if this data was displayed in the booking process?



Solution: Sniffing As A Service

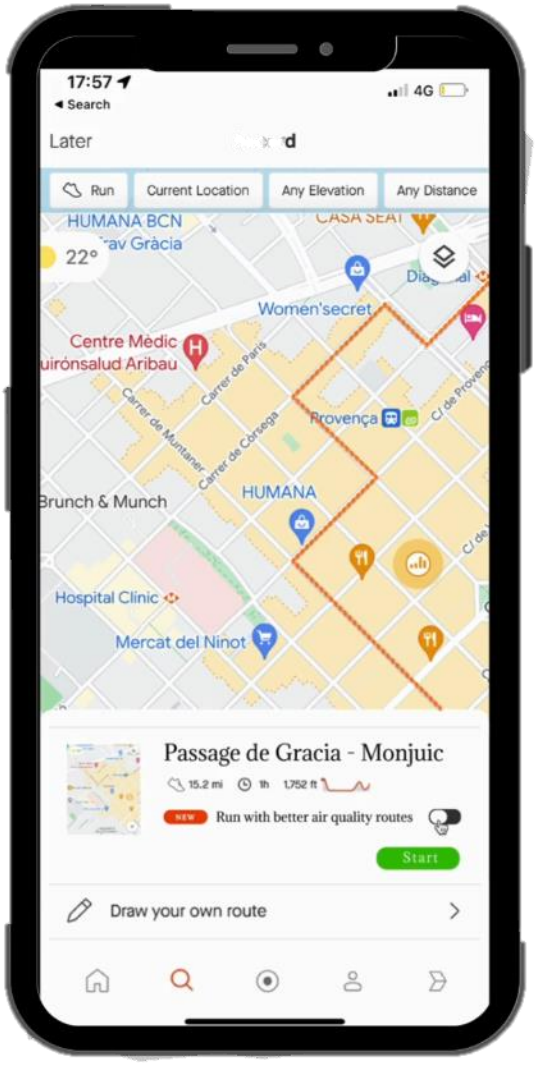
Once we noticed that the fact that people were interested in air quality, and took into consideration the growing importance of data driven industries in today's world and the Machine Learning algorithm being the major USP, all the markers pointed towards a data driven solution. The Sniffing As A Service (SaaS) offers a unique alternative to the current revenue generating model by suggesting the establishment of an infrastructure to enable smart cities with the SnifferDrone sensors and in the process collect, process and sell the data to companies like Lobelia and Strava that can then use these to improve the lives of everyday users.

Prototype

Following our idea of the health interested users we targeted fitness apps. We researched the market of modern available options and we landed on Strava (www.strava.com). It is a widely popular fitness application that includes running, biking and many other sports. They offer a premium subscription with live weather data and more data. Their community is quite big and really invested in health-related ideas. We feel this is the perfect audience to target with our air quality monitoring, and we think that they would also appreciate the odor measurement more than the average commuters.

Other great feature that Strava implements is a gamification of the community members performance in different category ladders. There is the "king of the hill" (the fastest person on a course), the most distance run this week, month, etc. This great range of leaderboards could also have for example a cleanest air run during this week. This could be a target for people more interested in health that the competitive performance ladders. Some of us take recreational sport runs and feel like any little gamification is welcome to something that can get a bit boring after many years of doing it.

The intention of this prototype is to realistically show an example of a mobile application (e.g. Strava) that would take advantage of the data monitored by the sensors deployed in the area to calculate the best route when the user wants to travel or go out for a run.



QR figma prototype link

SCAN ME

SNIFF DRONE

Possible customers

Our prototype targets health and fitness apps to help user find optimum routes for their running and biking, but we also did a deep analysis in other areas. During the process we made some contacts that were interested in the technology centered around air quality.

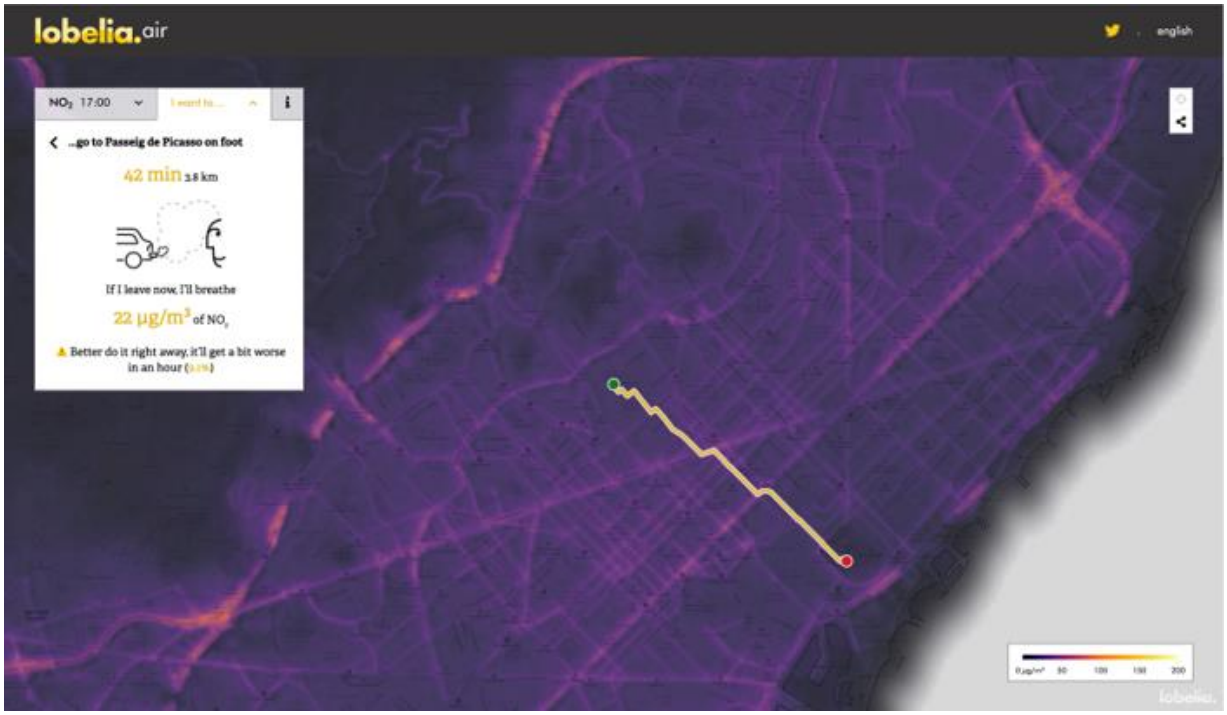
Lobelia Air

- Website: https://aire-barcelona.lobelia.earth/es/
- Contact:

The main partner found in the Air Quality business is Lobelia Air. Their mission is: "We quantify climate risks to build a resilient society." They want to give better life to citizen in terms of health, and work towards supporting an ever-smarter city for the long run.

They showed great interest in a real-time mapping of the air quality and odors of the city of Barcelona. Currently, their sources of data are: satellite images & static gas sensors which belong to the city of Barcelona (they cannot manage the sensors), so they have to interpolate the sparse data points to cover all the city.

All the companies dealing with air quality face similar problems, as the most important aspect is to collect reliable, real-time data from as many points as possible to have an accurate map of the situation. Our value proposition tackles this problem and also could add the odor detection functionality. They would love to add dynamic sensing to calculate an odor map for alternative routes.



Planet Watch

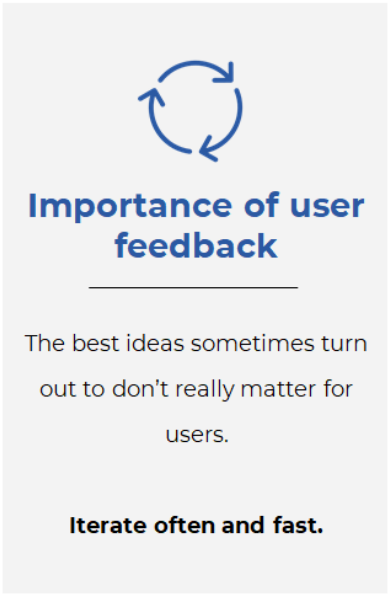
- Website: https://www.planetwatch.io/
- Contact: C. Filipe RAMOS, CERN (Knowledge Transfer Officer) cf.ramos@cern.ch

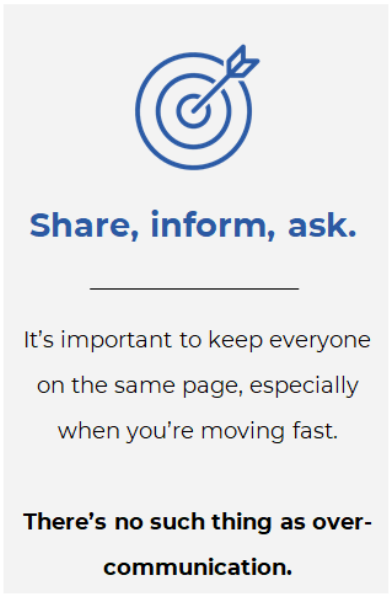
Part of the feedback received in our presentation in CERN was about Planet Watch. This company started as a spin off of a CERN project and took off during covid-19. They specialize in decentralization and incentivization of environmental monitoring.

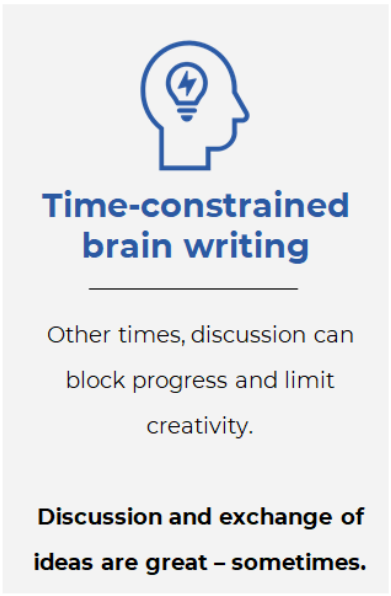
They are partnering with a state-of-the-art blockchain and with one of the leading research centers in the world to build the world's first immutable air quality ledger and to reward any contribution to our ecosystem. The tokens received can be exchanged for goods in their store, but their main driving force is the global community formed around monitoring and preserving the air quality of the planet.

They are building a global network of outdoor air quality sensors and people who care about the environment (PlanetWatchers). Some sensors are installed and managed by local residents, with additional sensors being installed by PlanetWatch in partnership with transport and telecommunications companies, local authorities, etc. This approach allows us to rapidly deploy low-cost, high-density air quality monitoring networks which fill a data gap in governmental networks.

Student reflection







In more general terms of the course, the workshops on design thinking, customer research, public speaking, etc... were very relevant to us. They added another dimension to our thinking skillset. The multi-disciplinarity of the course made for a unique teamwork experience, even multi-culturally! Our skills and values grew leaps and bounds as a team. If we have to point out what most stuck with us is the empathy and responsibility we feel for the society needs that are all around, you just have to look closely.

This whole project has been truly unique and eye-opener for most of us, new in TESI projects. We will not forget working so closely looking for societal needs.

In terms of our envisioned future role with the project, we think SNIFFIRDRONE will move forward without us. We provided useful information for the research team, but we are not the experts, nor the contact with the potential clients. If they want to talk or question about our insight furthermore or again in the future, we will be absolutely glad to help.

We believe that this kind of course is really important to inspire and train young people. Depending on your previous studies, this an unparallel learning opportunity. We feel grateful towards all the actors involved: the coaching staff, the researchers, all the great teammates, and of course the incredible CERN staff! Thanks for everything.