



## A CITIZEN SCIENCE PROJECT TO IMPROVE THE SELECTIVE WASTE COLLECTION SYSTEM IN MOLLET DEL VALLÈS 2022

*TRANSFORM Summary of Results*

Research coordinated by the Catalan Cluster of the TRANSFORM project:



**Science  
for Change**



**Generalitat  
de Catalunya**



**UNIVERSITAT DE  
BARCELONA**



**Ajuntament de  
Mollet del Vallès**

**UAB**  
Universitat Autònoma  
de Barcelona

Collaborating organizations:

The European project TRANSFORM brings together 3 European regions (Lombardy, Brussels-capital and Catalonia) to experiment with different innovative participatory methodologies to make research and innovation more responsible.

Specifically, a **citizen science pilot** has been carried out in Catalonia in the city of Mollet del Vallès to contribute to the improvement of the selective collection of municipal waste. Citizen science can be defined as a model of participatory research which actively involves citizens in some or all activities of a scientific research.



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*This pilot project has been developed by the company Science for Change, the Area of Economic Strategy of the Catalan Government, and the research group OpenSystems of the University of Barcelona, together with the City Council of Mollet del Vallès and the support of the Autonomous University of Barcelona.*

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## CHALLENGE

In Mollet del Vallès, the percentage of selective collection in 2020 was 39% (far away from the 55% required by the European Union for 2025 and the progressive increase required for the following years). In order to **increase the percentage of selective collection in the city**, the city council is considering changing the current selective collection system (open bins in the public space), for an **innovative system of selective collection** consisting of installing smart bins or door-to-door collection. Before making a final decision, the city council wanted to **listen and understand what citizens' preferences were**.

In order to contribute to this process, a pilot project was designed with the objectives of 1) **increasing citizens' knowledge about innovative waste collection systems**, opening up public debate and 2) **collecting citizens' assessments, preferences and barriers** to innovative waste collection systems.

## PHASES OF THE PROJECT

### 1. The challenge: citizen science to improve the separate collection system

Through its **participation in the TRANSFORM Think Tank** on Responsible Research and Innovation and citizen science, Mollet City Council proposes the challenge of **integrating citizens in the process of changing the city's selective collection system** (June-December 2020).

### 2. Co-design of the digital waste game *Dilemma-R*

A group of **10-15 inhabitants of Mollet**, together with students of the **Degree in Smart Cities of the Autonomous University of Barcelona** and different **departments of the city council** participate in four co-design sessions to define the contents of the game. Afterwards, the **digital development of the game** is carried out (March 2021-February 2022).

### 3. Use of *Dilemma R* as a citizen science tool

**60 secondary school students from 4 schools in Mollet** (Sant Gervasi School, Vicenç Plantada Secondary School, Anselm Clavé School and Mollet Study Centre) participate in the implementation phase of the game, in the data collection phase, in the data interpretation phase and in the formulation of proposals for the city council (March-May 2022).

### 4. Impact on public policies

The **results of the pilot** are taken into account by the city council when defining the **new waste collection and street cleaning public contract**, in which the use of innovative selective collection systems is integrated (June-September 2022).

*Image left*  
 Screenshot of the  
 Dilemma-R game  
 (Option in Catalan  
 and Spanish)  
*Image right*  
 Users of the game  
 in Mollet



\*¿En qué consiste esta bonificación?  
 Recuerda que, según las veces que hagas uso de la decalificación, puedes obtener una bonificación de hasta el 20% en tu tasa municipal de residuos.  
 ¡Te ayudamos a conseguir tu bonificación! Participar en Dilemma R equivale a un uso.



RESULTS OBTAINED AND RELATED PROPOSALS

With the *Dilemma R* game, **402 valid answers** were collected from the citizens. The **10 most relevant conclusions of the study** are summarised below together with the associated proposals that were drawn up by the professional research team of the pilot (Science for Change and Opensystems UB) and the secondary students participating in the project.

**The results and the proposals have been taken into account by the city council for the drafting of the new public contract for the street cleaning and waste collection.**

**1** The public knowledge of innovative waste collection systems is low and the knowledge of the current system, although higher, is not higher than 50%

Proposals of the professional research team:

To develop environmental education campaigns on the current status of the selective collection in the municipality and the characteristics of the innovative systems

**2** The vast majority of inhabitants who stated that they had no prior knowledge of the innovative systems have acquired it after playing the game

Proposals of the professional research team:

To use *Dilemma R* as an environmental education tool in other projects

**3** A large majority of inhabitants surveyed opted for smart bins

Proposals of the professional research team:

To develop pilots of smart bins with user identification in different neighbourhoods

To extend the research on the preference in all neighbourhoods to collect more data

Students proposals:

Implement smart bins in high density residential areas

Implement bins that generate a label to identify the generator of each bag

Generate a system so that the collection staff can check that the contents of the bags are correct but without violating privacy

**4** As an exception, in the neighbourhood of Santa Rosa, the preference for door-to-door collection or smart bins has been very evenly matched

Student proposals:

To develop a combination of both systems but surveying neighbours again to widen the sample and validating the results

**5** The majority of the inhabitants surveyed showed themselves to be sensitive to environmental issues and in favour of receiving economic incentives for the use of new systems, despite the fact that this may imply certain limitations to citizens' privacy or convenience\*

**6** Economic incentives seem to have greater potential as facilitators of the adoption of innovative systems than environmental benefits, except when faced with the possibility that the new systems generate more dirt on the streets

Proposals of the professional research team:

In the implementation of innovative selective collection systems, integrate incentive systems as a way of testing from the outset

In the information campaign associated with the implementation of the new systems, emphasise the environmental messages and the incentive system

Combine these information campaigns with educational campaigns that focus on the environmental impacts of waste and the environmental benefits of the new systems

**7** Similar number of people opting to receive economic incentives either at the individual or communal level

Proposals of the professional research team:

Generate a combined system of individual and collective incentives

Develop community panels to define how incentives will be distributed or link them to participatory budgets

Student proposals:

Design a prototype of a smart bin that works with a neighbourhood card and not a personal card

To create a campaign explaining the difference between an individual and a collective economic benefit



RESULTS OBTAINED AND RELATED PROPOSALS

8 Limitations to privacy have not emerged as a very relevant aspect when set against environmental benefits, and even less when set against economic benefits

No proposal related

9 There are two practical aspects that require attention as possible barriers to implementation: 1) the limited time and schedule associated with the door-to-door system; 2) the possibility that the new system generates more dirt on the streets

Proposals of the professional research team:

During the implementation of innovative systems, provide all the necessary resources to avoid the feeling of increased dirt in the streets

Student proposals:

In the case that a system with limited timetables and calendars is implemented, design a flexible system with different time slots

Design a system to encourage citizens to clean the streets (e.g. automatic financial reward)

10 For people aged 65 and above, the complexity of using a card or a mobile phone to operate the bins is a more important barrier than having to adapt to a timetable or calendar

Student proposals:

In the case of implementing the smart bin system for the elderly it would have to be by means of a card and not by mobile phone

Give specific support to the elderly through training and/or street assistants

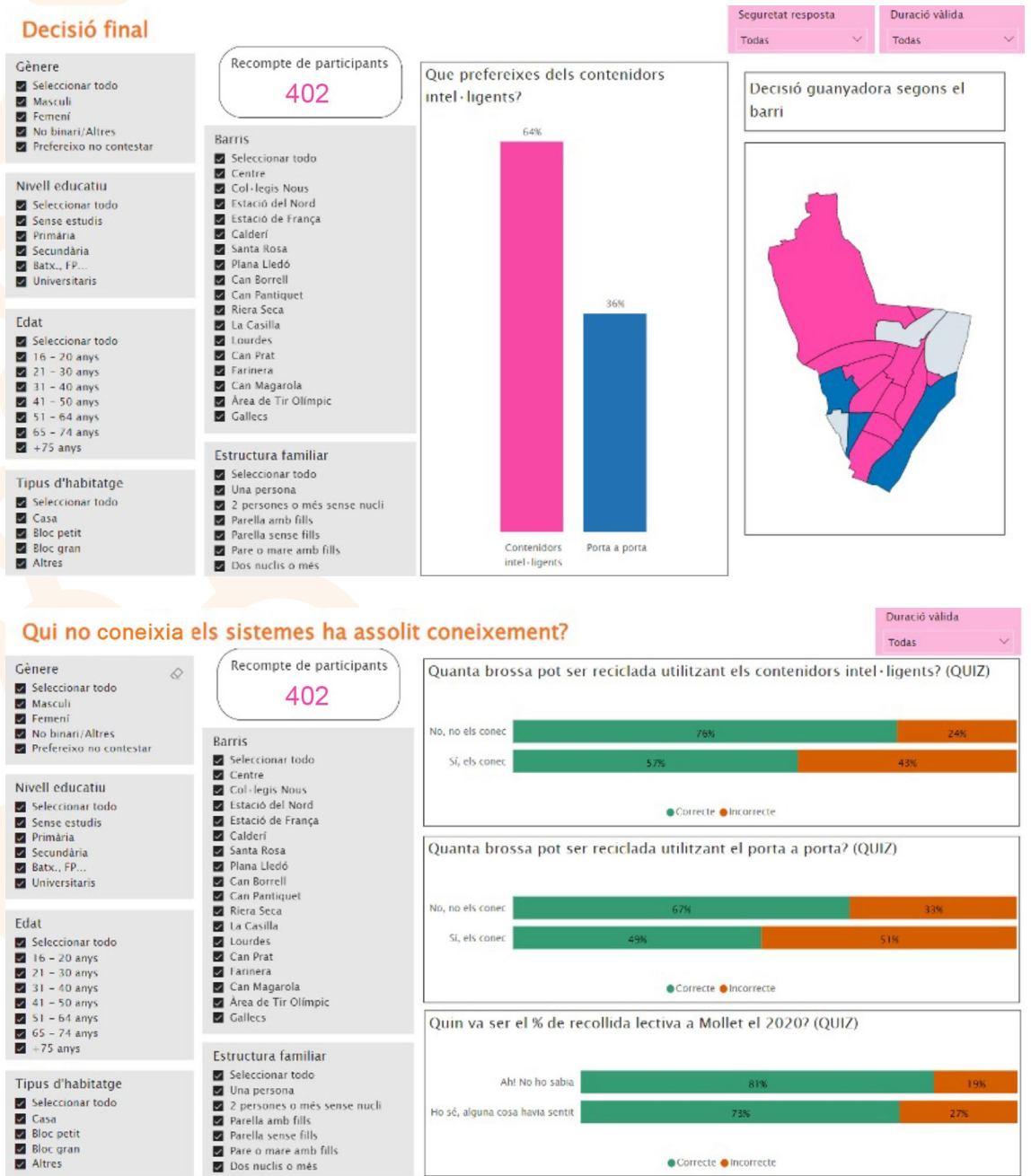
\* **Privacy:** the fact that innovative systems imply greater control by the public administration.

**Convenience:** the fact that innovative systems may imply 1) a limitation in the time and/or schedule on waste disposal, 2) initially, more dirt in the streets, 3) having to use a card or a mobile phone to open the bins.

LIMITATIONS OF THE STUDY

Although 402 valid entries to the game were obtained (which represents a statistically significant sample of the population of Mollet del Vallès), it should be borne in mind that there are certain strata (age ranges, types of housing, etc.) that are over- or under-represented in the sample, a fact that could lead to biases. On the other hand, even though the sample is representative of the total population, a representative sample of each stratum has not been obtained separately, a fact that can also lead to biases.

The results shown are, therefore, sample's results and should not be directly extrapolated to the whole population. The results, however, allow us to identify trends that point in certain directions and that can serve as a guide for policy decisions related to the new waste collection system. The trends identified would need to be studied in a larger sample in order to confirm the relationship between variables.



Images above  
Screenshots of the analytical results of Dilemma R

## ACKNOWLEDGEMENTS

This research has been possible thanks to the active participation, the motivation and enthusiasm of 60 students from 4 schools in Mollet del Vallès (Sant Gervasi School, Vicenç Plantada Secondary School, Anselm Clavé School and Mollet Study Centre) who took part in the phase of implementation of the game, in the involvement of the city's citizens and in the phase of interpreting the data and formulating proposals.

15 citizens of Mollet del Vallès also took part in the co-design phase of the digital waste game. We would like to thank them for their participation and we hope that they have enjoyed the experience of being part of a project with an impact on public policies in their city.

We would also like to thank the students of the Smart Cities degree of the Autonomous University of Barcelona who collaborated as facilitators in the participatory sessions. We hope that this collaboration has served as a fruitful experience in their training and professional endeavours.

For more information on the new model of selective waste collection in Mollet del Vallès, please contact the Area of Environmental Justice and Urban Landscape of Mollet del Vallès City Council.

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