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TOURISMO Final Conference

Data-driven solutions for smart crowd flow management.

Visitor counting with sensors and AI at tourism hotspots.

9th of June 2026

Valletta, Malta

Monitoring crowds from cruise port to historic city: the case of Valencia.

Joan Meseguer Llopis, Fundación Valenciaport

Primary objectives

- **Obj. 1:** Install complementary sensors to HERIT-DATA: 3 PAX counter & 5 AI Powered Cameras
- **Obj. 2:** Measure the proportion of tourists disembarking on each cruise visit.
- **Obj. 3:** Detect queues and their characteristics at tourist site entrances, utilizing intelligent cameras for this purpose.
- **Obj. 4:** Show trends and predict the number of passengers likely to disembark from the cruise.
- **Obj. 5:** Produce any means (e.g. nudging information) capable to influence the cruise tourist's decision-making.



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Equipment & Tools

AI based intelligent cameras

AXIS P4705-PLVE

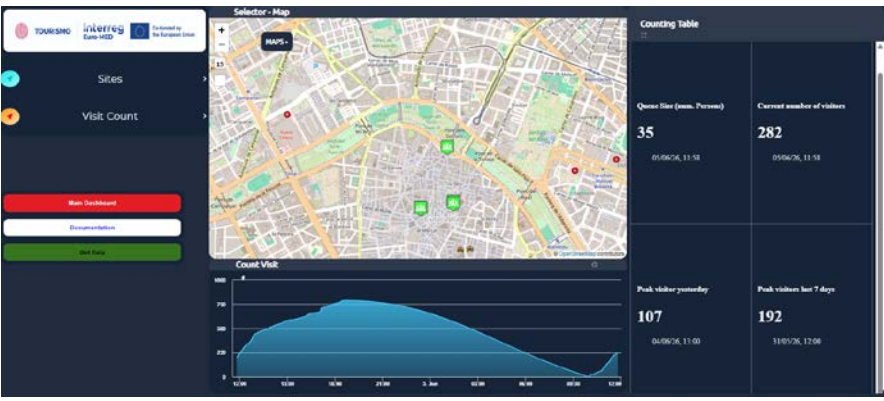
People counting at port, sites queue and visits

PAX Wifi Counters



People counting and flow monitoring

Dashboards and web apps



Informing cruise passengers of congestion situations

Machine Learning models



Prediction of disembarking cruise passengers



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Overview of Installed Equipment



4 PAX WiFi Counters
5 Intelligent Cameras

Tramed Terminal
Lane to city

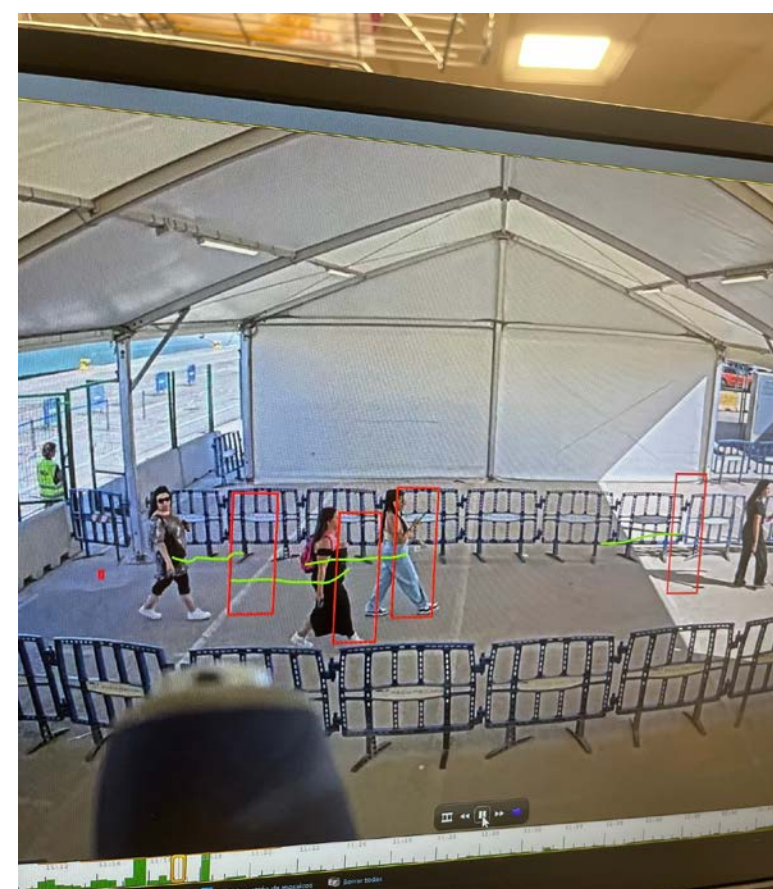
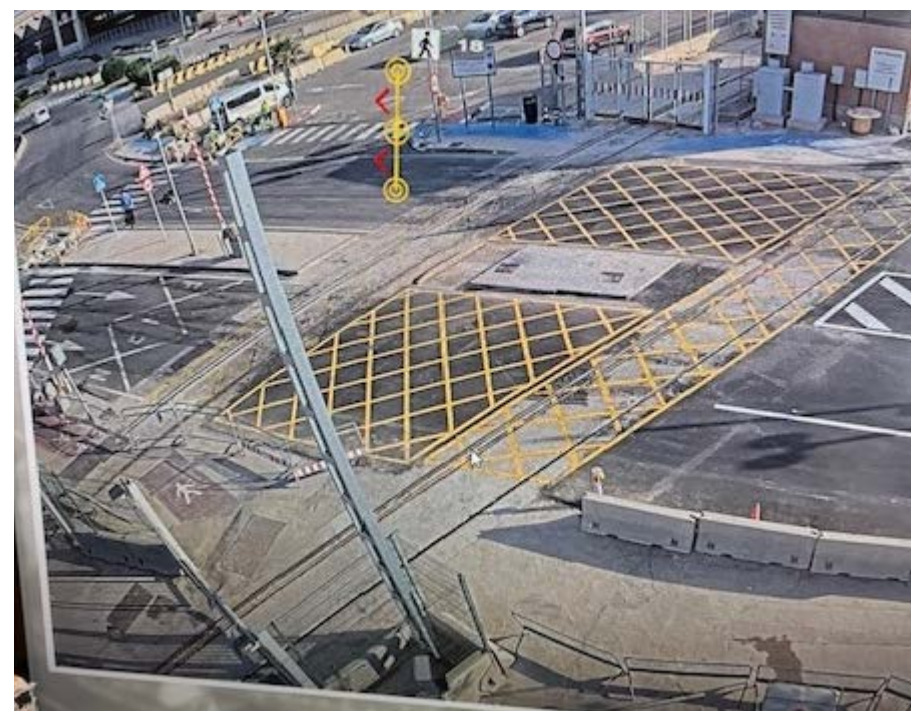


Big cruises berth: Dique del este



Port of Valencia: Cameras

Objective: count the cruise passengers disembarking and heading the city by their own



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Port of Valencia: Pax Counters

Objective: count the cruise passengers at the port and their itineraries in the city, using the PAX counters installed by the Regional Council along the City of Valencia

Shuttle bus stop



Trasmed Cruise Terminal



Trasmed disembarking bridge



Cruises berth: *Dique del este*



Device ID changes over time prevent most mobile phones detected at the port from being matched in the city.



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City of Valencia (old town)

Objective: queue size and attractions' visits counting for sites' operational management and to inform cruise passengers in real-time

Valencia Cathedral



Serranos Towers



La Lonja de la Seda



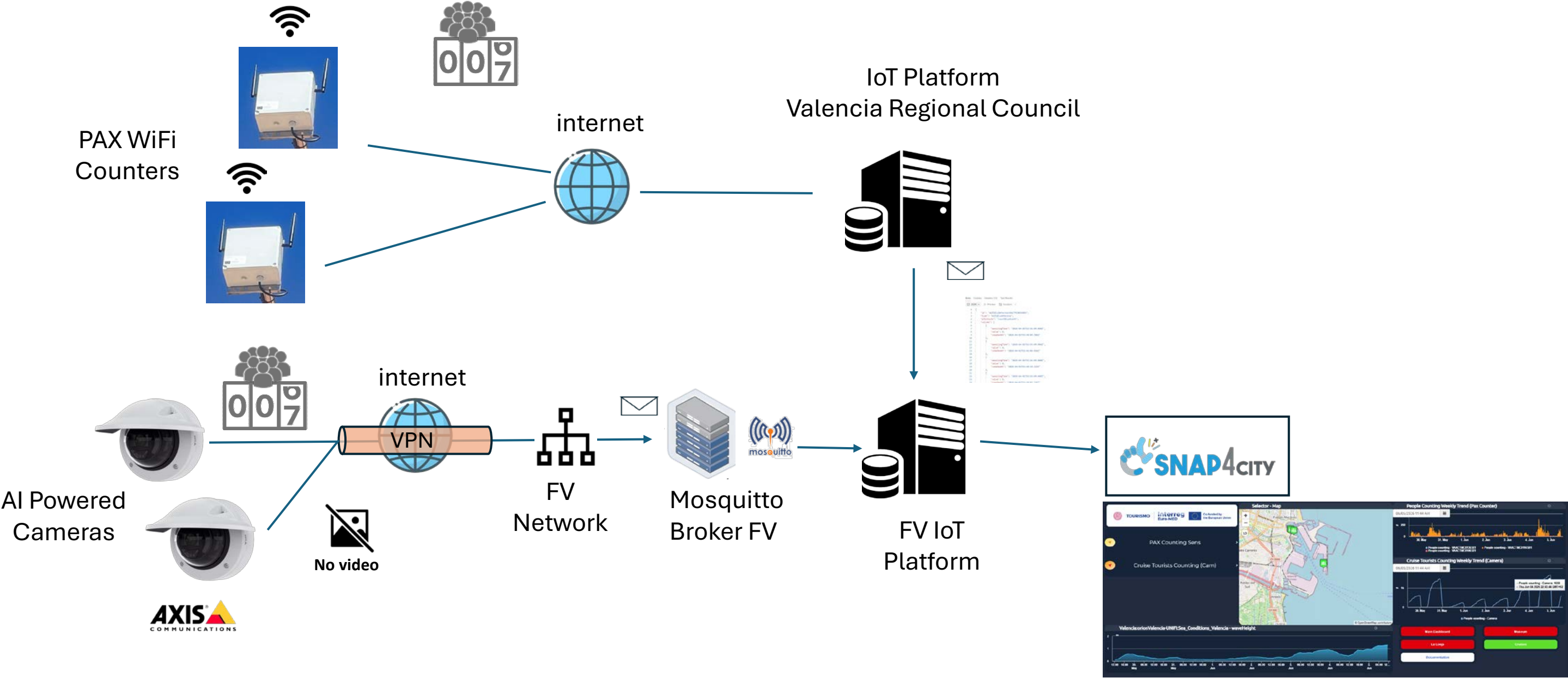
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Architecture



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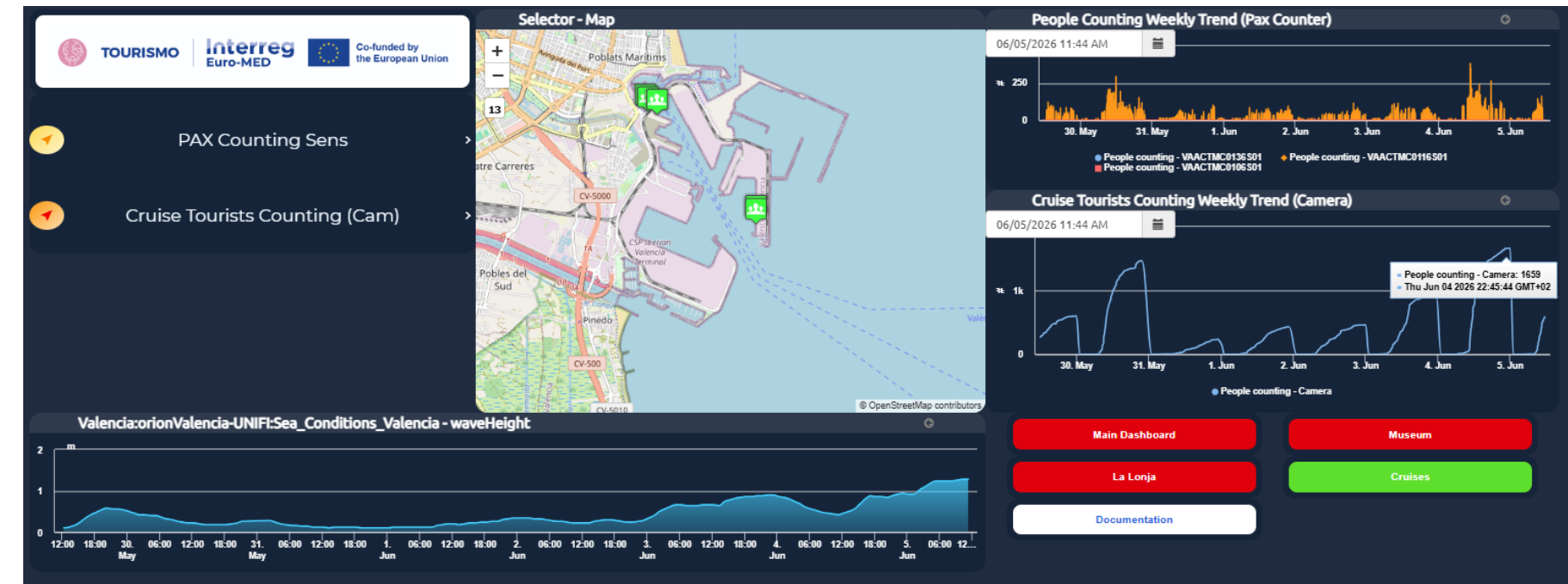
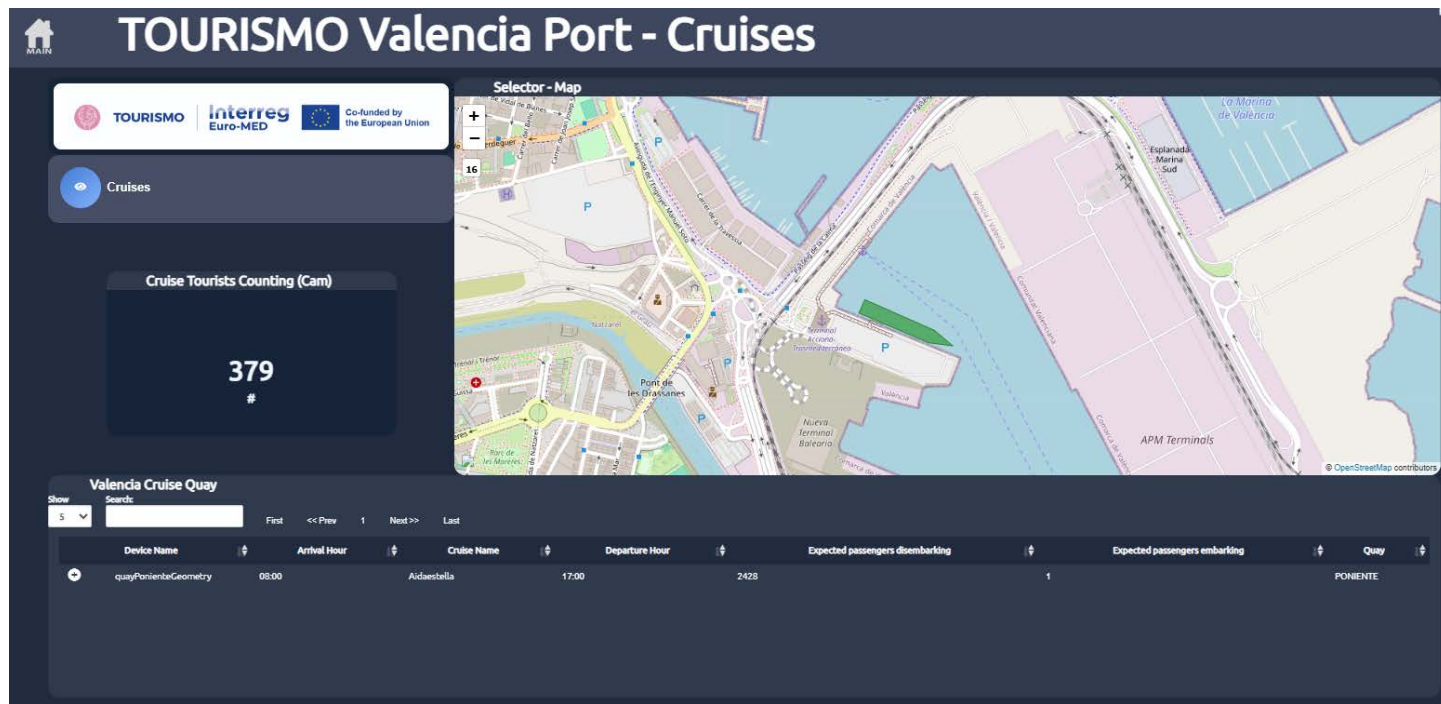
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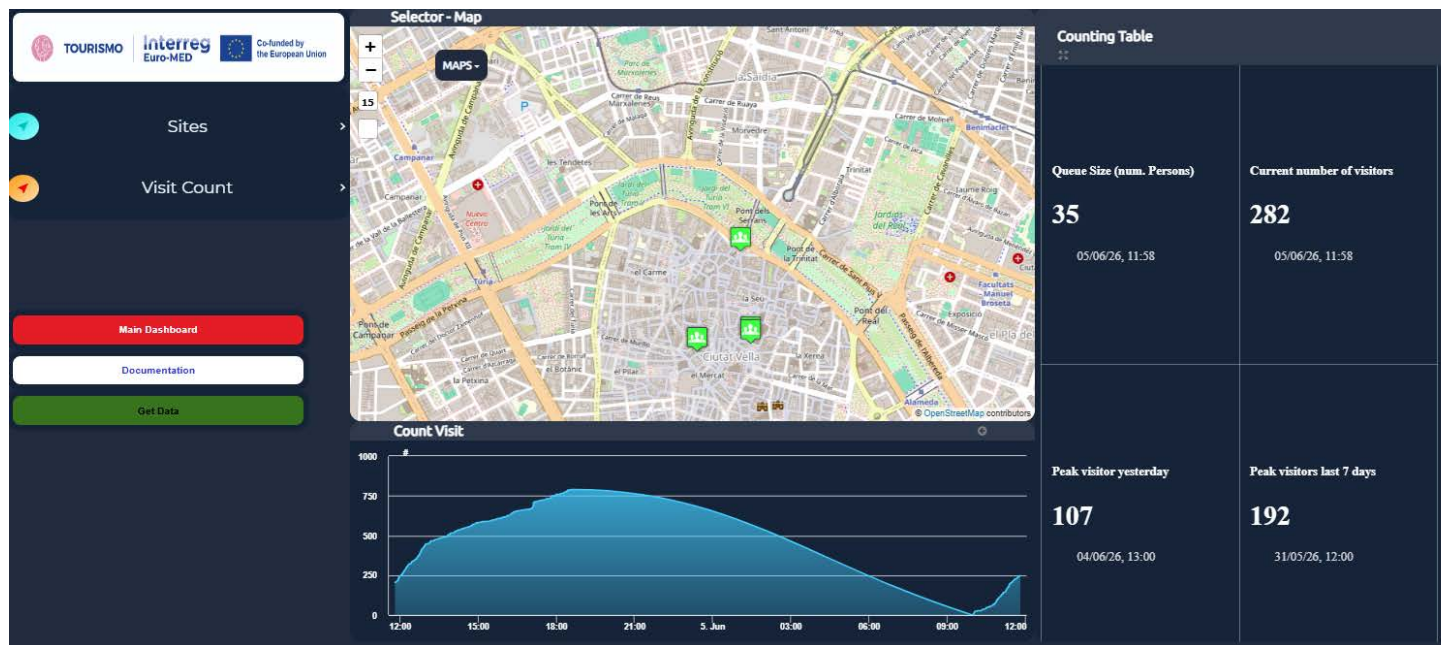
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Valencia Port & City Dashboards

Cruises' berth
Digital Twin



City sites
real-time
crowd
monitoring



Port's
equipment
monitoring



City sites & visits
crowd trends

Valencia Port & City Dashboards

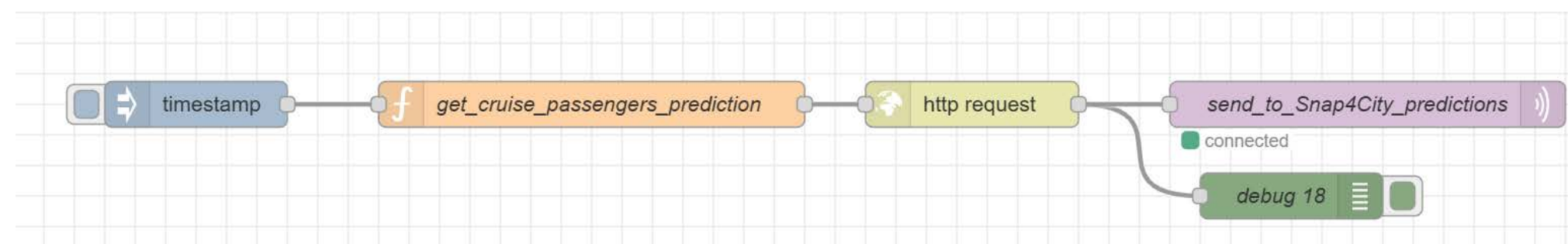


TO



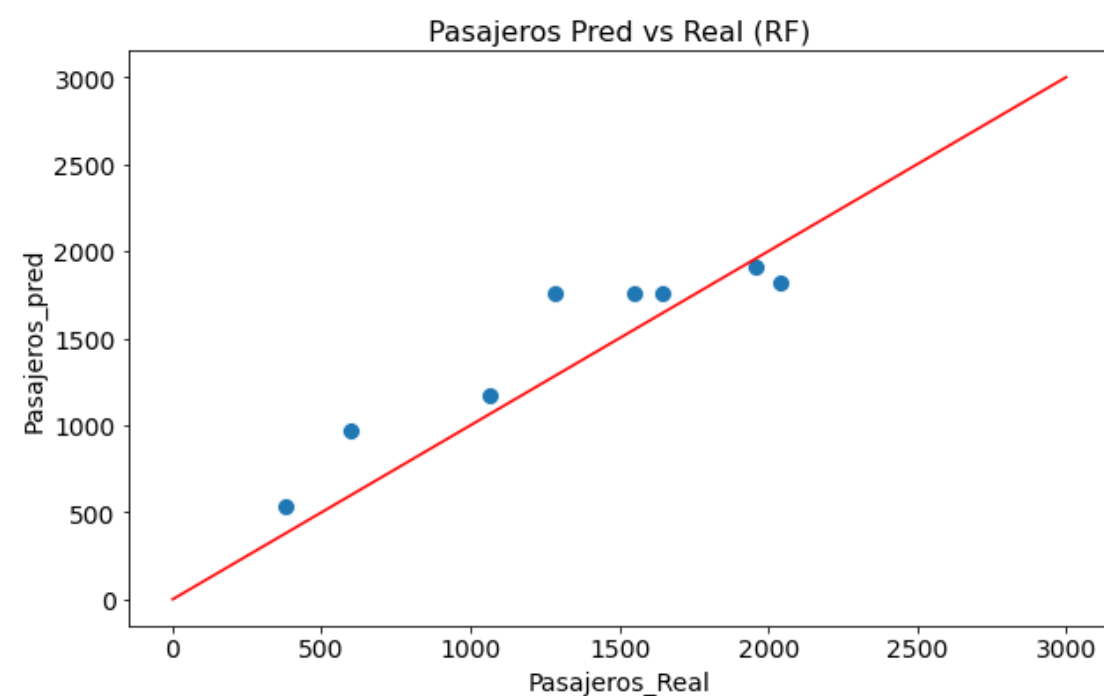
Prediction service of disembarking

Objective: Anticipate resource needs (e.g. transport, police, etc.) using cruise passenger flow forecasts.



Mean Absolute Error (MAE): 172.2
Mean Squared Error (MSE): 44367.85999999999
Root Mean Squared Error (RMSE): 210.63679640556632
R²: 0.8613357044185945

Limited data so far. More cruise arrivals will enable a more robust AI model.



```
#### RANDOM FOREST

from sklearn.ensemble import RandomForestRegressor

RFRegressor = RandomForestRegressor()

from sklearn.model_selection import GridSearchCV
# set up our search grid
param_grid = {"max_depth": list(range(2, 20)),
              "n_estimators": [5, 10, 50, 100, 150, 200, 250, 300]}
# try out every combination of the above values

search = GridSearchCV(RFRegressor, param_grid, cv=3).fit(X_train, y_train)

print("The best hyperparameters are ", search.best_params_)

RF_regressor = RandomForestRegressor(n_estimators=search.best_params_['n_estimators'], max_depth=search.best_params_['max_depth'], random_state=7)
RF_regressor.fit(X_train, y_train)
```



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Sentiment Analysis

Objective: to measure the overall experience of cruise passengers in their visit in the city of valencia

Summary of Findings (June 2026, 7 responses received – Valencia Port)

The document compiles survey responses collected from visitors to Valencia Port in June 2026 and are related to on cruise passengers' experience during their visit to Valencia. The sample includes Spanish- and English-speaking visitors, representing both domestic and international tourists. Respondents evaluated their overall satisfaction, key aspects of their visit, and main challenges experienced.

Key Results

Overall experience:

Visitor satisfaction was generally high. Most respondents reported being satisfied or very satisfied with their experience in Valencia, with only a small portion expressing a neutral level of satisfaction in some aspects. Overall impressions of the visit were strongly positive, and the vast majority of respondents indicated they would return or would likely return to the city.

Attractions & cultural experience:

The most appreciated aspects of Valencia included the historic city centre, local food and cuisine, architecture (both historic and modern), and the hospitality of local people. The historic centre in particular was the most frequently mentioned highlight, consistently associated with strong positive impressions.

Challenges & negative aspects:

The main issues reported were high temperatures (heat), congestion, and slow public transport. These factors were the most recurrent sources of discomfort during the visit. However, negative feedback remained relatively limited and did not significantly affect overall satisfaction.

Historic centre experience:

The historic centre was the main attraction and was consistently evaluated positively. Despite its popularity, some respondents noted that congestion and heat occasionally reduced comfort while exploring central areas.

Visit duration and willingness to return:

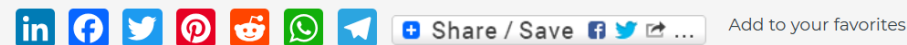
Although exact durations were not consistently provided, responses suggest typical short urban stays. A strong majority of respondents expressed a desire to return to Valencia and would recommend it to friends and family, reflecting a very positive overall perception.

Key recommendations included:

- Improving public transport speed and efficiency
- Managing crowding in central and tourist-heavy areas
- Addressing heat-related discomfort, especially in peak periods

Conclusions:

Valencia City Centre is perceived as a highly attractive and culturally rich destination with very strong visitor satisfaction. The historic centre, gastronomy, architecture, and general atmosphere are consistently praised. The main areas for improvement relate to congestion, heat, and public transport performance. Despite these issues, overall sentiment remains strongly positive, with high willingness to return and recommend the destination.



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Challenges & Lessons learnt

- **Installation permits are critical and often time-consuming**, requiring NDAs and collaboration agreements between public and private stakeholders.
- **The market offers a wide range of sensors and devices**, making it essential to understand their capabilities, strengths, and limitations.
- **Operational insights depend on data availability**, which may require further digitalization of certain sectors and processes.
- **No technology is perfect**; measurement errors should be expected, monitored, and mitigated.
- **AI-powered smart cameras currently provide the highest accuracy** for people-flow monitoring.
- **Long-term sustainability requires planning for maintenance, upgrades, and equipment replacement.**



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Making
the **Mediterranean**
Green Transition
happen

