The SOCIO-BEE Citizen Science ecosystem towards better air quality in cities

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Commission





SOCIO-BEE id card

- SOCIO-BEE (GA No: 101037648)
- Wearables and droneS fOr Clty Socio-Environmental Observations and BEhavioral ChangE
- Duration: 36 months, Start date: 01.10.2021 End date: 30.09.2024
- Budget: **5 455 801.66** Euro (EU contribution: **4 999 858.91** Euro)
- Coordination: Dr. Anastasios Drosou (CERTH-ITI), Email: drosou@iti.gr
- 18 Partners from 7 European countries



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Funded by the European Union



The SOCIO-BEE Consortium



Eighteen (18) partners from seven (7) European countries 3 Research Institutions, 6 Universities, 3 Innovative SMEs, 3 Municipalities, 3 End Users





-**ZC** Fundación Zaragoza Conocimiento







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Background

- European cities: Home of 75% of the European population (~340 million people)
- Air pollution: One of the key threats for the inhabitants of many European cities
- Energy demand & mobility: One of the drivers behind pollution

The behavioral change due to COVID-19 pandemic, showed a **change in energy demand** patterns & a **17% drop in CO₂ emissions** during the lockdown due to the reduced surface transport



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Policy-measures and human action have great potential on emission reduction



Rationale

Reducing air pollution requires:

Technological innovation &

A behavioral shift

Such changes require collaboration between:

Citizens

Businesses

Volunteers

Decision makers



The SOCIO-BEE Vision

Integrate all supporting technologies and engagement strategies to

motivate citizens to co-create and co-execute air pollution monitoring campaigns, while driving the behavioral change to reduce air pollution



The SOCIO-BEE ecosystem



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The SOCIO-BEE solution

<u>A</u> citizen science web platform for air quality monitoring:

- Supported by decision makers and action groups
- <u>B</u>ridging citizens and policymakers

An affordable ICT – based and accessible wearable

Attachable to objects like bracelets and drones

A stakeholder engagement strategy



Key technologies in SOCIO-BEE

Citizen engagement services suite

Co-creation module

Collaborative campaign creation / Access to collected data / User Engagement

Campaign blueprints Campaign templates

Micro-volunteering engine Identify and propose WBs to each campaign

Personalized Messaging Engine Persuasive Messaging / Appropriate Time Calculator/ Notification Engine

Data Services suite for data collection, connection, harmonization, processing & annotation

Oity pollution, citizen exposure and citizen behaviour analytics and profiling components

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Second se

A prototype wearable sensor device

Embeds PM 2.5, NO2,O3, thermal and humidity sensors Wireless basic data communication services



Web and mobile front-ends (SOCIO-BEE AcadeMe)

Integrated dashboards

The Bee Mate suit

Audio-visual captioning / Audio-driven pollution detection / Sentiment analysis/ Gamification components

Behavioural change in the SOCIO-BEE frame

- A more or less permanent change of daily habits or procedures
- A wide and dynamic area of research, experimentation and observations
- SOCIO-BEE focus on:
 - Education for children (8 to 16 yo) on environment issues
 Aim: To increase the preference of healthier options for mobility inside the city

Schange of habits of elder citizens to prefer a non-polluted and non-crowded environment for their activities

Aim: To increase the preference of green and more "sportif" options for mobility in the city

Schange of daily routes of commuters based on measurements of their individual exposure to air pollution

Aim: Changes in citizens mobility choices, translated into changes in emissions in the city

The SOCIO-BEE Pilots

The hives will be deployed & tested in three cities:

Zaragoza

Ancona

Marousi (Amaroussion)

<u>Pilot Case 1:</u> Improve the air quality in the city of Zaragoza Context (AYUNTAMIENTO DE ZARAGOZA)

Execute a set of citizen science experiments, designed to use the SOCIO-BEE **air quality device integrated in wearables**.

Sensing through	i. SOCIO-BEE wearable deviceii. Gas sensors
Behavioral	To increase the preference of healthier
change goal	options for mobility inside the city

<u>Pilot Case 2:</u> Clean air for aged population with green & healthy mobility (COMUNE DI ANCONA)

Promotion of individual health & mobility for elderly population.

Sensing through	i. Large deployment of wearable gas sensorsii. Crowd & vehicles monitoring system
Behavioral	To increase the preference of green and more
change goal	"sportif" options for mobility in the city



Pilot Case 3: Protect & promote green choices

for mobility

(MUNICIPALITY OF AMAROUSSION)

Focus on **citizen mobility** & access to **alternative options** with the assistance of the municipality

Sensing through	i. Large deployment of gas sensorsii. Drones
Behavioral change goal	Changes in citizens mobility choices, translated into changes in emissions in the city

Pilot features (similar yet different)







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🕙 Zaragoza

Challenge: Boost a change of behaviour in children (8 to 16 yo) on environment issues through a technological, agile and joyful approach based on citizen science

Targeted Population: Youngsters

🕙 Ancona

- Challenge: Motivate the elderly (>65 yo) to be active outdoors in a non-polluted and non-crowded environment, promoting a healthy lifestyle
- Targeted Population: Aged population

Marousi (Amaroussion)

 Challenge: Commuters to actively contribute in understanding their individual exposure to air pollution through CS campaigns -Feedback to citizens on most/less polluted neighborhoods
 Targeted Population: Commuters

Project status (M14)

Achievements:

Stakeholder engagement methodology & toolkit developed & validated

Communication strategy formed and applied

- Oesign completed:
 - Use cases, user requirements, technical specs. & architecture

Overlaps activities initiated and running

The Knowledge Powerhouse for CS on Law and Ethics launched and running:

- A living & open inventory of a variety of resources on ethical and legal aspects of CS
- To serve SOCIO-BEE and sibling projects







Want to learn more?

socio-bee.eu/



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