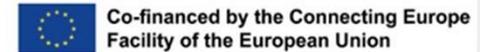


# URBAN CO-CREATION DATA LAB

## #1 Micromobility



# Problem

- Increase in cities population lead to an **increase** in **traffic growth** and **traffic congestion**
- This aspect have serious **impacts** in **pollution** and **emission of greenhouse gases**
- **Bike sharing services (BSS)** have been **growing** as an **alternative** to the traditional mobility alternatives

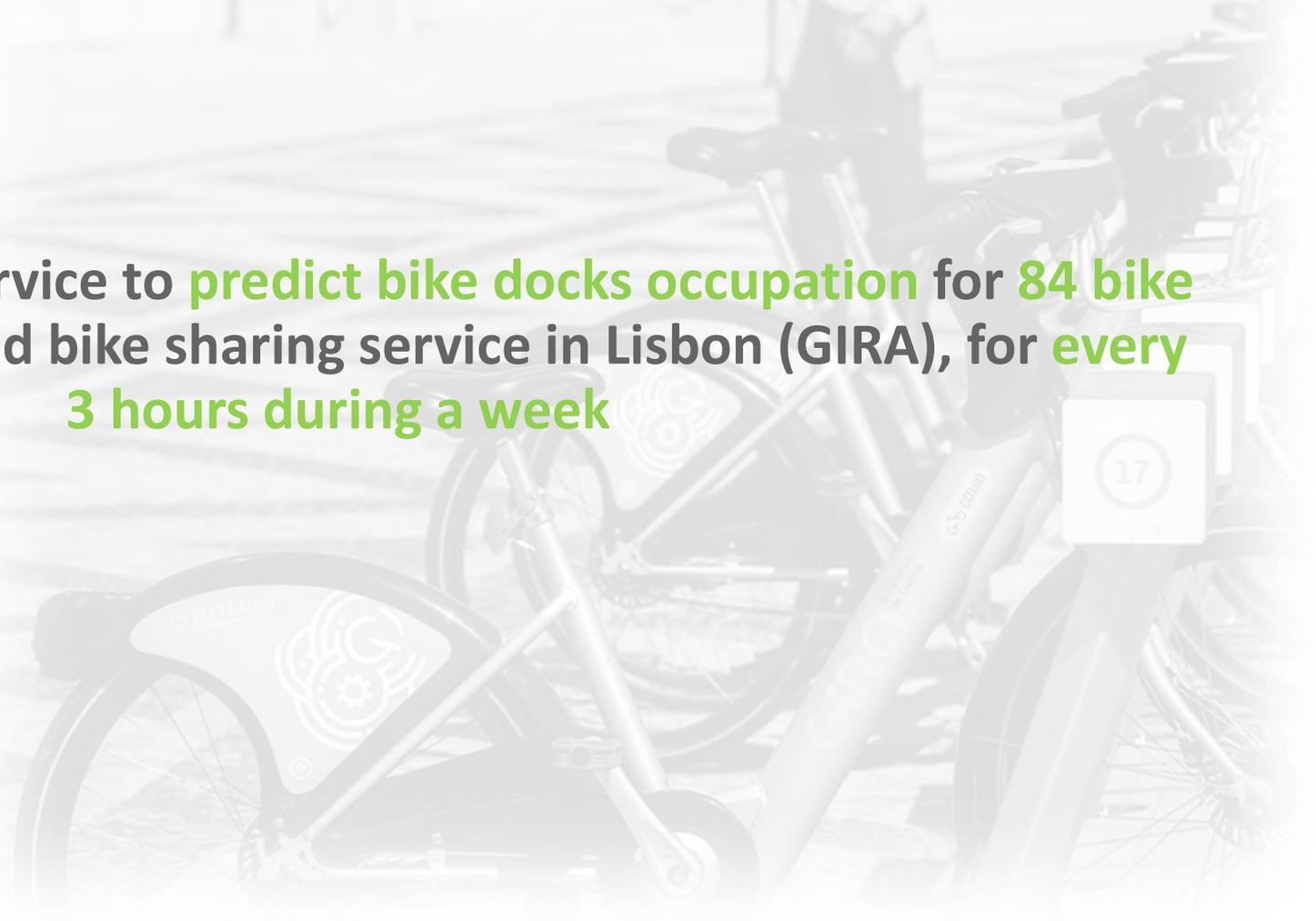
# Business understanding

- **EMEL** (Municipal company to manage parking and mobility) is responsible to **manage a docked BSS in Lisbon – GIRA**
  - Necessity of information about the **bike stations that need bike rebalancing** due to the **lack of bikes in a bike station** (not allowing a bike pick-up), and due to the **excess of bikes in a bike station** (that could not allow bike drop-offs)
- **Lisbon City Council Mobility Department (DMM)** is responsible to plan the **expansion GIRA bike stations network**
  - Need for useful information for **planning and managing the expansion of GIRA bike stations network**

# Service



Development of a service to **predict bike docks occupation** for **84 bike stations** of the docked bike sharing service in Lisbon (GIRA), for **every 3 hours during a week**



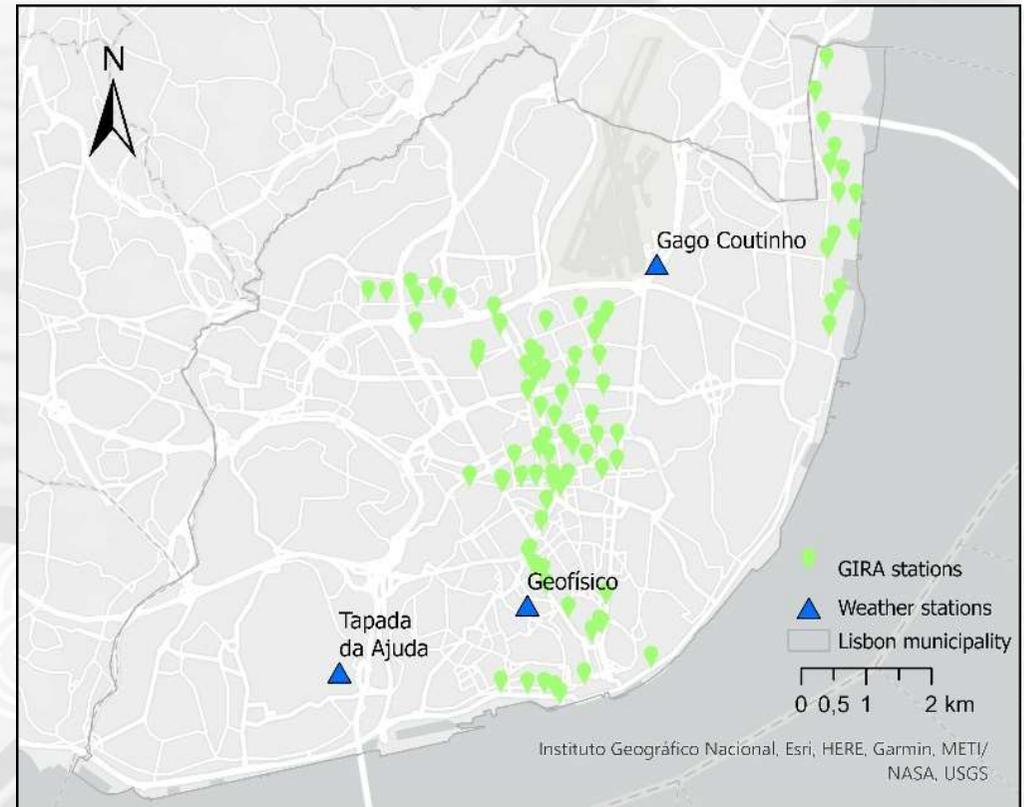
# Data understanding



Bike docks occupation (2020)  
for 84 bike stations

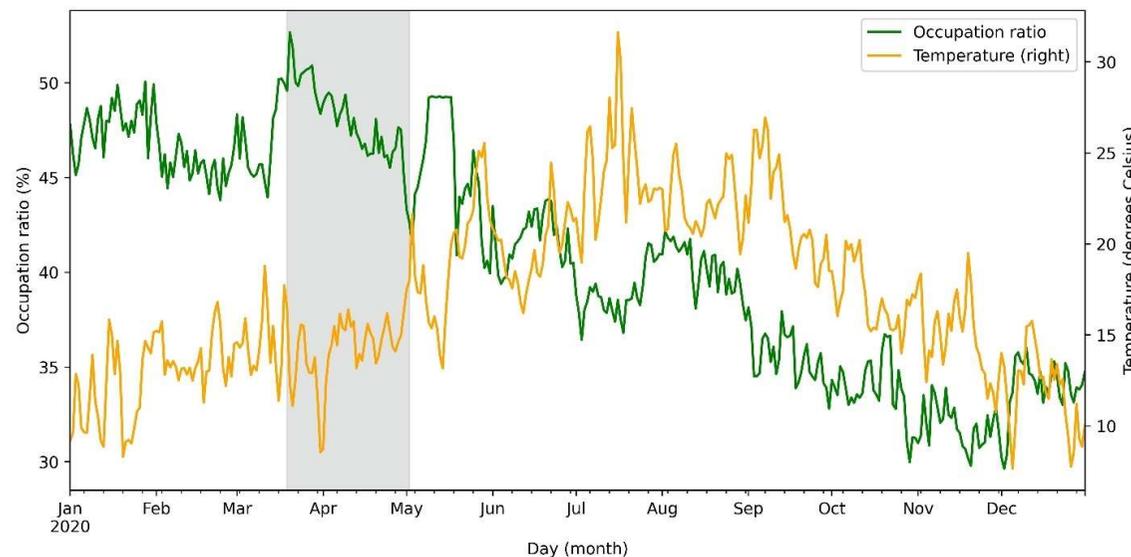


Weather data (temperature  
and precipitation)



# Data understanding

- Before COVID-19 lockdown there's an **opposite relation between occupation and temperature**
- After June, **temperature don't have much impact in the increase use of GIRA service**

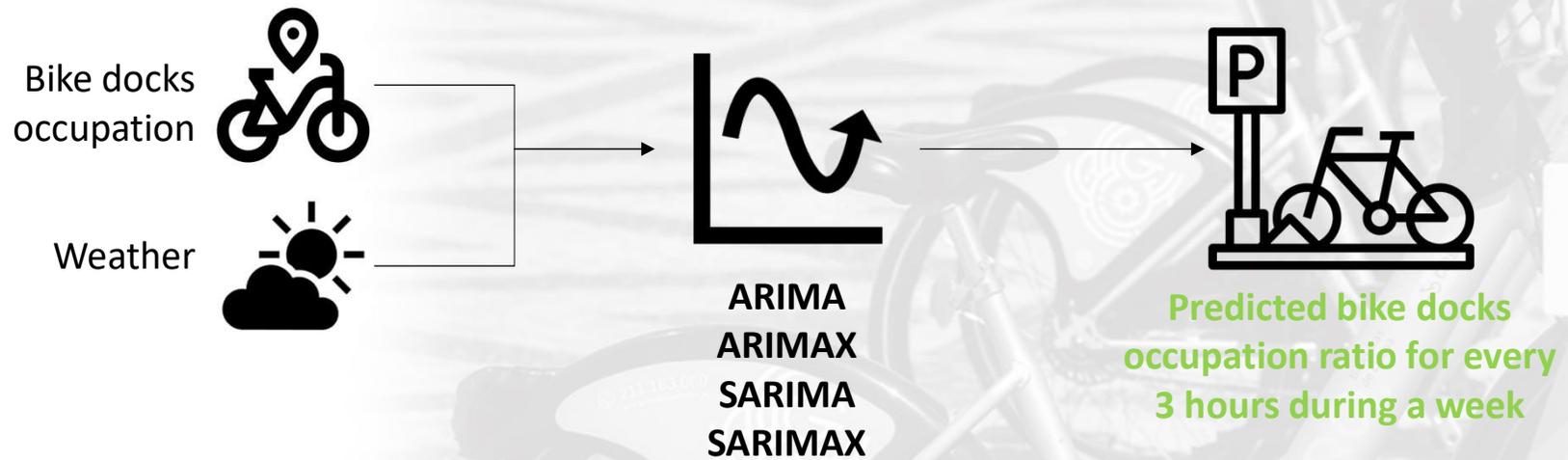


# Data preparation

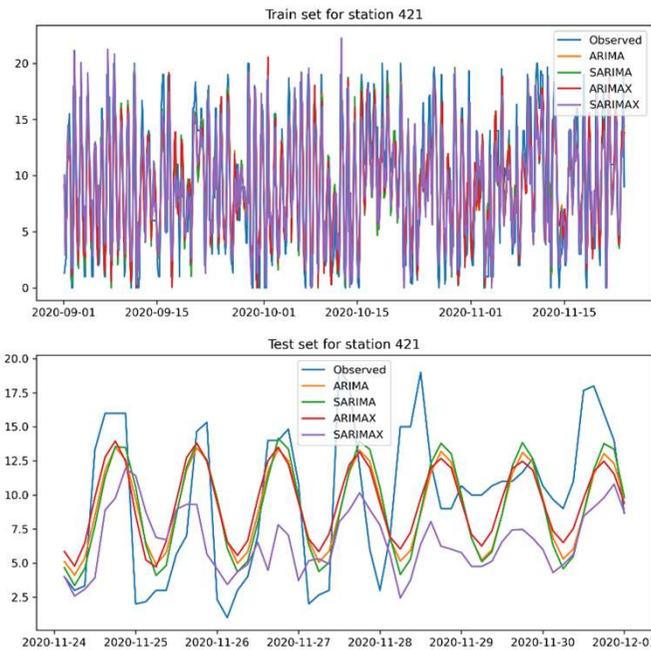
- **Weather data** was added to the **nearest** bike station
- The number of empty docks and weather data was **aggregated** in **periods of 3 hours** for **each bike station**
- It was created a **dummy variable** to identify **business days and weekends**

Feature	Description
MEAN_numdocasvacias	mean number of empty docks in periods of 3 hours
MEAN_temp	mean temperature in periods of 3 hours
MEAN_precip	mean precipitation in periods of 3 hours
is_business_day	flag identifying business days (1) and weekends (0)

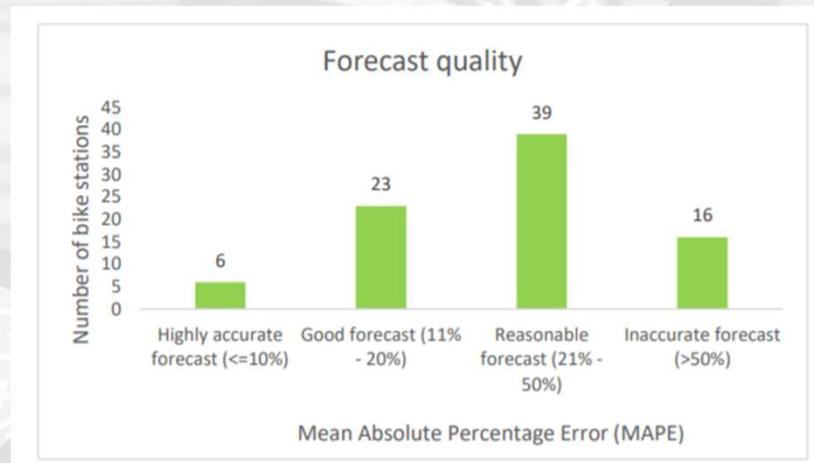
# Modelling



# Modelling



Model	MAE	RMSE	MAPE (%)
ARIMA	2,8	3,4	25
ARIMAX	2,8	3,4	28
SARIMA	2,8	3,4	25
<b>SARIMAX</b>	<b>2,8</b>	<b>3,3</b>	<b>27</b>



**The SARIMAX model was chosen for evaluation**

# Evaluation



## Analysing and predicting occupation in Gira stations



Beneficiaries:



Co-financed by the Connecting Europe  
Facility of the European Union



# Thank you

<http://urbandatalab.pt/>



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