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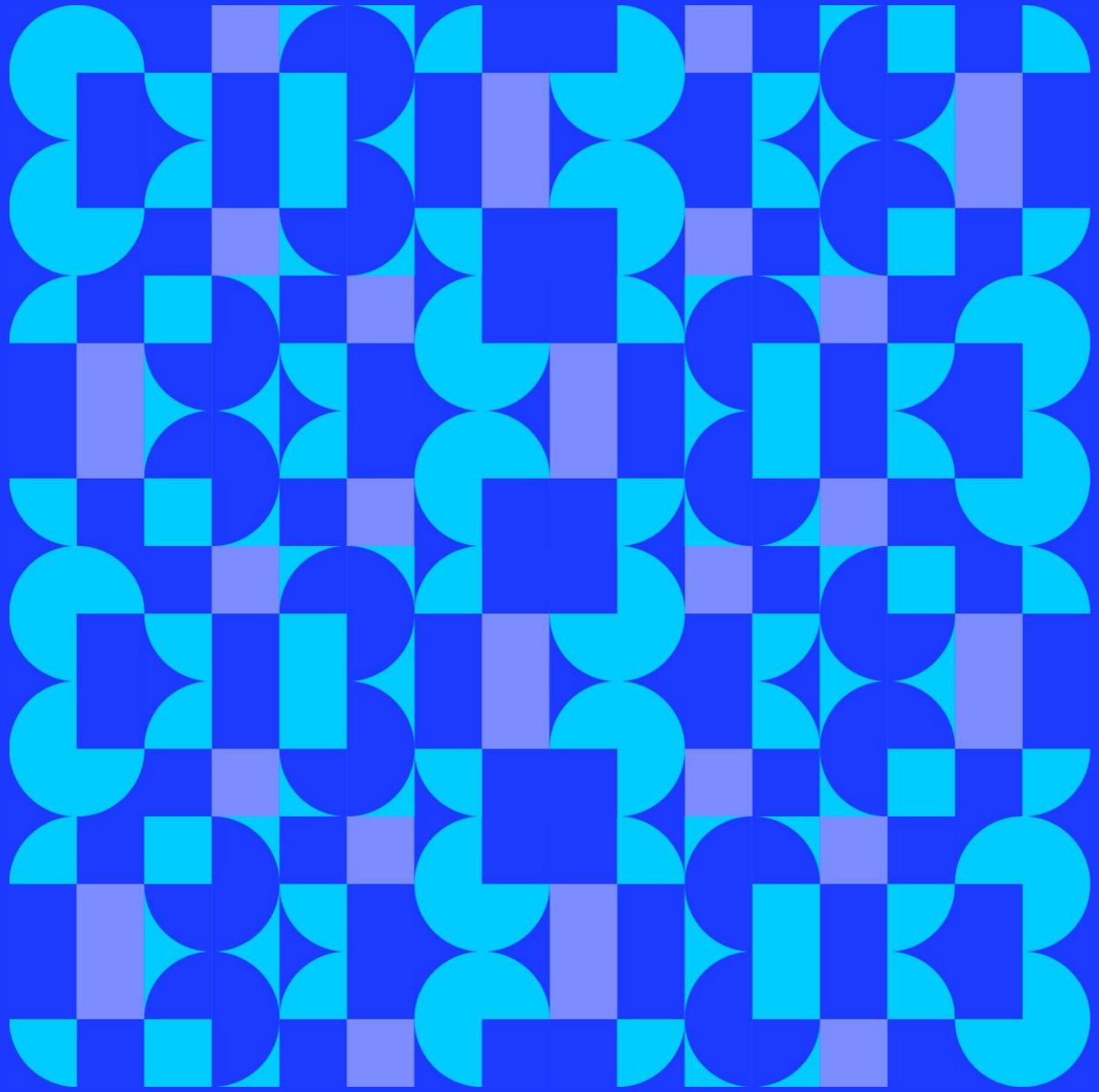
Cartagena, Molina de Segura & Torre Pacheco

Urban Security in Historical City with Key Critical Infrastructure



Ayuntamiento de Cartagena
Ayuntamiento de Molina de Segura
Ayuntamiento de Torre Pacheco

Cartagena, Molina de Segura, Torre Pacheco – **Storytelling & Challenges**

POINT A
PREMISE

How can we support local authorities and decision makers in enhancing traffic management and urban security in historic city centers, where high population and vehicle density increase the risk of incidents and public safety challenges?

CHALLENGES

- **Environmental Health:** Air quality, noise, and light pollution
- **Safety:** Pedestrian and cyclist safety; crime prevention
- **Climate Adaptation:** Heat, radiation, ozone; Low Emission Zone compliance
- **Governance:** Shift to data-driven decisions (datacracy)
- **Participation:** Publish clear data to engage residents

CURRENT STATUS

- **Digital services developed** integrating air quality, noise levels, crowd monitoring and traffic data.
- **Interactive platforms running** with live or static data visualization
- **HVDs integrated** and shared via BeOpen CKAN

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

ANALYSIS PROCESS

1. Using the available information, a statistical calculation rule is created based on data availability, data quality, and compliance with regulatory results.

2. We cross-referenced the data and related them to each other.

3. The data are analyzed.

4. Conclusions are drawn.

DECISION-MAKING PROCESS. DATACRACY. PUBLIC DATA

- Decisions are made based on these conclusions
- The results are analyzed to determine whether they are appropriate.

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Decisions adopted in the **Cartagena** pilot:

- Traffic calming with massive non-restrictive measures.
- Specific restrictions on loading and unloading (heavier, more polluting vehicles) until 11:00 a.m.
- Promotion of electric vehicles, charging points in these areas, and free parking.
- Traffic calming with street restructuring. We're seeking funding (traffic calming, renaturalization, reduction of light impact on homes due to vegetation: decision to develop a project and seek funding).
- Lighting distribution based on road safety: targeting high-traffic areas, non-targeting urban residential areas.

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Decisions adopted in the **Torre Pacheco** pilot:

- Traffic calming
- Promotion of electric vehicles, charging points
- Traffic calming with street restructuring
- Expansion of the sensor network
- Implementation of Sustainable Urban Mobility measures
- Speed limit in the city center to 30 km/h
- Installation of speed bumps on main avenues
- Construction of a cycle path
- Installation of a vegetation strip between the cycle path and
- the avenues. Renaturalization.
- Installation of license plate reading cameras and measurement
- of environmental parameters. Expansion of HVDs.
- Publication of data on open data portals

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Main decisions taken in the **Molina de Segura** pilot:

- Promotion of electric vehicles, charging points in these areas, and free parking.
- Pedestrianization of several streets in the center
- Establishment of a low-emission zone
  - Regulation and publication of the municipal ordinance
  - Launch of the procedure for registering authorized vehicles
  - Penalties for unauthorized vehicles begin on January 1st, 2026

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

- HVDs identified and improved

Dataset	Use	Score Baseline	Score Achieved
Air quality	Validation role for DS, Visualisation	40%	100%
Noise levels	Development of DS	30%	100%
Crowd monitoring	Development of DS	30%	100%
Traffic data	Validation role for DS, Visualisation	30%	100%

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

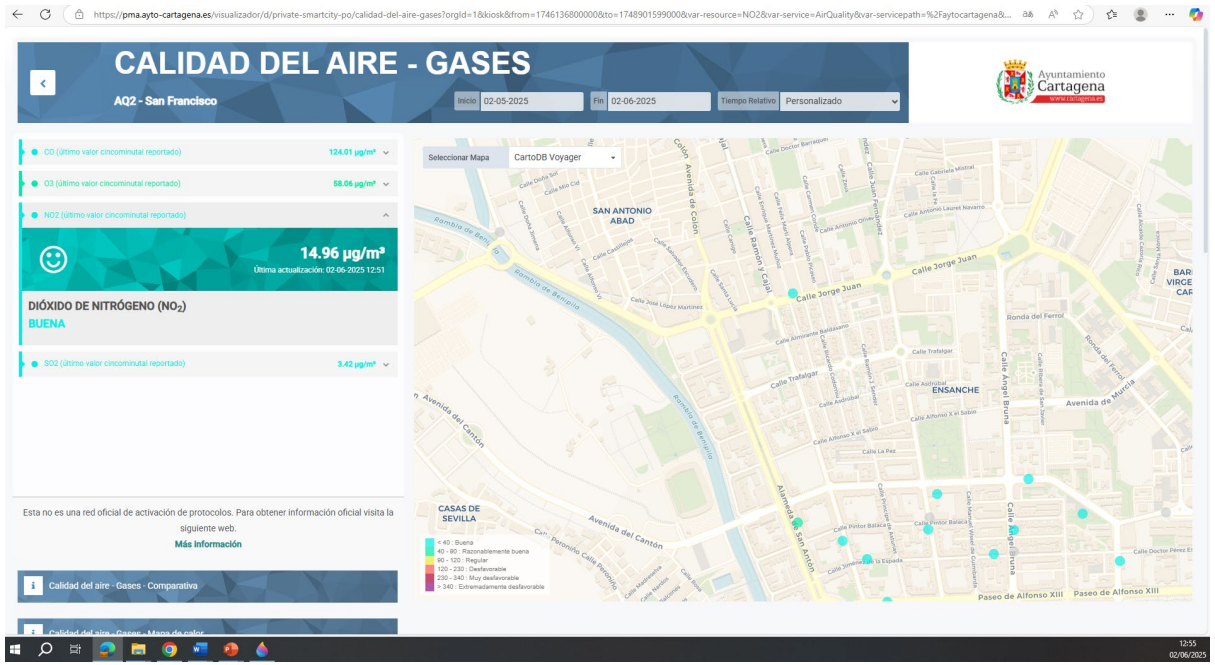
Digital Service:
Data Visualisation and Acquisition Platform: air quality, crowd monitoring, noise levels

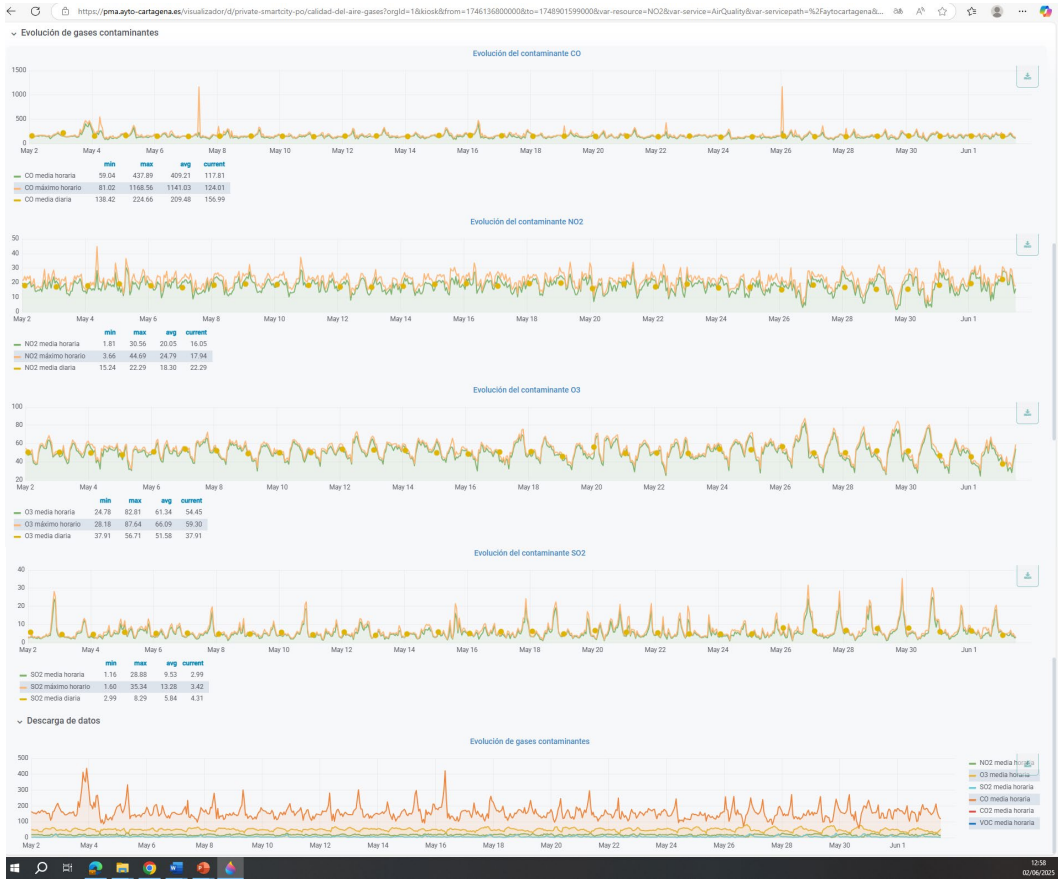
https://pma.ayto-cartagena.es/visualizador/
https://torrepacheco-opendata.hopu.eu/
https://ciudadinteligente.molinadesegura.es/

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

Cartagena's air quality

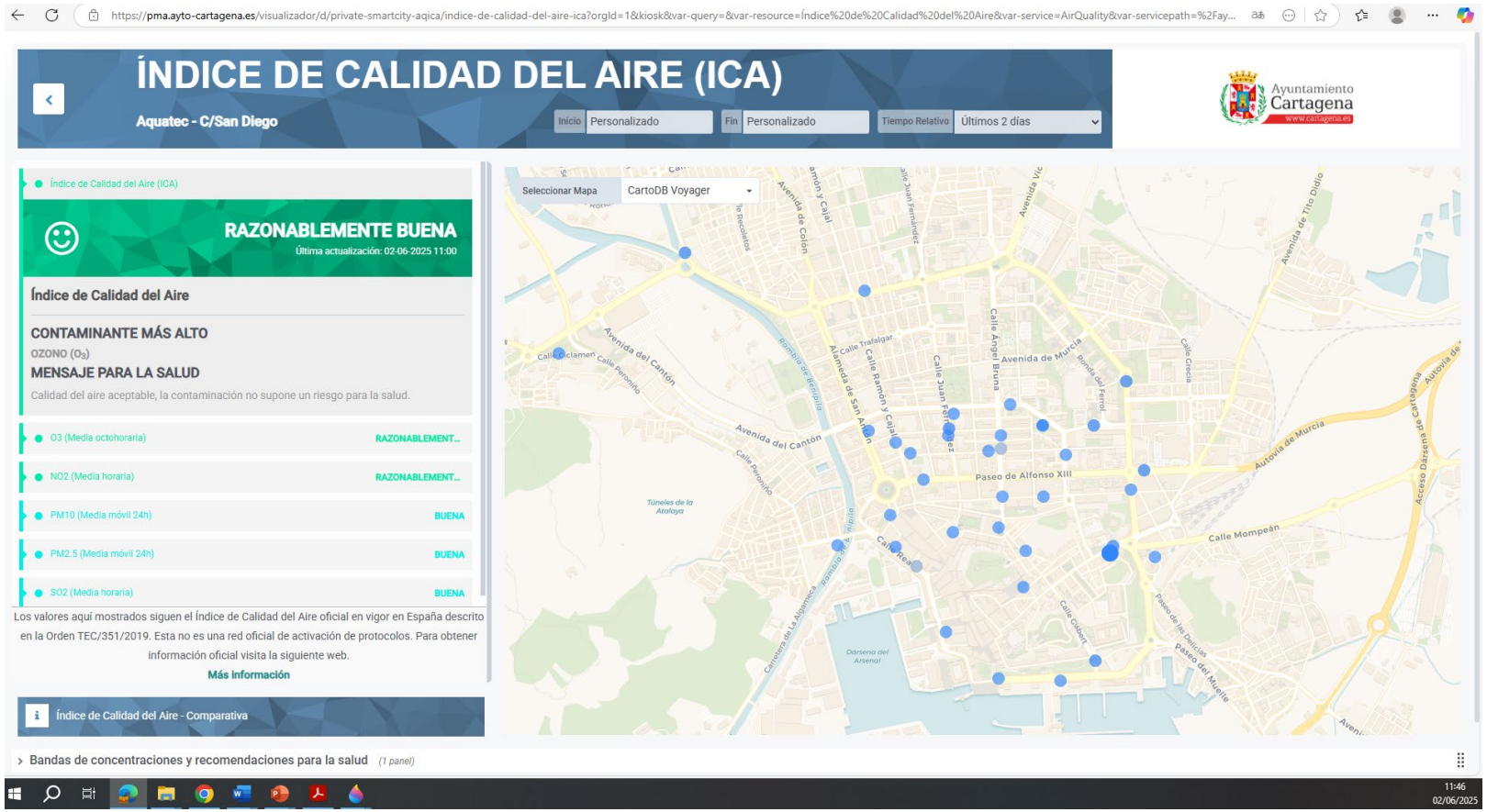




Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

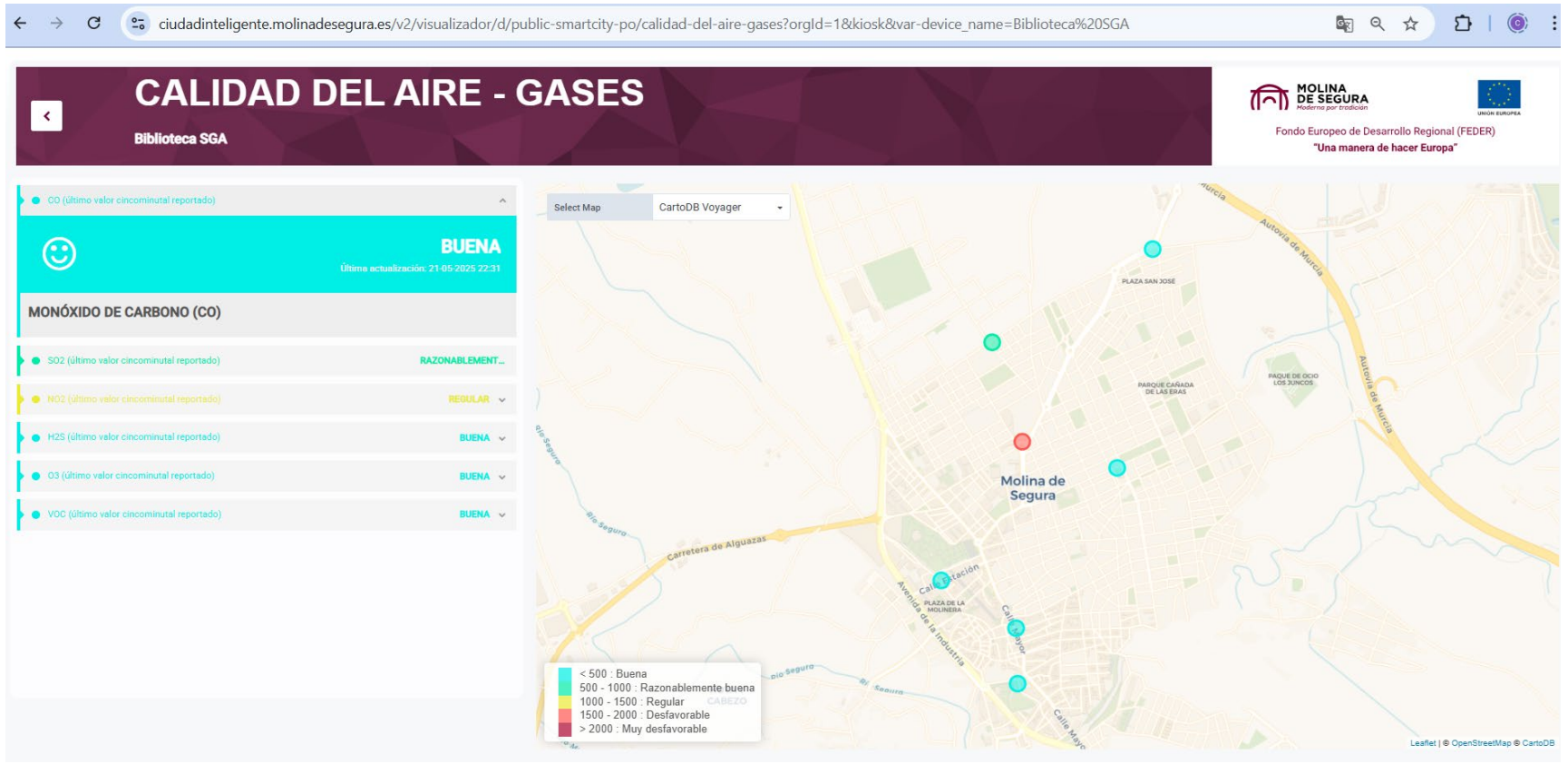
Cartagena's air quality index



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

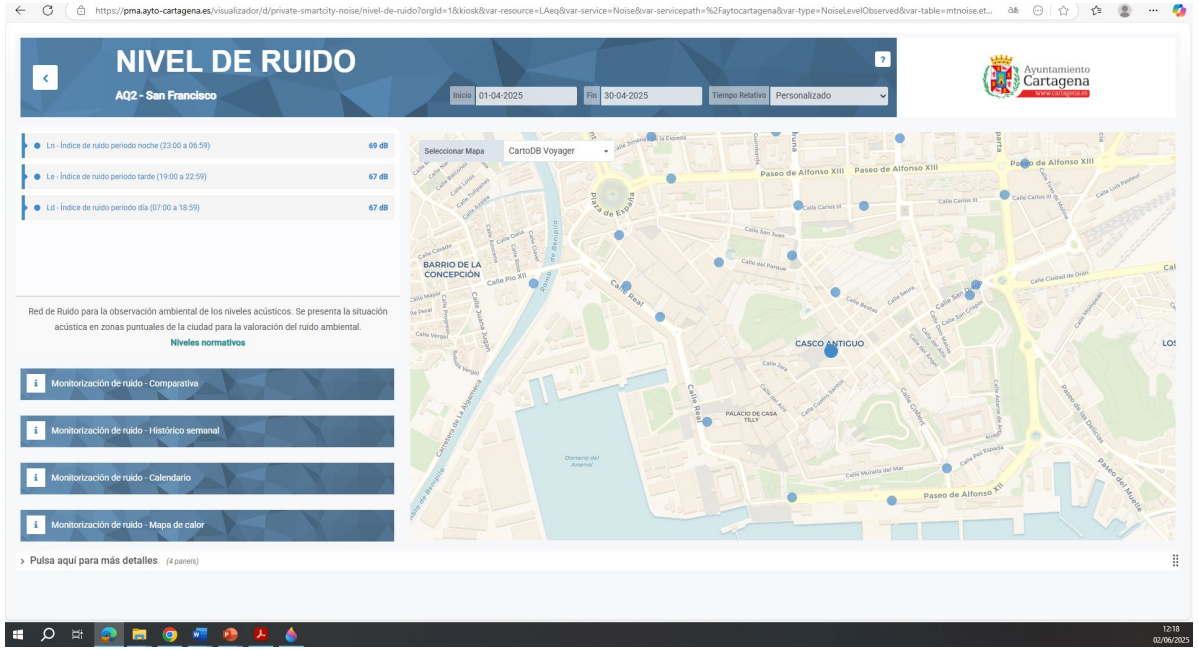
Air quality

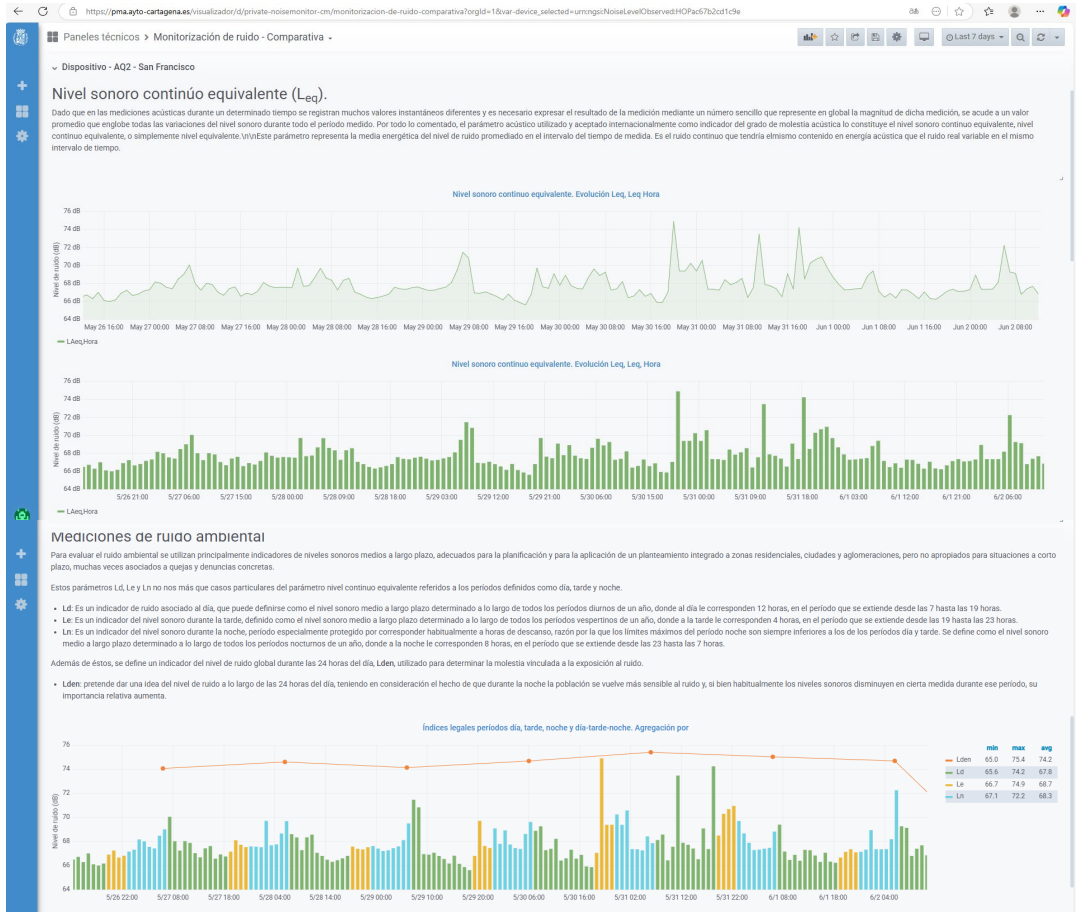


Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

Cartagena's noise levels

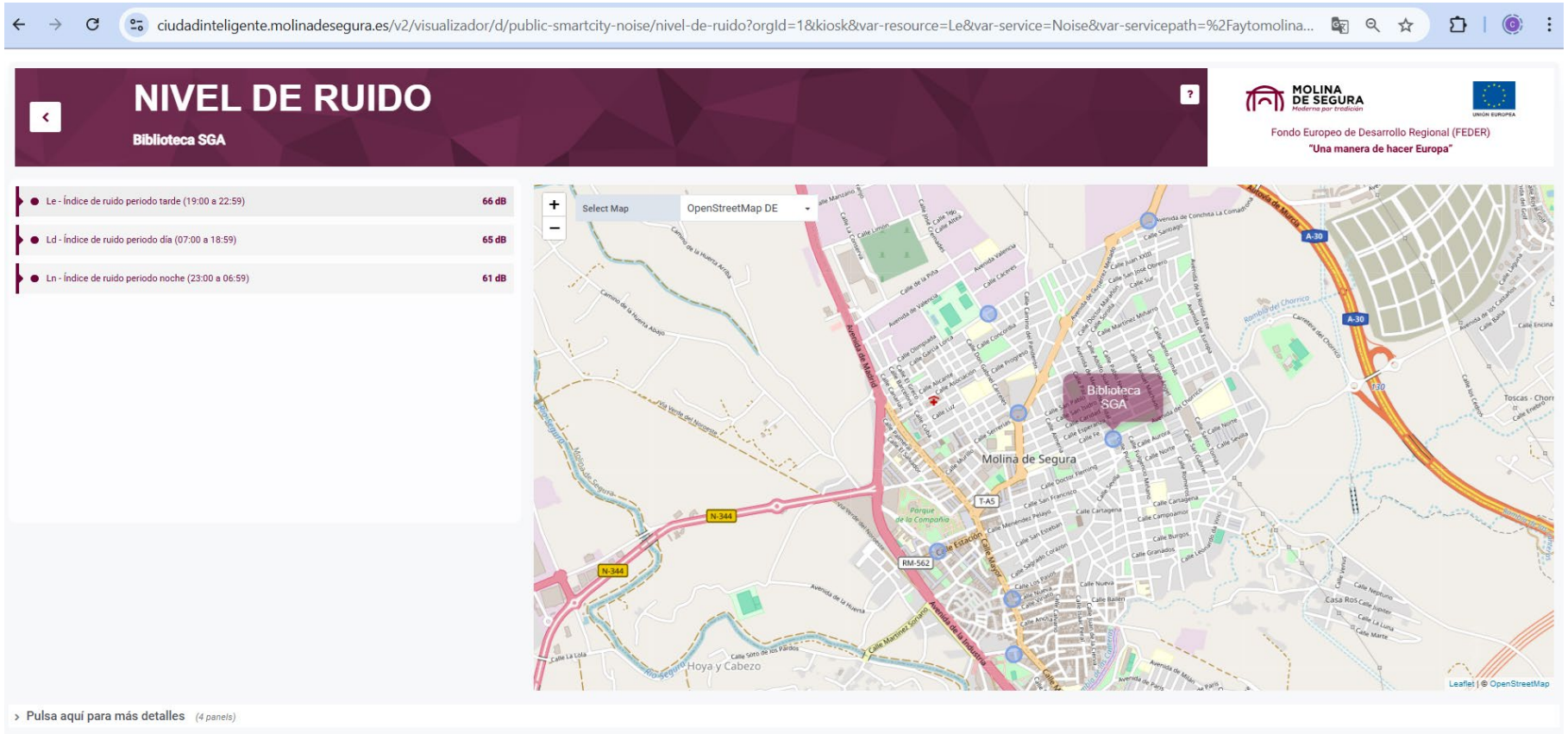




Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

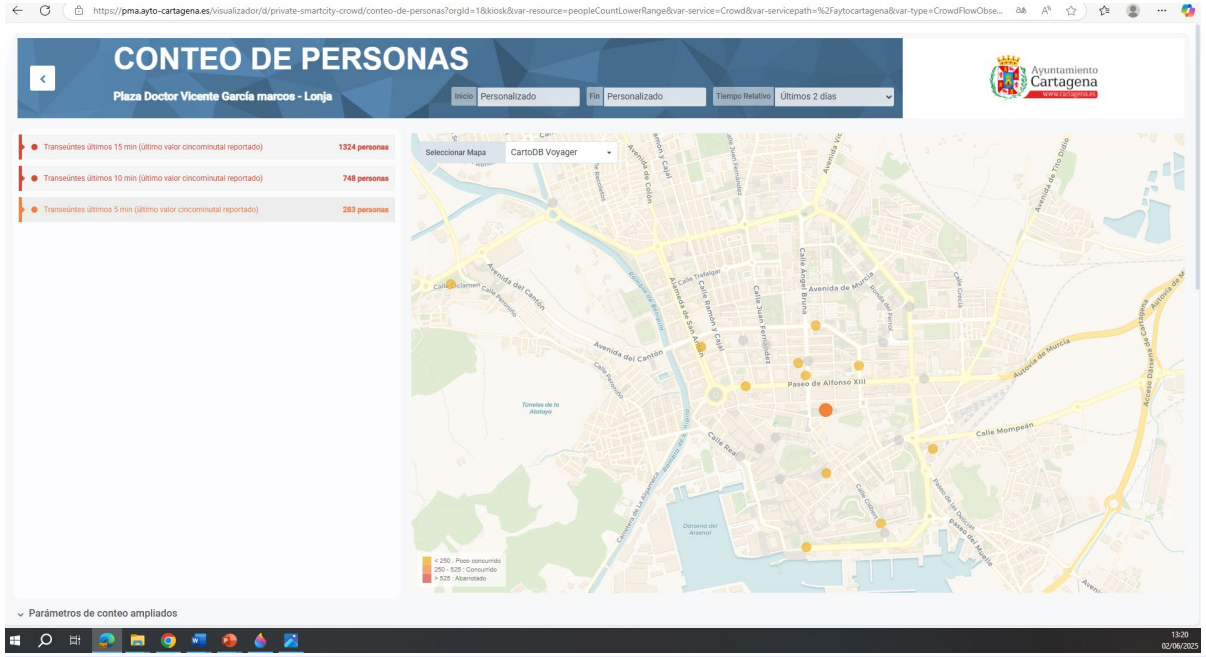
Noise levels

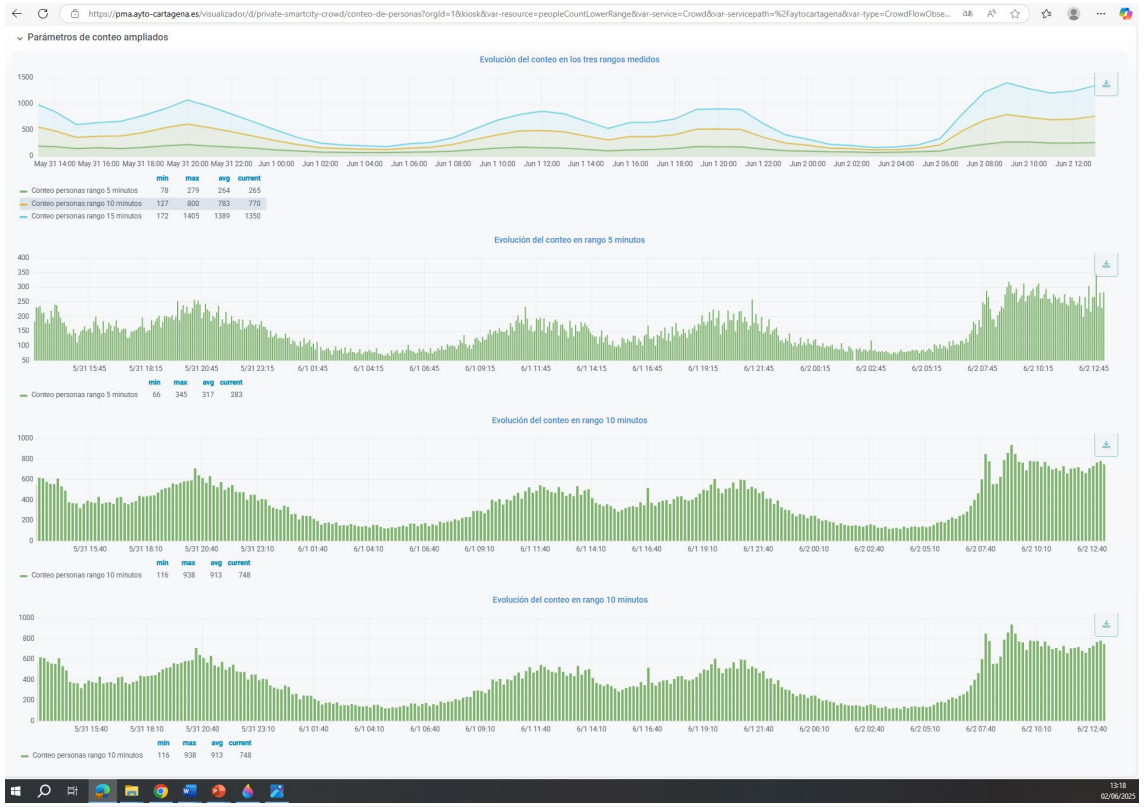


Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

Cartagena's crowd monitoring

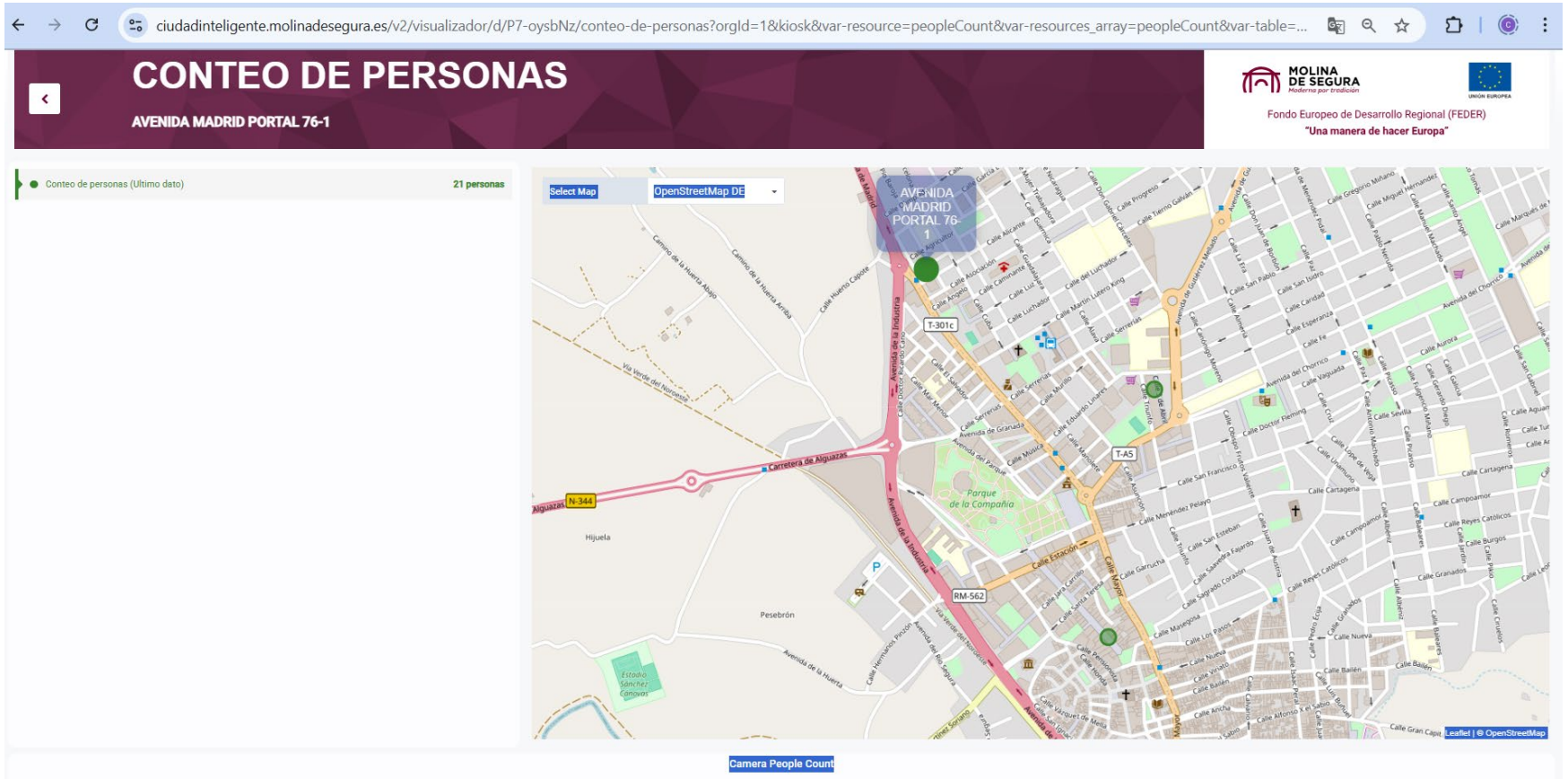




Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

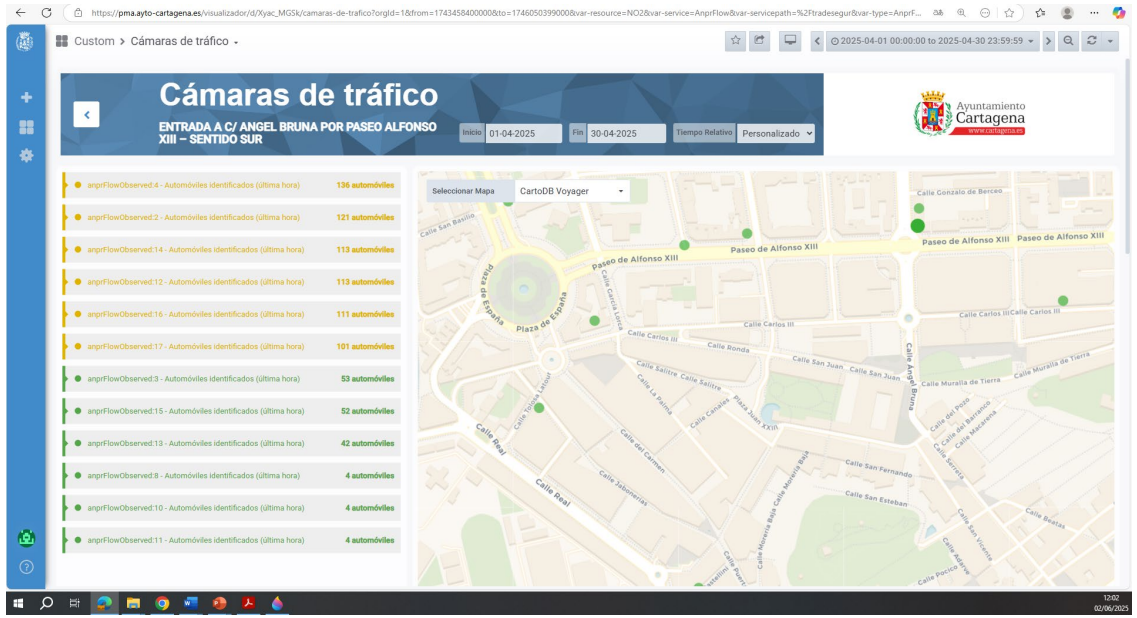
Crowd monitoring



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

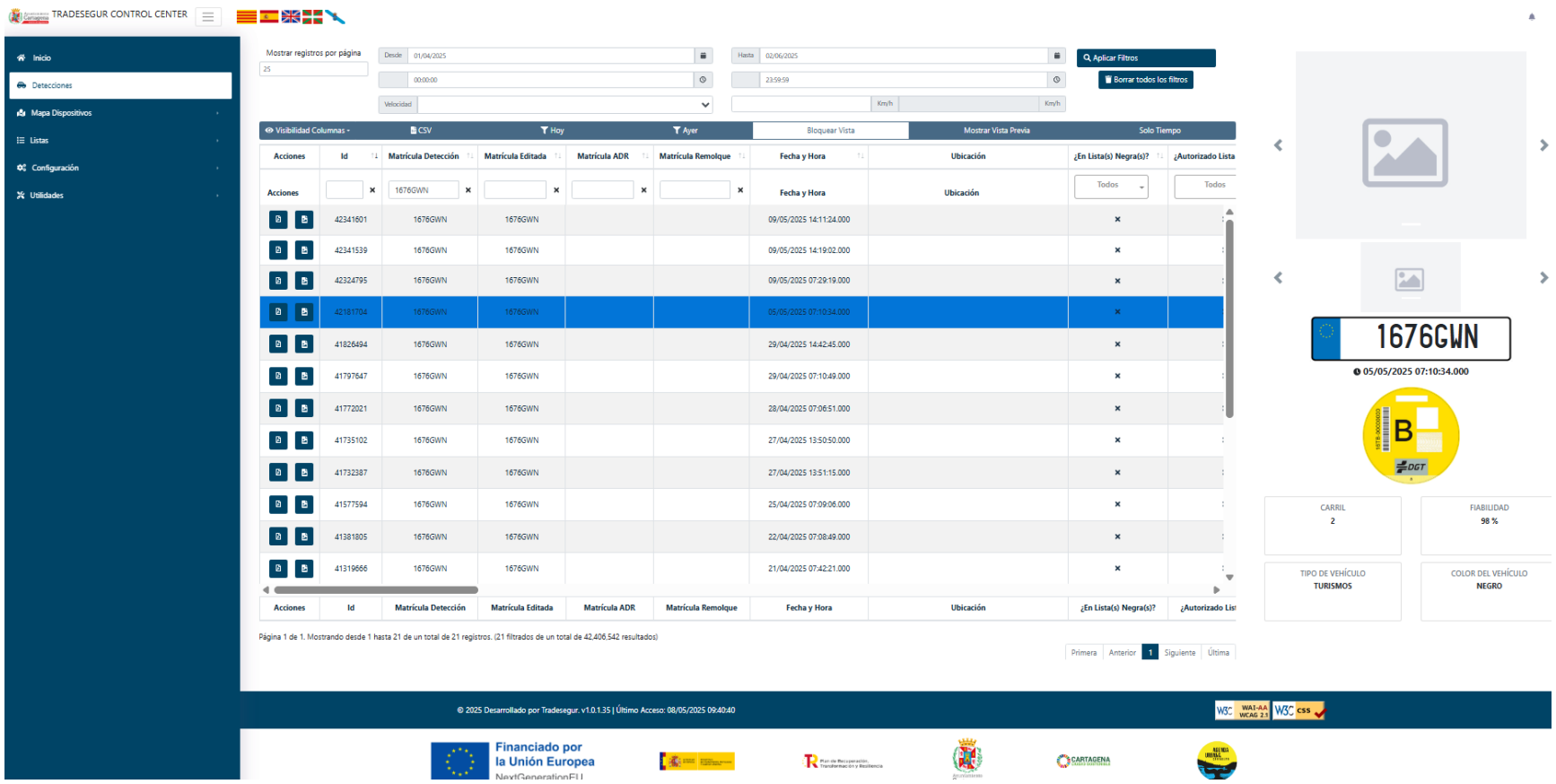
Cartagena's traffic data



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

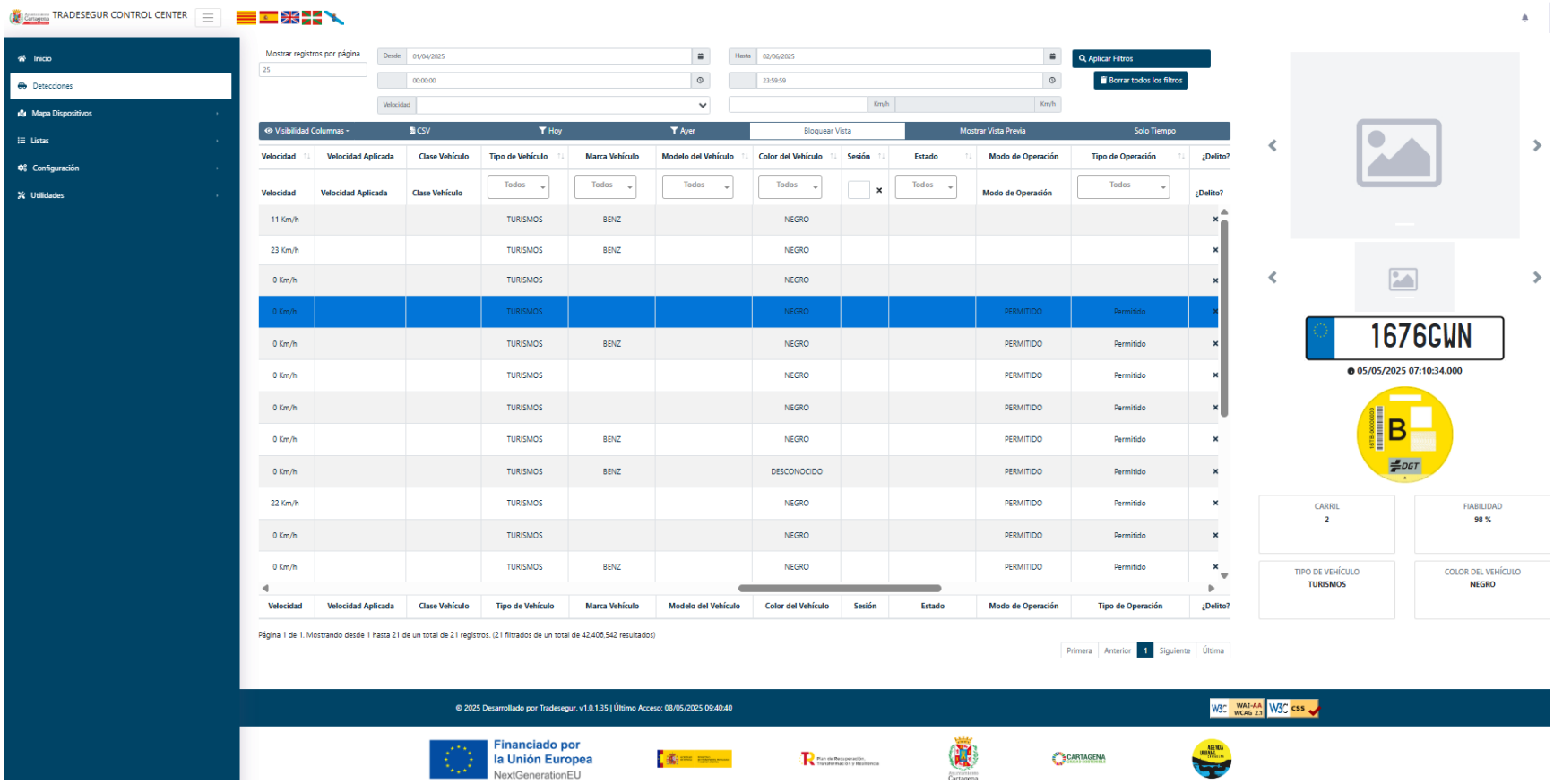
Cartagena's traffic data



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

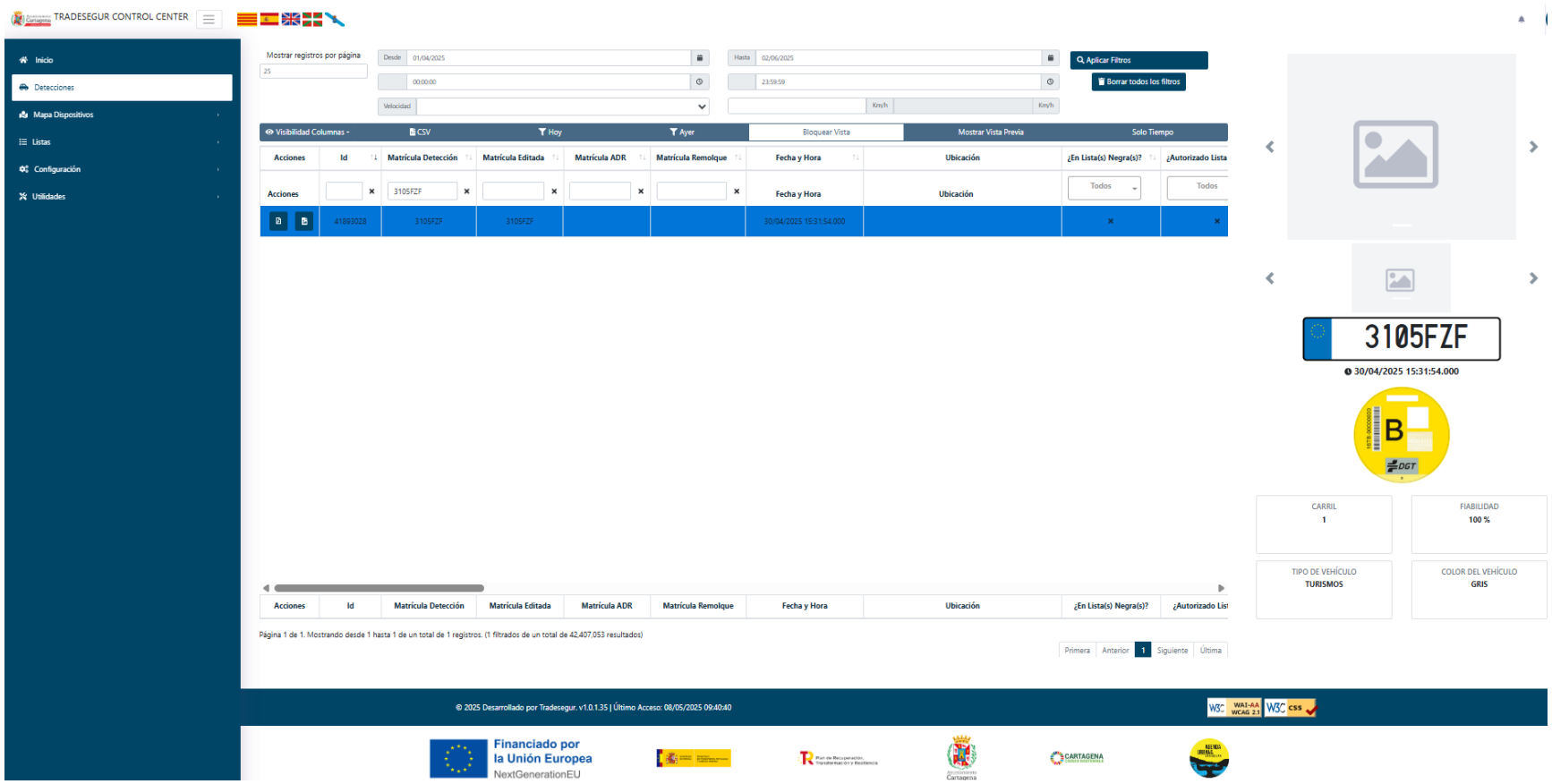
Cartagena's traffic data



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

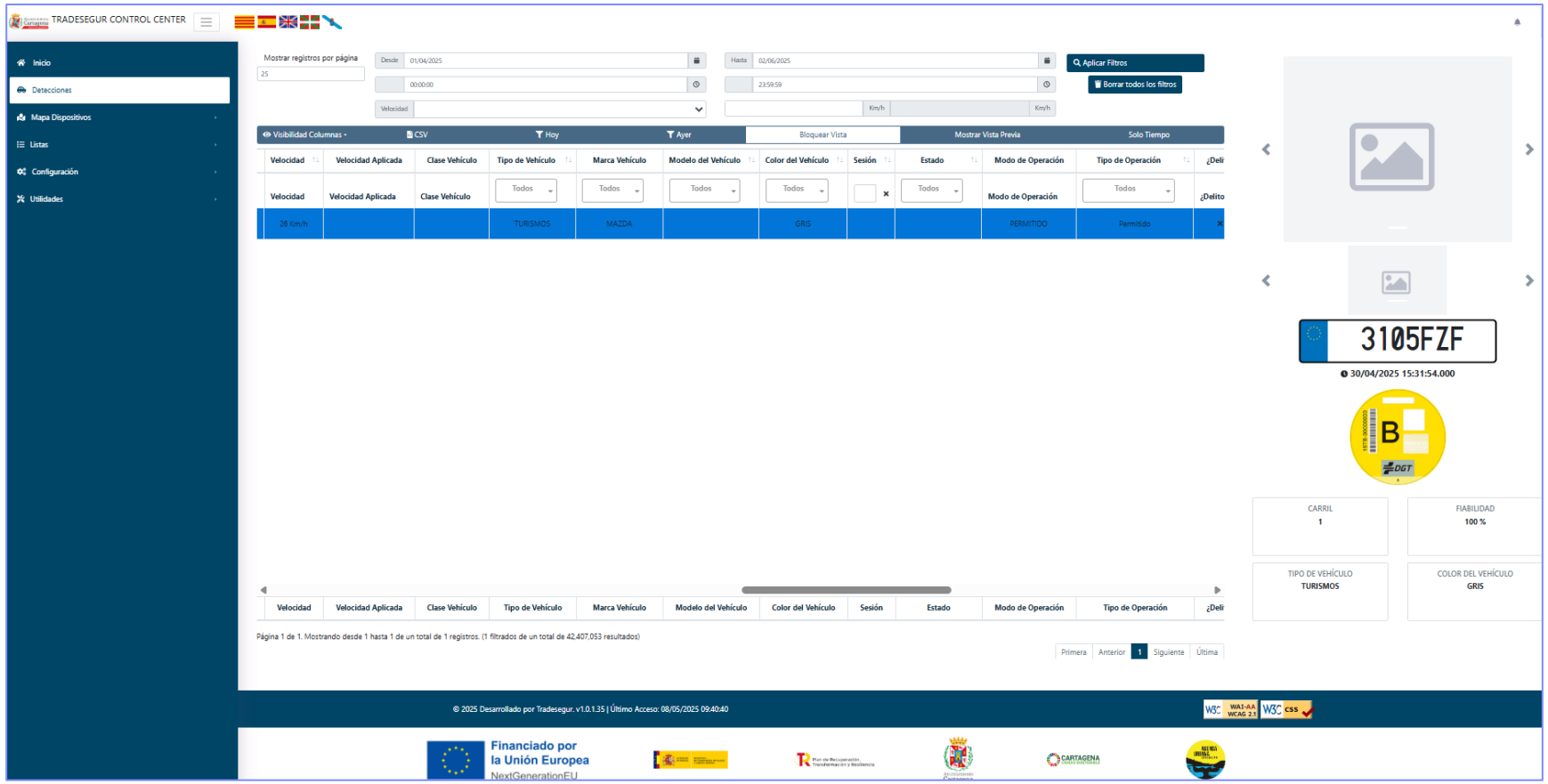
Cartagena's traffic data



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

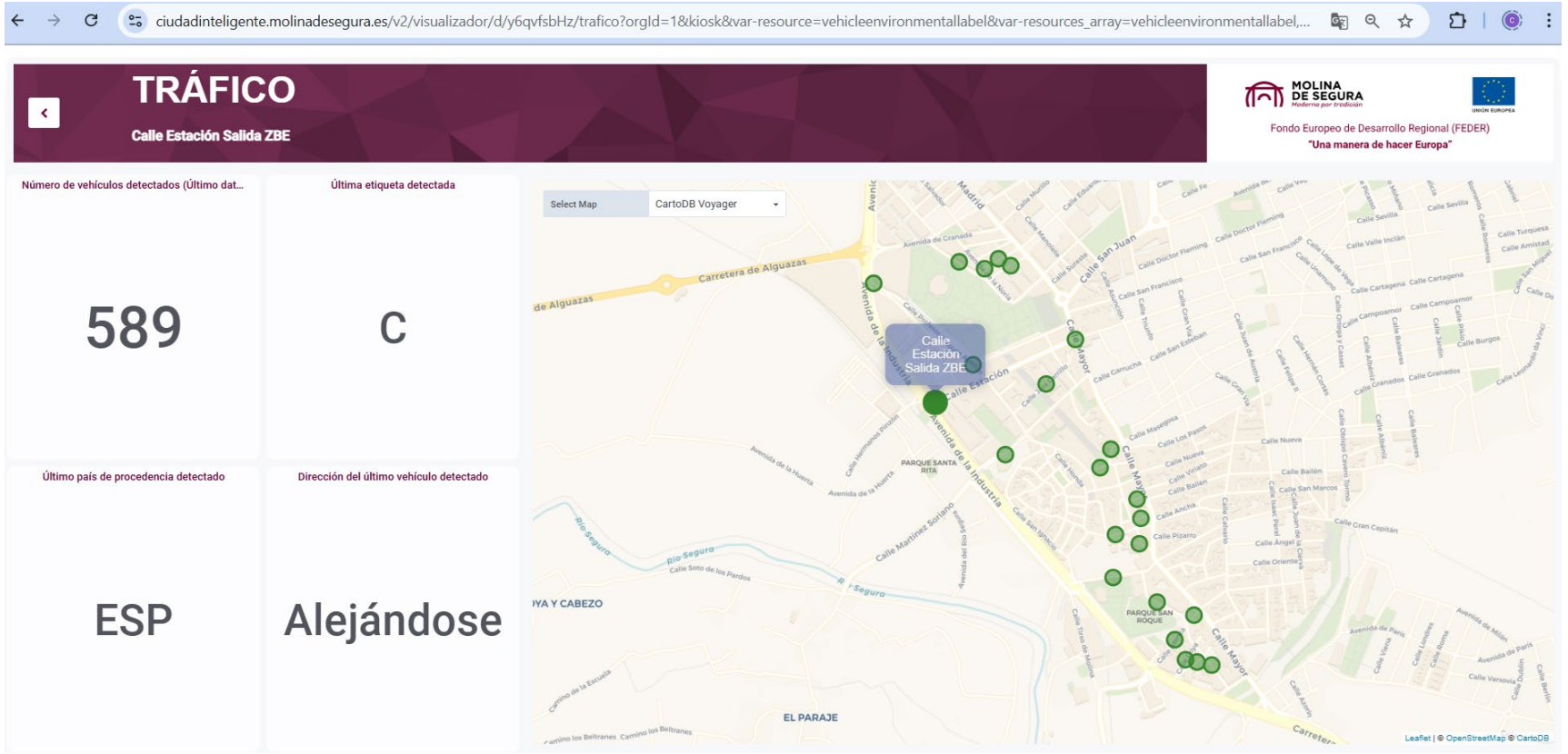
Cartagena's traffic data



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

Traffic data



Cartagena, Molina de Segura & Torre Pacheco – **Stakeholder involvement**

- Meetings and videocalls
- Baseline Surveys
- 1st Iteration feedbacks
- 2nd Iteration feedbacks
- Demo Event (Cartagena, May 21st; Molina, May 7th; Torre Pacheco, May 8th)
- Impact Assessment Surveys

Cartagena, Molina de Segura & Torre Pacheco – **Stakeholder involvement**

Iterations/Stakeholders Feedback

- **4 main functionalities evaluated:**
  - Interactive Urban Data Maps
  - Advanced Data Visualization & Comparison Tools
  - Data Download
  - User Engagement & Accessibility

- **Feedback and changes made between iterations:**
  - Map improvements: clearer sensor names and more descriptive metadata.
  - Visualization updates: mini-graphs, sensor comparisons.
  - Download options: more flexible exports, now with sensor metadata.
  - Governance/maintenance: starting internal discussions and defining workflows for long-term support.

Cartagena, Molina de Segura & Torre Pacheco – **Lessons learnt**

- **Urban security is multi-dimensional**
  Effective solutions require combining data from multiple sources (e.g. traffic, air quality, crowd levels) — no single indicator is enough (social, economic, environmental, traffic, incidents, income, poverty, age, medical…).
- **Data must be understandable to be useful**
  Real-time data is powerful, but only when presented in clear, actionable formats for municipal staff and responders.
- **Cross-departmental collaboration is essential**
  Urban safety involves urban planning, local police, emergency services, and IT — BeOpen helped foster that coordination.
- **Local context matters**
  Smaller municipalities like Torre Pacheco face resource constraints. The solution must be scalable and lightweight, not one-size-fits-all.
- **Citizen trust grows with transparency**
  Publishing safety-related data in open formats increases public confidence and enables communities to participate more actively in safety efforts.
- **Digital twins** of urban metabolism represent the future of sustainable and data-driven city management.
- **AI is rapidly transforming urban life, citizen participation, and democratic governance** — and public administration must be ready to adapt.

Cartagena, Molina de Segura & Torre Pacheco – **New approach after adopting BeOpen?**

What Changed with BeOpen

- Shifted from **reactive incident response** to a **data-informed prevention model**
- Integrated diverse datasets (noise, air quality, traffic, pedestrian presence) into a **single visual platform**
- Enabled real-time **risk monitoring** in public spaces, especially in high-density or vulnerable zones
- Fostered **collaboration between departments** (urbanism, local police, emergency services)
- Opened access to urban safety data for **greater transparency and public trusted** data

Strategic Value of BeOpen

- Urban security is now seen as a **cross-cutting digital service**, not just an operational issue
- Encouraged a **replicable framework** for smaller municipalities
- Positioned the platform as a tool for **evidence-based safety planning**, emergency preparedness, and citizen communication
- Reinforced the value of **open data and community engagement** in public safety
- Participation in other EU projects such as Re-Allocate and BeatTheHeat

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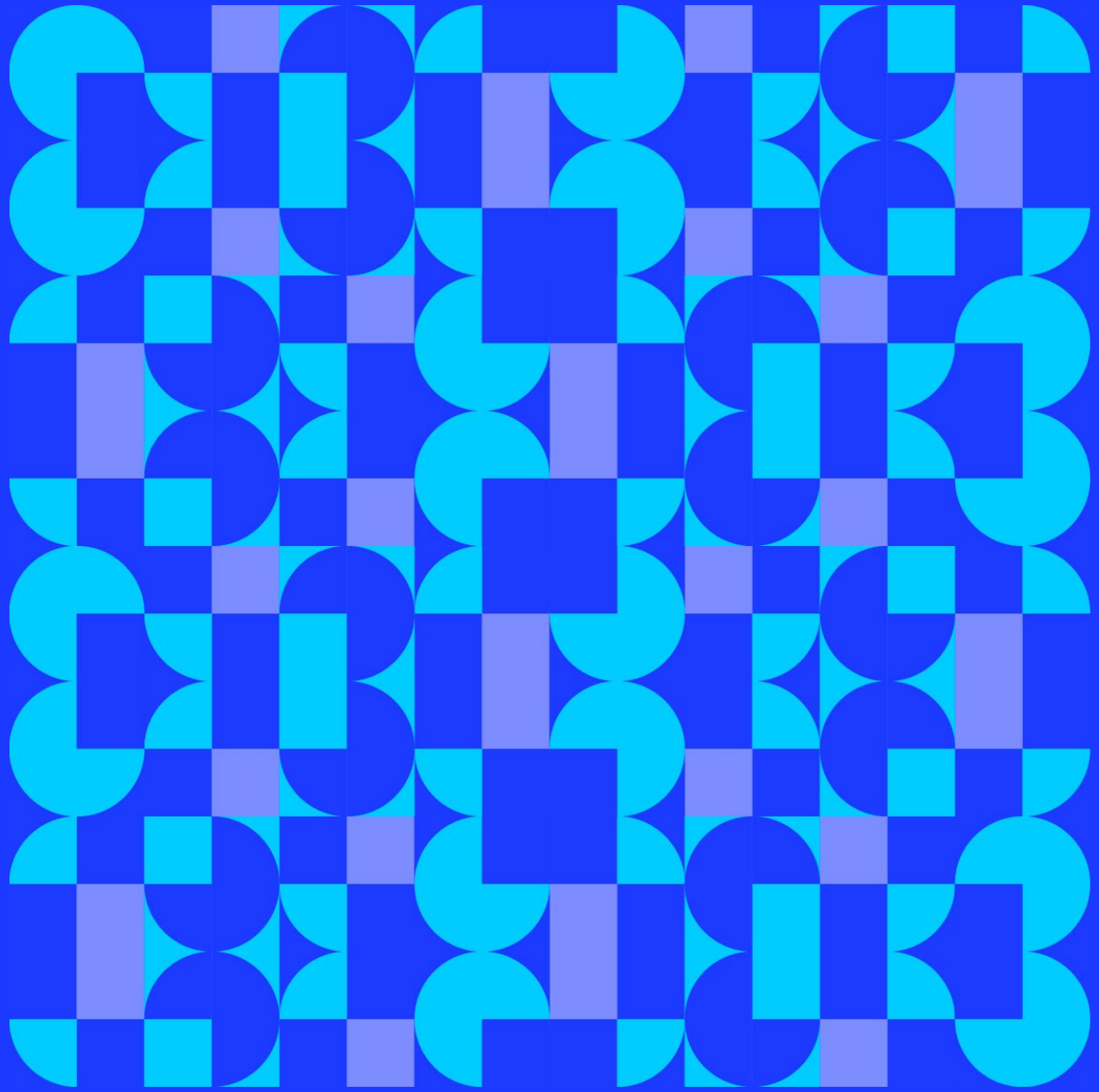
Cartagena, Molina de Segura & Torre Pacheco
Sustainable introduction of LED lighting
and its health impact



Ayuntamiento de Cartagena
Ayuntamiento de Molina de Segura
Ayuntamiento de Torre Pacheco

Cartagena, Molina de Segura, Torre Pacheco – **Storytelling & Challenges**

POINT A PREMISE

How can we use high-value datasets (HVDs) to optimize LED street lighting in a way that balances energy efficiency, improved visibility, and the protection of public health from blue light exposure?

CHALLENGES

- **Multifactorial causes** of LED-related health issues make direct correlation complex
- **Lack of integrated datasets** linking lighting exposure with health outcomes
- **Difficulties in data sharing** and coordination with public health authorities (e.g., Servicio Murciano de Salud)
- Need for **cross-sector collaboration** (urban planning, public health, energy)

CURRENT STATUS

- **Platform developed** with **static information** on:
  - Light intensity and energy consumption
  - Geolocated lighting infrastructure
- Used for **initial analysis and stakeholder engagement**
- **Health data** acquired is svary limited and static
- Stakeholder input collected to **guide future functionality**

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Performed Activities

- 1st Iteration
- 2nd Iteration
- DS improvements and HVD incorporations
- Screen recordings DS
- Replicability Surveys

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Decisions adopted in the Torre Pacheco pilot:

- Development of luminosity maps of the municipality.
- Analysis of the impact of blue LED light on health, analysis of the optimal relationship between color temperature and energy consumption.
- Study of lighting replacement in the pilot area. Analysis of energy consumption and color temperature.
- Energy audit. Luminosity maps of the entire municipality and the San Antonio Neighborhood pilot area.
- Sharing data with stakeholders.
- Publication of data on open data portals.
- Implementation of technology in new projects with color temperatures and light spectra free of blue input to protect the night sky and health

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Main decisions taken in the Molina de Segura pilot:

- Changing lighting in industrial areas
- New lighting in sports facilities
- New lighting in peripheral areas
- Replacement of LED lighting on downtown streets

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

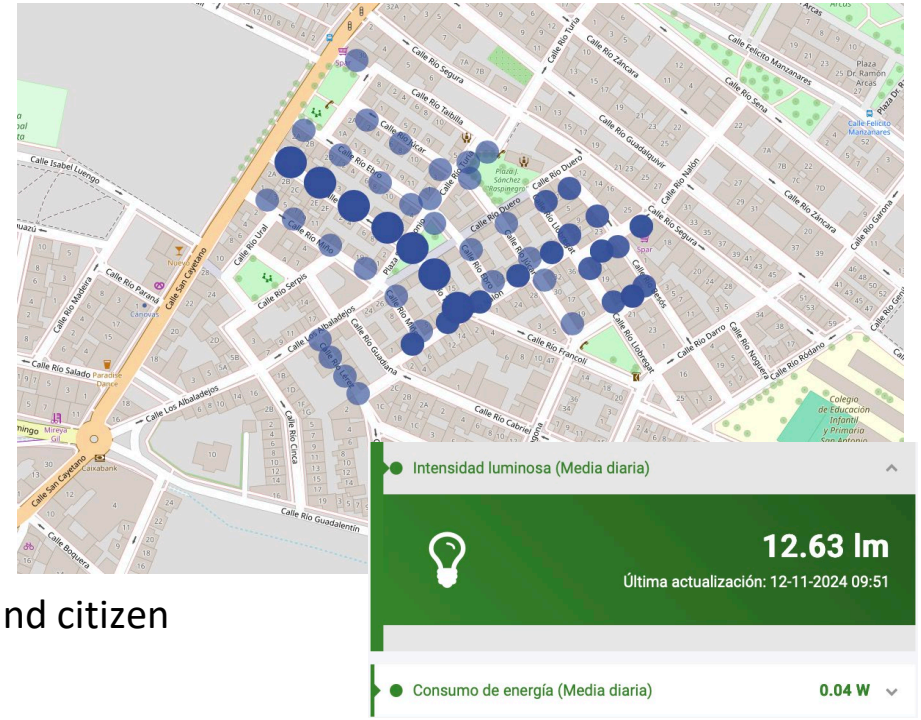
- HVDs identified and improved

Dataset	Use	Score Baseline	Score Achieved
City Luminosity Data	Validation role for DS, Visualisation	20%	100%
Energy Consumption	Development of DS	20%	100%

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

ACHIEVED RESULTS

- Developed a **pilot digital service** showing geolocated data on:
  - LED lighting infrastructure
  - Energy consumption per lighting point
  - Intensity levels at each location
- Enabled early-stage **assessment of spatial lighting coverage**
- Provided a **public-access visual platform** as a first step toward transparency and citizen engagement
- **Collected stakeholder input** that will shape future iterations toward health-aware lighting design



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

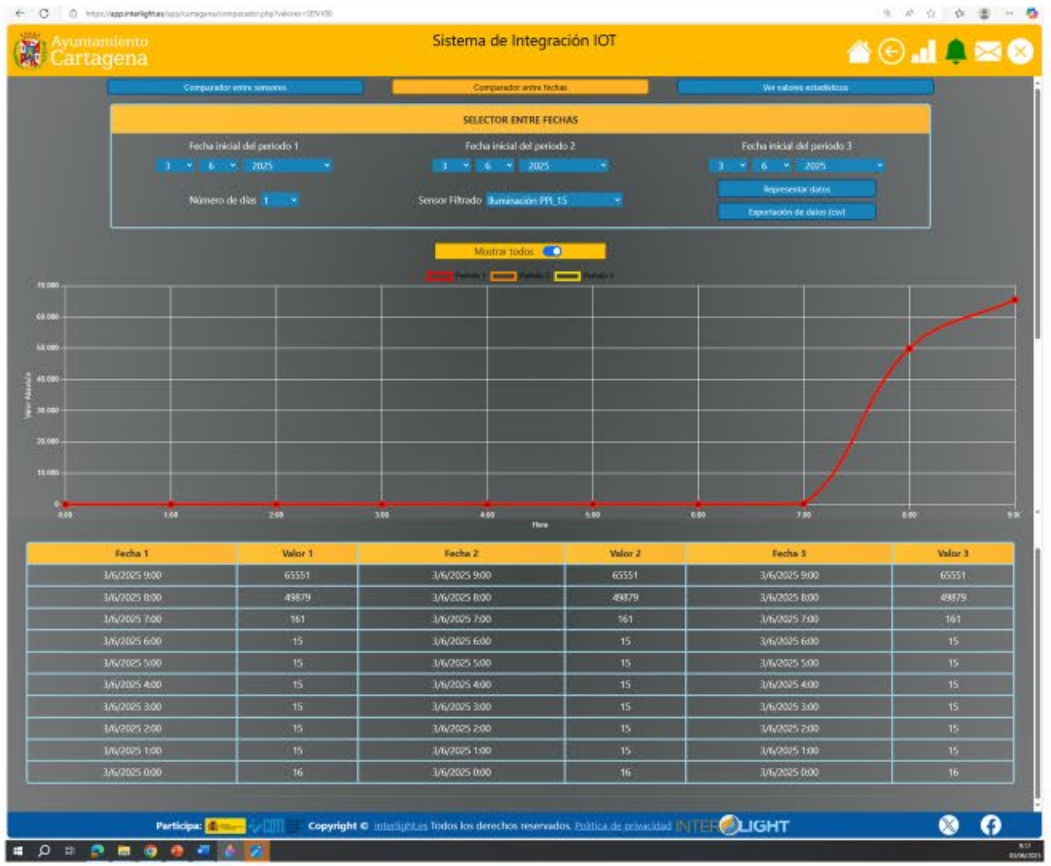
Digital Service:
Data Visualisation and Acquisition Platform.

https://pma.ayto-cartagena.es/visualizador/
https://torrepacheco-opendata.hopu.eu/
https://ciudadinteligente.molinadesegura.es/

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

Cartagena's lighting level



Cartagena, Molina de Segura & Torre Pacheco – **Stakeholder involvement**

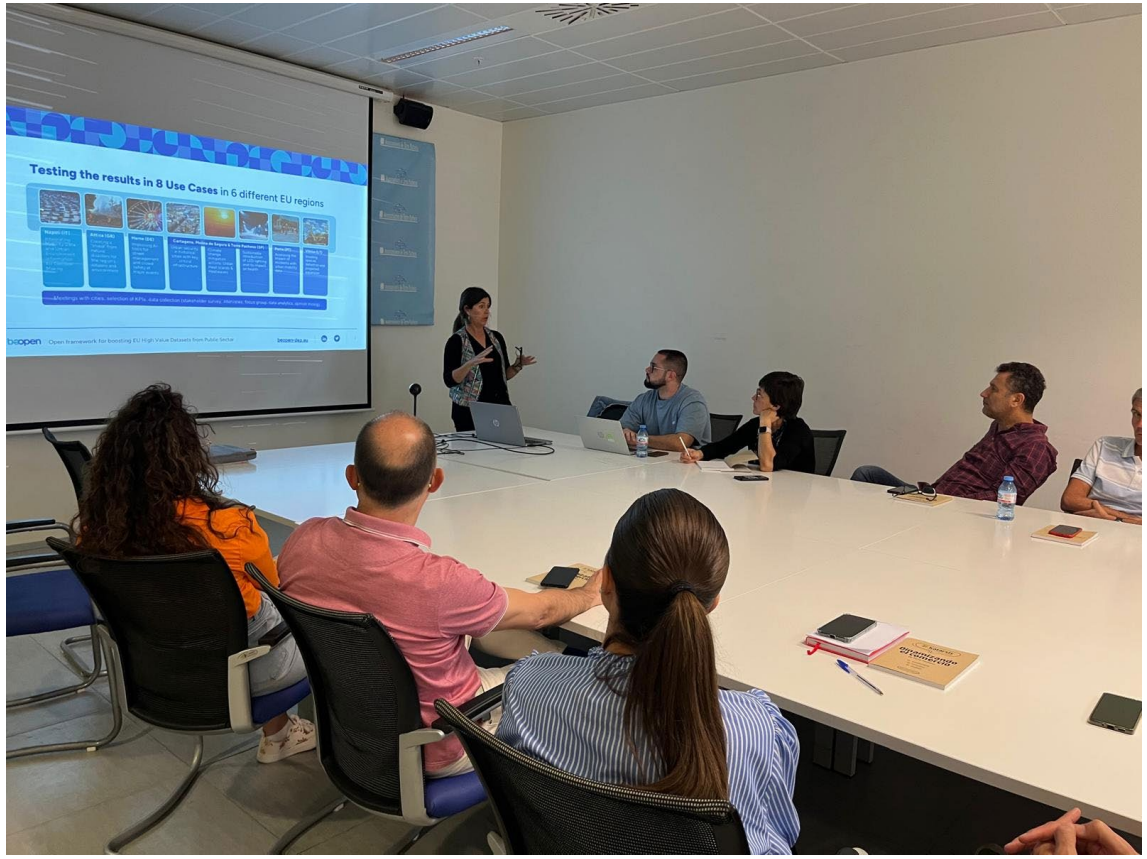
Stakeholders involvement

- Individual meetings and videocalls

- 1st Iteration feedbacks
- 2nd Iteration feedbacks

- Demo Event (Molina, May 7th, Torre Pacheco; May 8th; Cartagena, May 21st)

- Impact Assessment Surveys



Cartagena, Molina de Segura & Torre Pacheco – **Stakeholder involvement**

Stakeholders Feedback

Feedbacks for future improvements of the Digital Service:

- **Dynamic Lighting Monitoring** evolving from static data to real-time or periodic monitoring of lighting behaviour (e.g. intensity variation over time, automatic dimming schedules).
- **Integration of Human Activity Data** to explore the correlation between pedestrian presence and lighting levels for better energy management and safety planning.
- **Colour Temperature Visualization** including colour temperature data to evaluate impact on comfort, visibility, and health (e.g. warmer light at night).

Cartagena, Molina de Segura & Torre Pacheco – **Lessons learnt**

Lessons Learnt – Use Case: LED Lighting and Health Impact

- Real-world application requires real-time data
  - Static datasets are a strong starting point, but stakeholders emphasized the value of dynamic lighting data to assess usage patterns and adapt lighting strategies more effectively.
- Health impact is complex and multifactorial
  - We learned that the connection between blue LED exposure and public health (e.g. circadian disruption) needs input from health authorities and interdisciplinary analysis. Coordination with health services is critical.
- Stakeholder-driven innovation
  - We could involve more stakeholders to develop a more adaptive DS and more user-centered lighting design.
- Data integration is key
  - The lack of access to correlated data (e.g. pedestrian activity, sleep disruption, local health trends) is a major barrier. Cross-sector collaboration is essential in future iterations.
- Public engagement matters
  - Transparency and public access to lighting and energy data can build trust and encourage community involvement in decisions about public space and well-being.

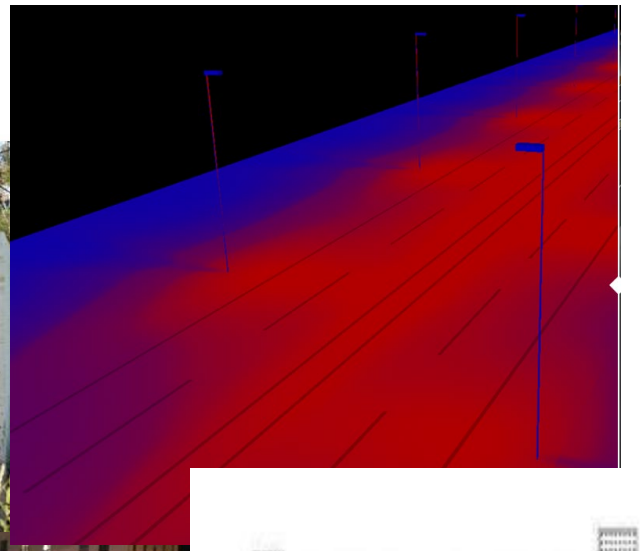
Cartagena, Molina de Segura & Torre Pacheco – **New approach after adopting BeOpen?**

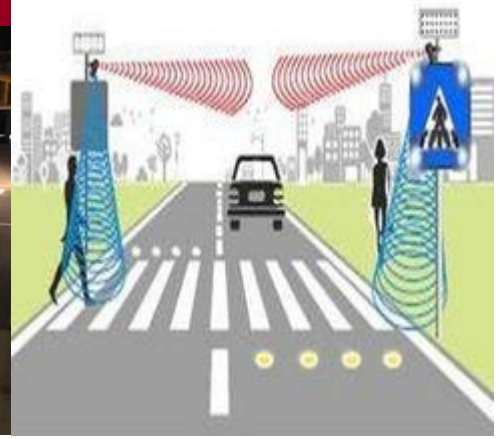
What Changed with BeOpen

- **Digital-first, open data mindset**
- **Visual platform** with geolocated data and openly accessible
- **Multidimensional policy issue for street lighting**
- Engaged stakeholders
- **Standards for high-value datasets (HVDs)**

Strategic Value of BeOpen - Key Actions & Benefits

- Data-informed selection of lighting zones and types
- Use of LOGICA LEDs with no blue light emission:
- - Protects night sky and ecosystems
- - Reduces circadian rhythm disruption
- Simple, cost-effective installation with high-quality components
- Combines energy savings with health-conscious urban design
- Implementation of a sensor network to dynamically obtain data sets.





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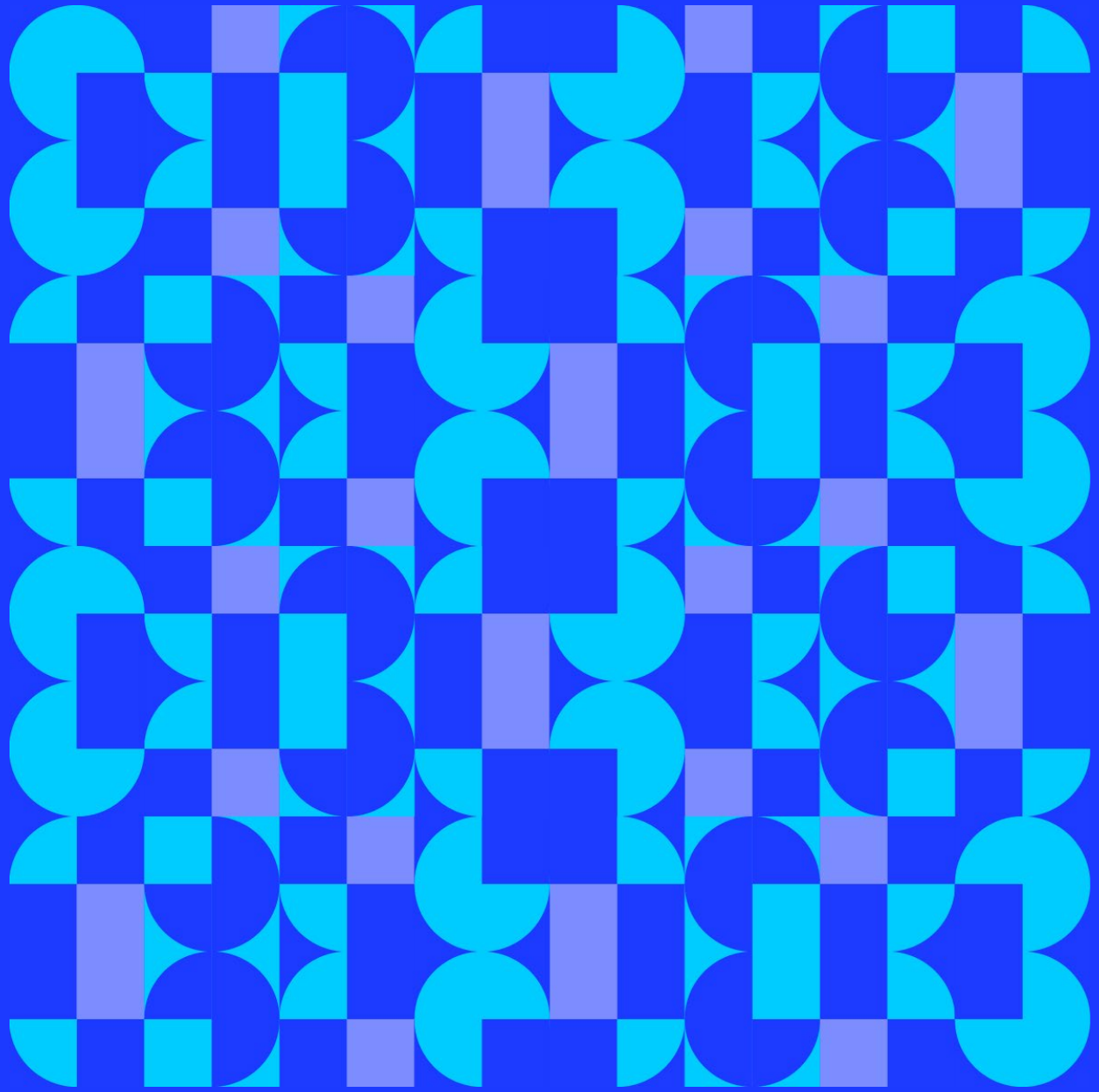
Cartagena, Molina de Segura & Torre Pacheco

Climate change mitigation actions:
Urban Heat Islands and Heatwaves



Ayuntamiento de Cartagena
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Cartagena, Molina de Segura, Torre Pacheco – **Storytelling & Challenges**

POINT A
PREMISE

How can we mitigate the impact of extreme heat and climate-related weather events in urban areas, using data to protect public health, improve air quality, and preserve urban biodiversity?

CHALLENGES

- Use high-value environmental datasets to identify urban hotspots.
- Provide a real-time, publicly accessible map of temperature and environmental conditions.
- Support municipal planning, emergency response, and climate adaptation strategies.
- Encourage citizen awareness and preparedness during high-risk periods.

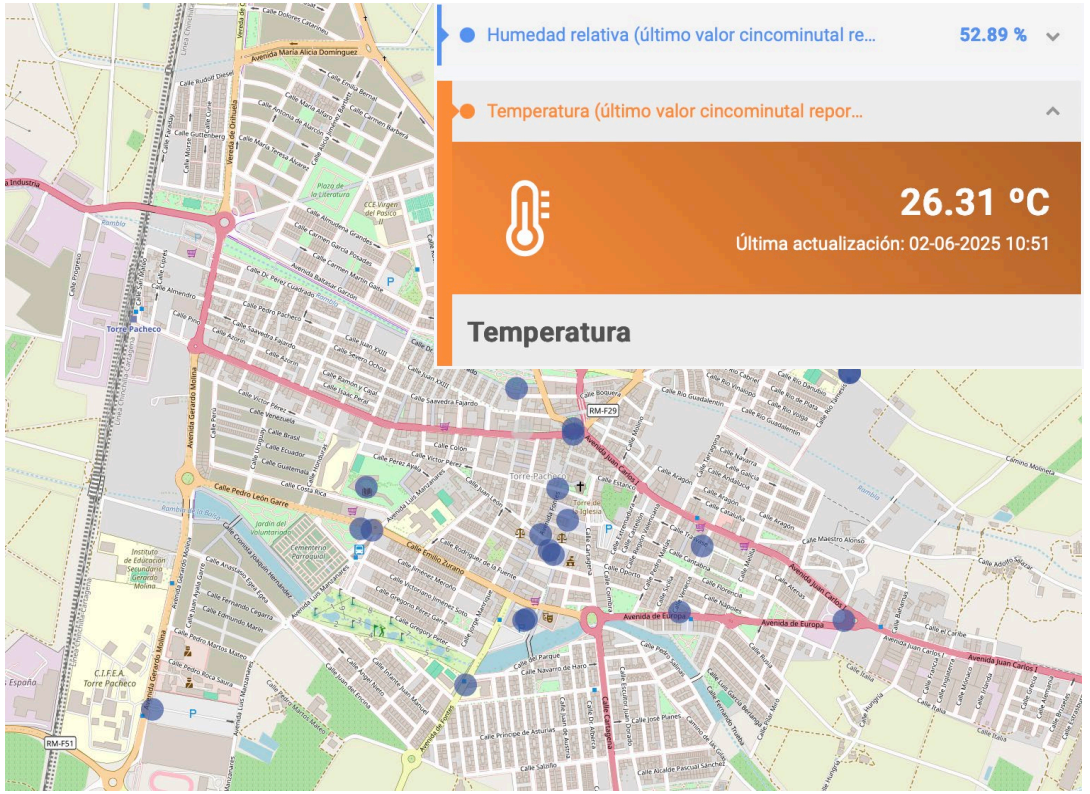
CURRENT STATUS

- Digital service available: ciudadinteligente.molinadesegura.es
  - HVD. Air quality
  - HVD. Environmental Data (temperature, humidity, …)

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

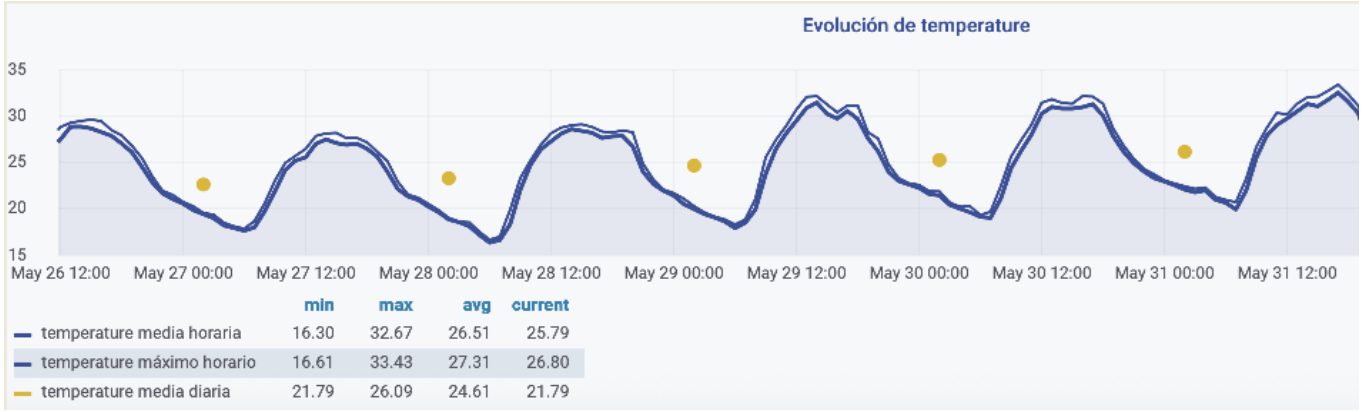
Pilot Execution

- 1st Iteration feedbacks
- 2nd Iteration feedbacks
- DS improvements and HVD incorporations
- Screen recordings DS
- Replicability Surveys
- Deliverables contribution



Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Activity	Description	Data collection documentation
Surveys	Development of surveys to collect direct input from stakeholders	Surveys results (Excel)
Internal analysis of BeOpen metrics	Analysis of quantitative information to help measure KPI	Quantitative info (Excel)
Group meetings	Meetings with stakeholders and colleagues from the Spanish project pilots	Project log



Temperature

Time	temperature media	temperature maximo
26/05/2025 2:00	null	null
26/05/2025 11:00	26.27	27.31
26/05/2025 12:00	27.40	28.74
26/05/2025 13:00	28.79	29.21
26/05/2025 14:00	28.80	29.41
26/05/2025 15:00	28.61	29.56
26/05/2025 16:00	28.21	29.40
26/05/2025 17:00	27.81	28.42
26/05/2025 18:00	26.98	27.86
26/05/2025 19:00	26.04	26.75
26/05/2025 20:00	24.45	25.39
26/05/2025 21:00	22.78	23.44
26/05/2025 22:00	21.60	21.89
26/05/2025 23:00	20.99	21.44

Humidity

Time	relativeHumidity media	relativeHumidity maximo
26/05/2025 11:00	43.42	46.21
26/05/2025 12:00	41.57	44.53
26/05/2025 13:00	40.88	42.99
26/05/2025 14:00	43.63	46.93
26/05/2025 15:00	41.97	47.06
26/05/2025 16:00	41.14	45.73
26/05/2025 17:00	42.90	45.12
26/05/2025 18:00	43.75	45.12
26/05/2025 19:00	43.60	47.37
26/05/2025 20:00	49.58	54.13
26/05/2025 21:00	60.52	67.70
26/05/2025 22:00	71.63	73.13
26/05/2025 23:00	72.78	73.82

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

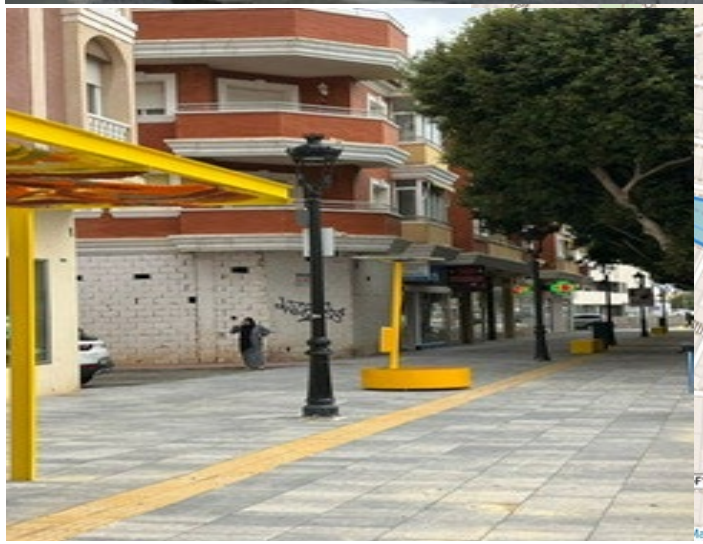
Main decisions taken in the Molina de Segura pilot:

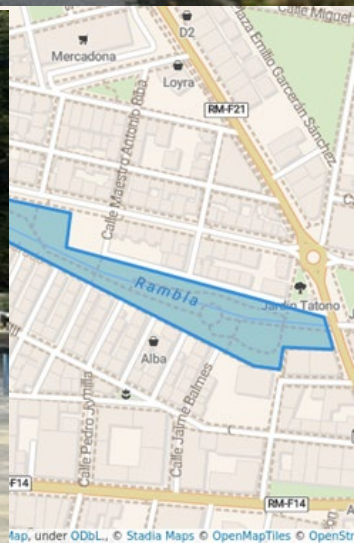
- Reforestation of the banks of the Segura River
- Installation of shaded areas in public squares
- The new "Molina Renace" project (2025-2040) incorporates actions that aim to prevent heat islands in the town's streets and squares by planting trees and creating shaded areas with pergolas and awnings.

Cartagena, Molina de Segura & Torre Pacheco – **Performed activities**

Decisions adopted in the **Torre Pacheco pilot**:

- Expansion of the network of temperature & humidity sensors.
- Data collection from different sensors and heat island analysis.
- Remodeling of a downtown green area.
- Installation of temperature, humidity and environmental parameter measurement sensor
- Data analysis and impact of heat islands
- The most important proposals for intervention in heat islands.
- Development of renaturation projects in the urban center.
- Expansion of permeable pavements in the urban center.
- Creation of shaded areas in the urban center.
- Publishing data on open data portals





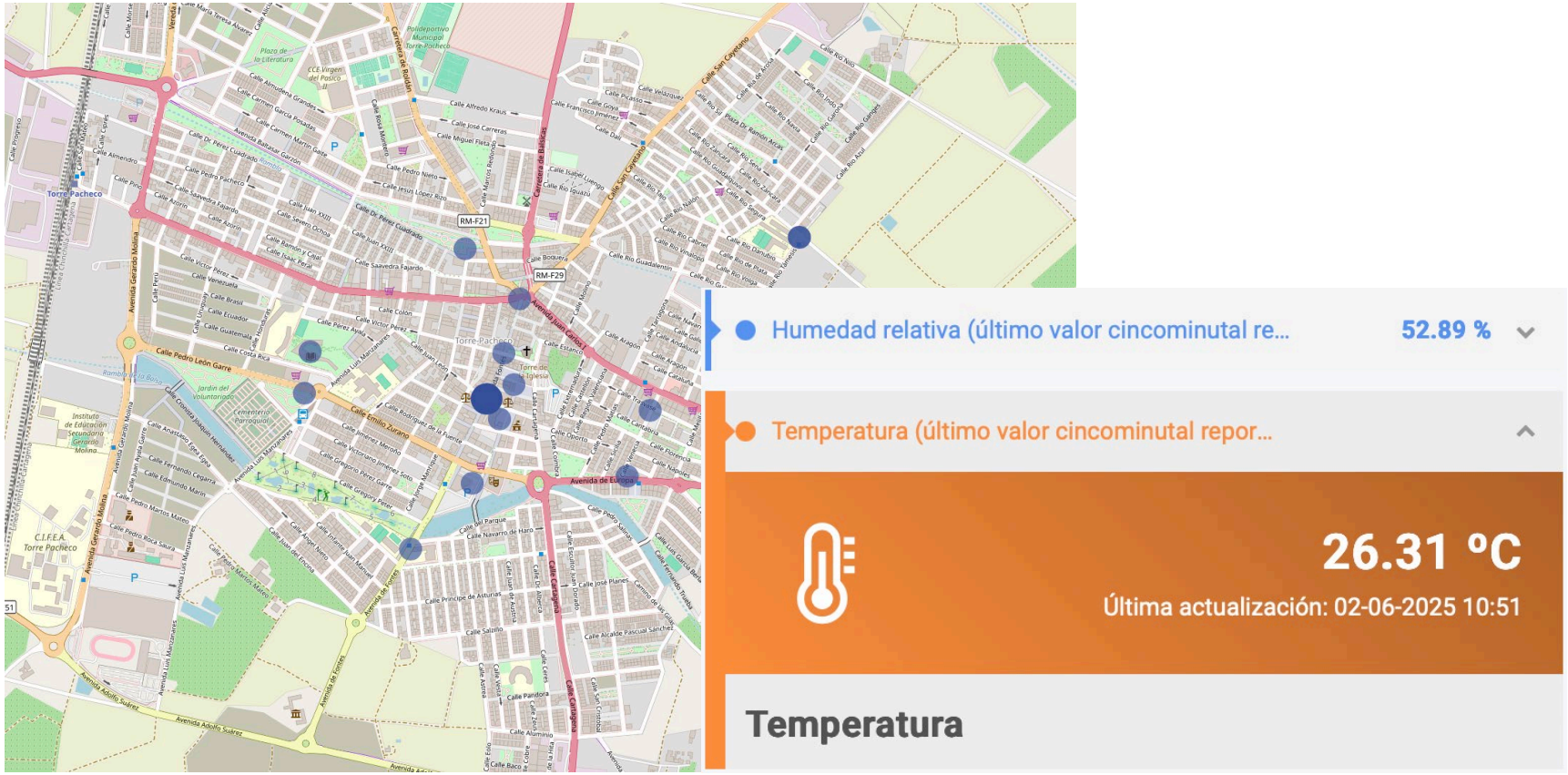
Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

HVDs identified and improved	Description/Purpose	HVD Category
Air quality	Dataset including gas levels and PM among others	Meteorological
Crowd Monitoring	People count in different places of the city	Statistics
Energy Consumption	Street lightning energy consumption	Companies and company ownership
Environmental Data	Humidity and temperature levels	Earth Observation and Environment
Luminosity	Luminosity data of different points of the city	Earth Observation and Environment
Noise	Noise leves of different points of the city	Earth Observation and Environment
Traffic data	Traffic information including number of vehicles and pollution features	Statistics

Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

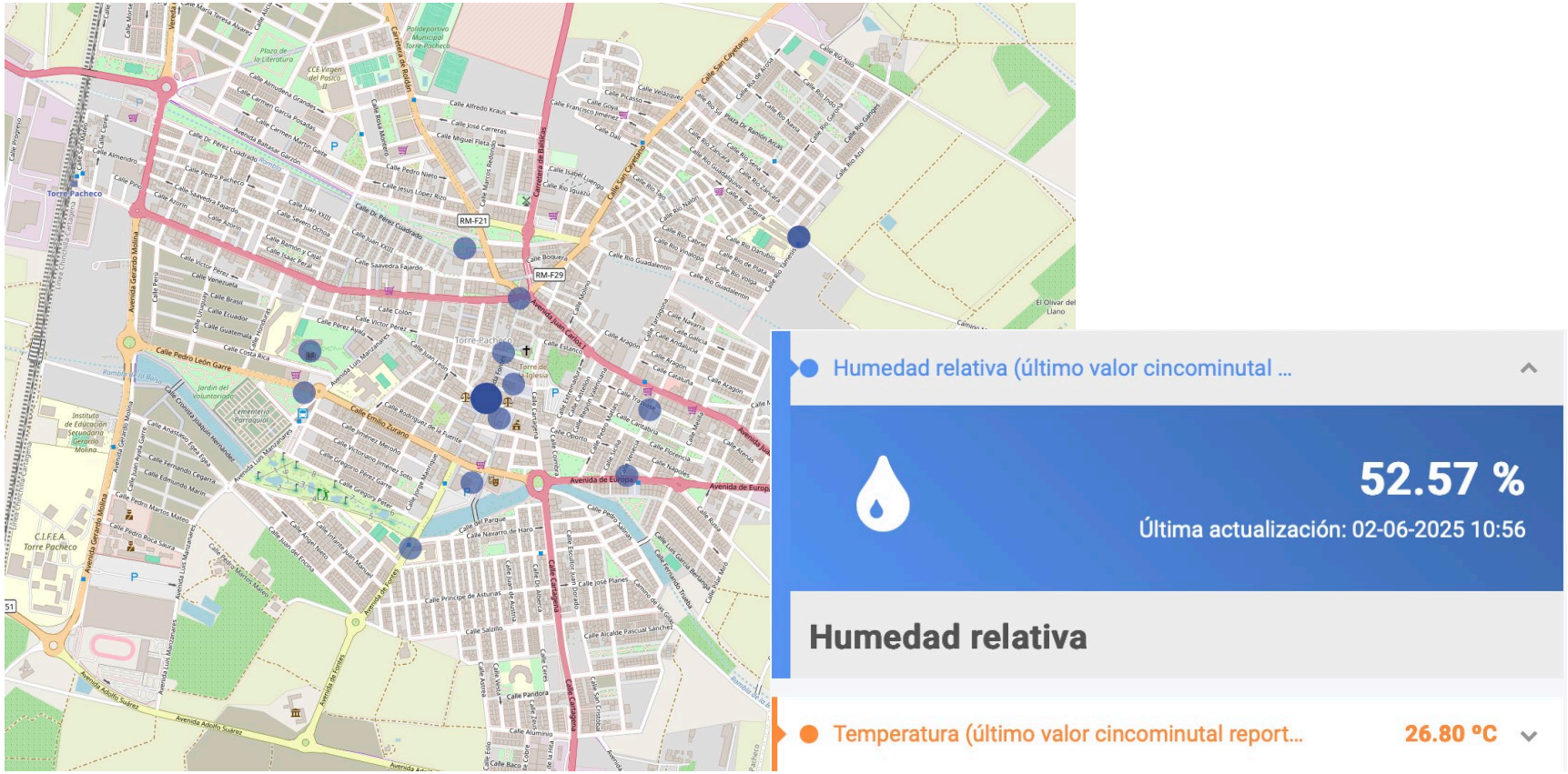
Environmental Data (Temperature)



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

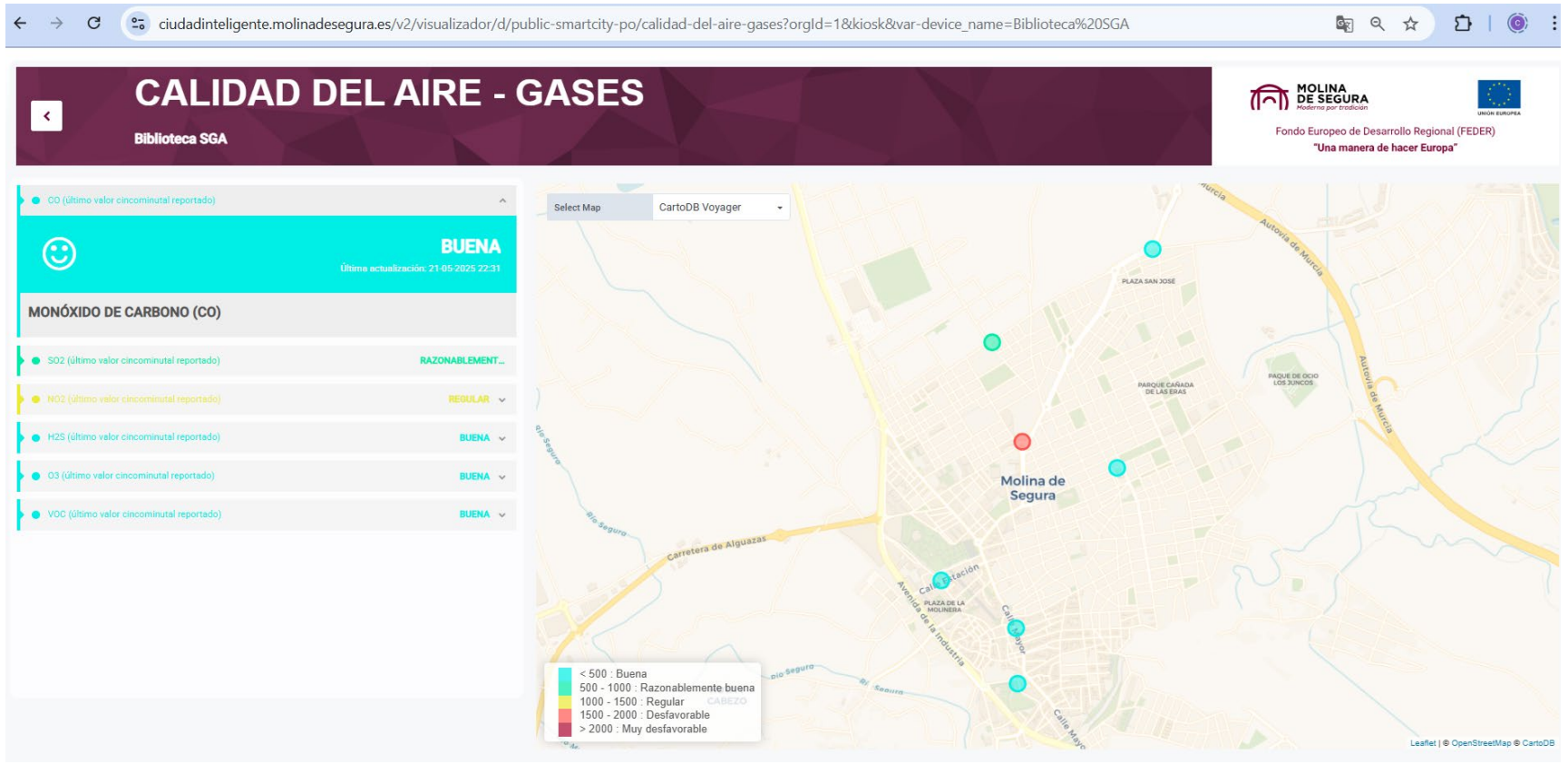
Environmental Data (Humidity)



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

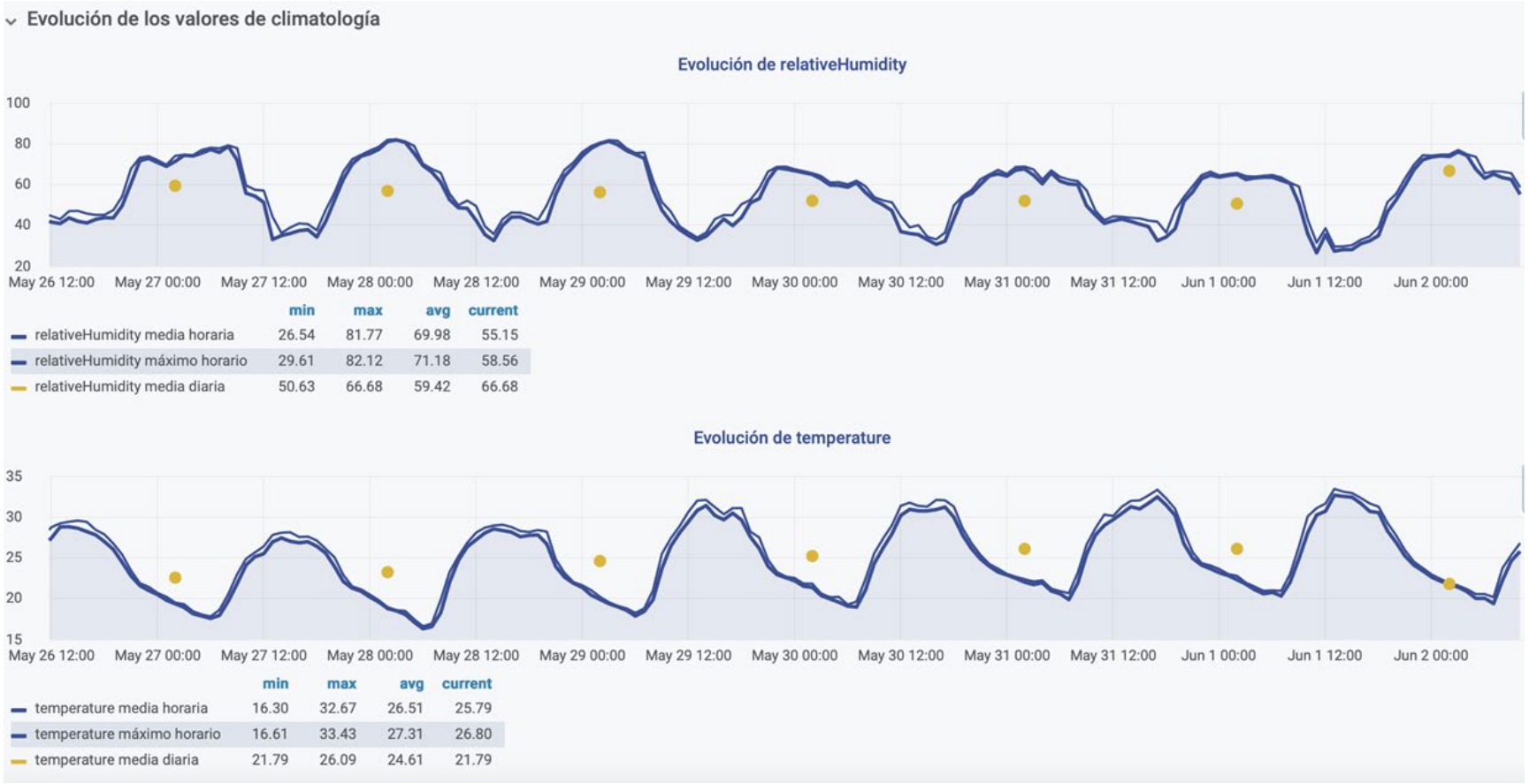
Air quality



Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:
Data Visualisation and Acquisition Platform.

View and Download data

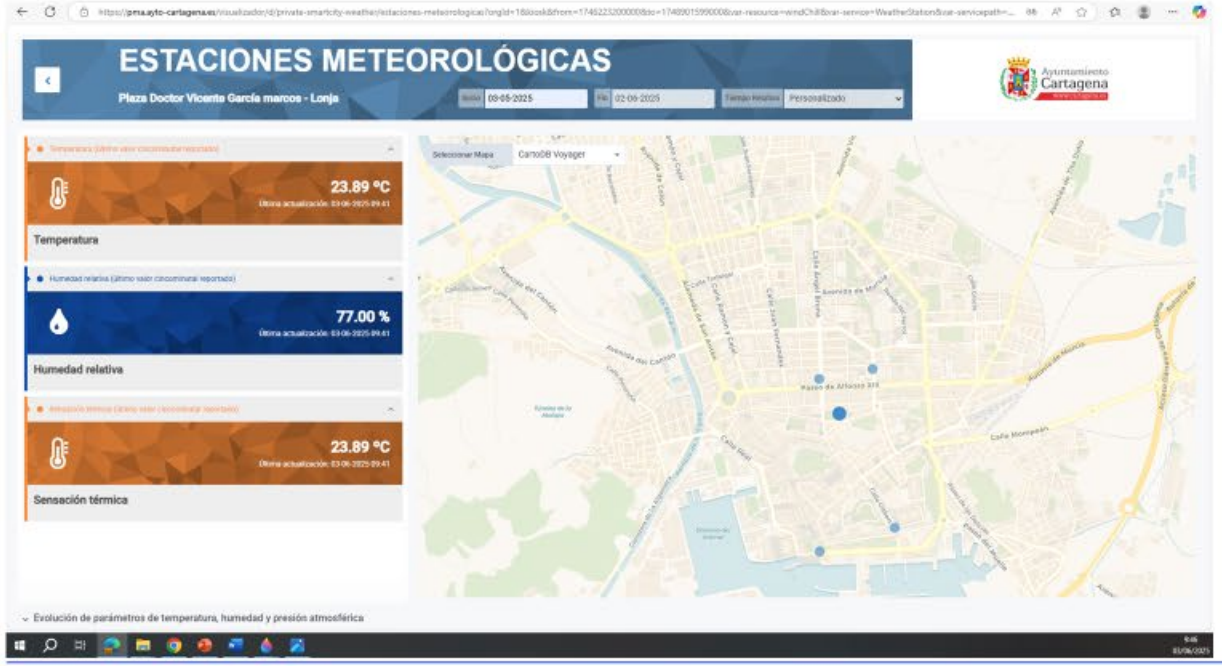


Cartagena, Molina de Segura & Torre Pacheco – **Achieved Results & used HVDs**

Digital Service:

Data Visualisation and Acquisition Platform.

Cartagena's environmental conditions



Cartagena, Molina de Segura & Torre Pacheco – **Stakeholder involvement**

- Meetings and videocalls
- Baseline Surveys
- 1st Iteration feedbacks
- 2nd Iteration feedbacks
- Demo Event (Cartagena, May 21st; Molina, May 7th; Torre Pacheco, May 8th)
- Impact Assessment Surveys

Cartagena, Molina de Segura & Torre Pacheco – **Lessons learnt**

- Urban heat is a cross-cutting issue
- Data granularity and coverage matter
- Early public access builds trust
- Smaller municipalities need scalable solutions
- Actionable insights require combining datasets
- Maintenance and continuity are critical

Cartagena, Molina de Segura & Torre Pacheco – **New approach after adopting BeOpen?**

What Changed with BeOpen

- Enabled real-time heat and environmental monitoring across pilot cities
- Visualized heat-prone zones using combined datasets (temperature, air pollution, solar radiation)
- Made environmental data publicly accessible, supporting vulnerable populations and health planning
- Engaged urban planners and social services to target heat risk mitigation strategies
- Positioned the city to explore green infrastructure planning based on actual microclimate data

Strategic Value of BeOpen

- Shifted climate adaptation from strategy to actionable data use
- Positioned urban heat data as a tool for long-term resilience planning
- Created a collaborative ecosystem for climate action between municipalities

Thank you!

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