



UNIVERSITÀ  
DI CORSICA  
PASQUALE  
PAOLI

LABORATOIRE  
LIEUX IDENTITÉS  
ESPACES & ACTIVITÉS  
UMR 6240 LISA



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# Digital Twins



# DIGITAL TWINS

A virtual replica of a system / object

The concept was first introduced at the NASA during the apollos' mission.

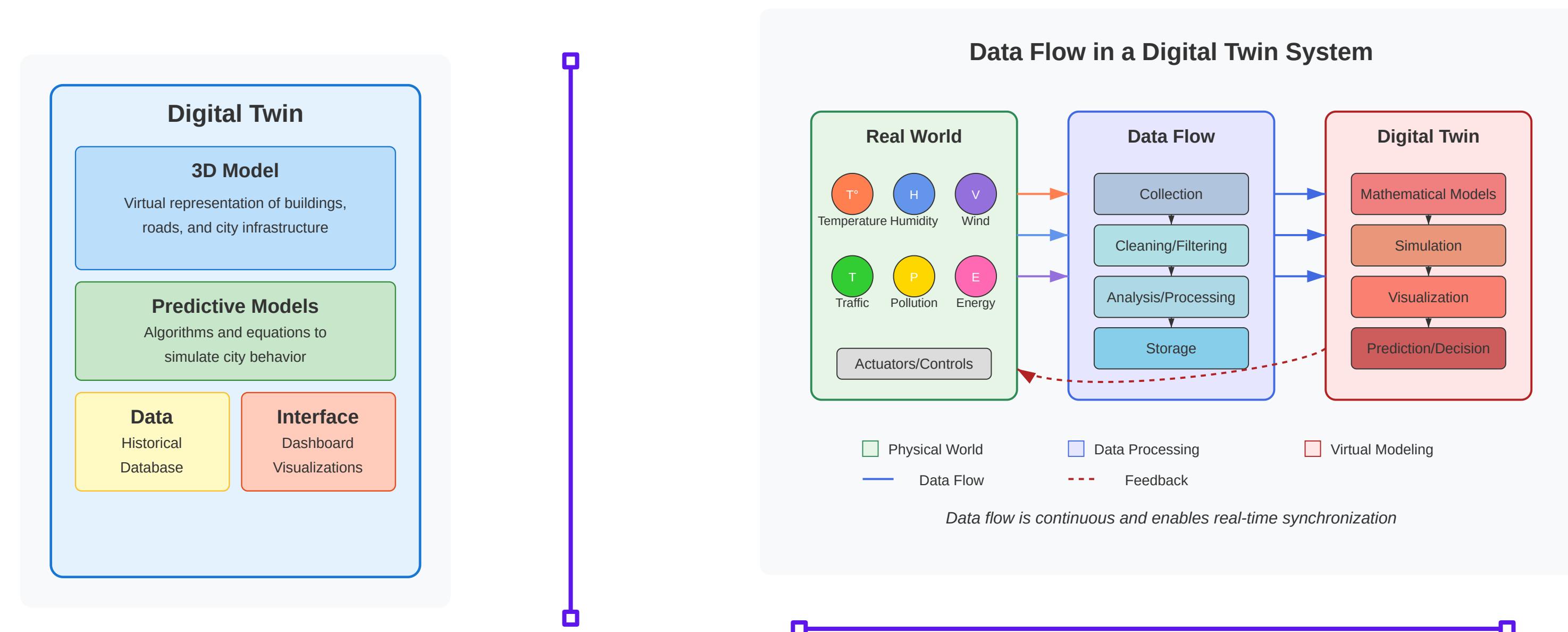
Since then, the concept has evolved to revolve around more interactivity and visualization through new technologies of visualization (web, AR, VR, etc...) and algorithmic (machine learning etc...).

Main goals:

- Simulate Past or Complex Events
- Optimize processes
- Being helpful for decision-making

# Structure and data flow in a Digital Twin

The four stages of development:  
Data Acquisition (through sensors and networks)  
Data Cleaning and Training  
Simulation and Action  
Learning and Iteration



# Types of Digital Twins

*Increasing complexity and functionality*

## Shadow Twin

(Jumeau Ombre)



### Characteristics

- Basic representation
- Static data
- No interaction

### Use Cases

- Documentation
- Simple visualization
- Inventories

**Level: Beginner**

## Complete Twin

(Jumeau Complet)



### Characteristics

- Detailed representation
- Dynamic data
- Limited interaction

### Use Cases

- Monitoring
- Performance analysis
- Predictive maintenance

**Level: Intermediate**

## Digital Twin

(Jumeau Digital)



### Characteristics

- Full model
- Real-time
- Bidirectional

### Use Cases

- Advanced simulation
- Autonomous optimization
- Decision-making

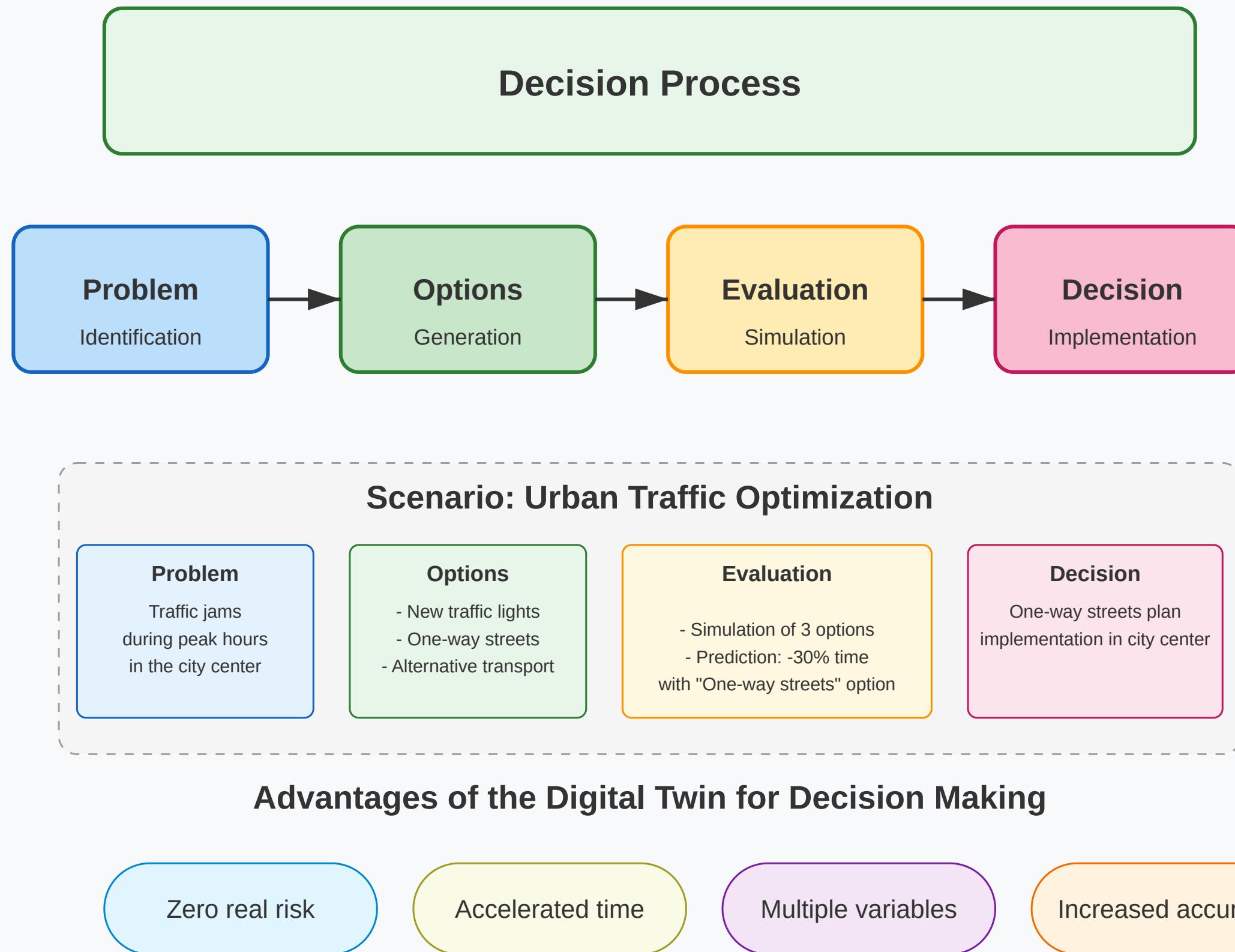
**Level: Advanced**

■  
Unidirectional  
(read-only)

+  
Semi-bidirectional  
(limited feedback)

++  
Bidirectional  
(full sync)

# Decision Support with a Digital Twin



# THE SOCIO-ECOLOGIC IMPACT

In an era where climate change is rapidly transforming ecosystems, creating Digital Twins provides a powerful way to communicate information and data to a wide range of audiences through dashboards and interactive visualizations.

The goal of this project is to maintain maximum transparency and keep data as open as possible while educating stakeholders in the territory, fostering a "learning territory" approach.

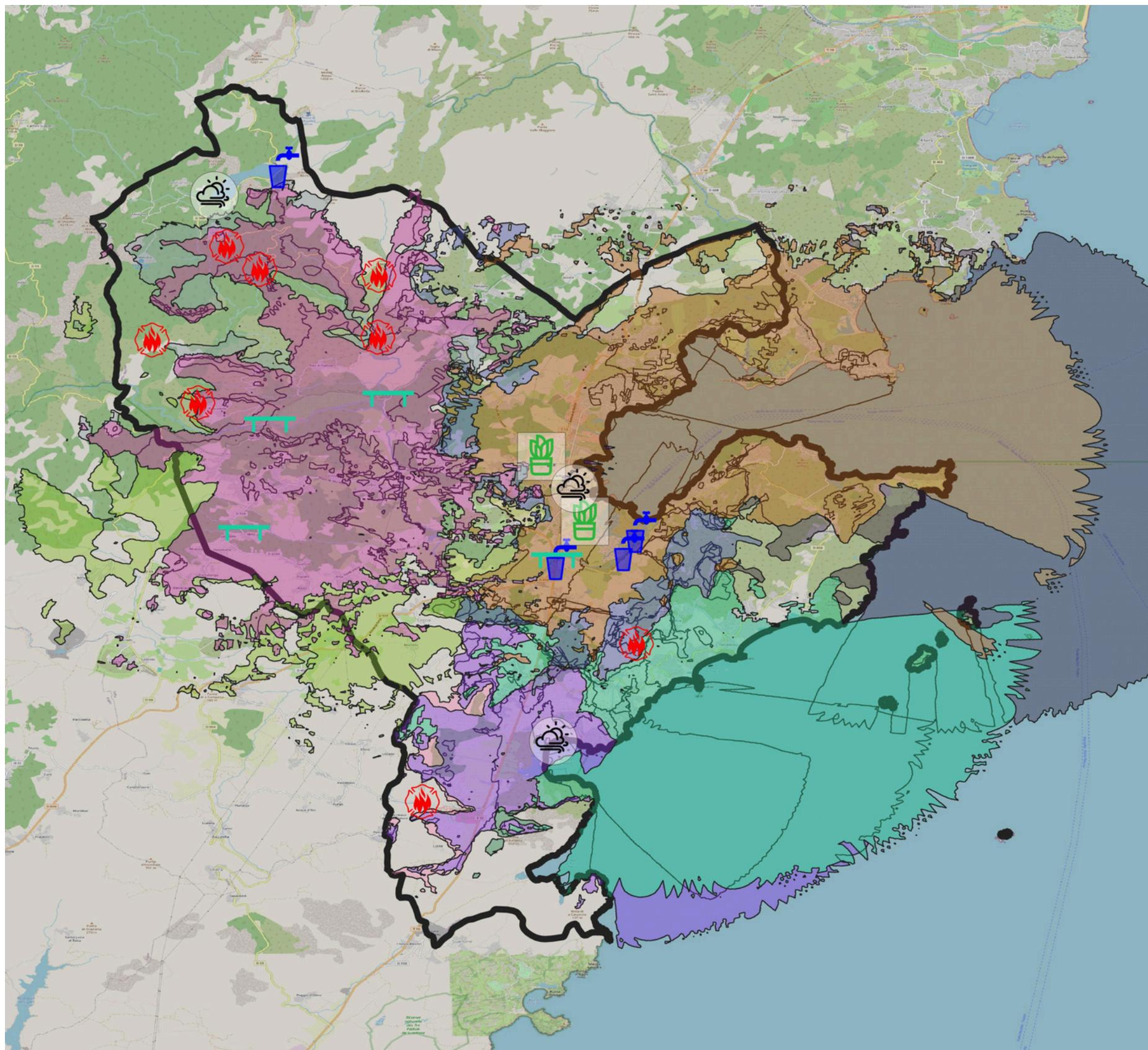
# TERRITORIAL WEAKNESSES AND RISKS

Freshwater resources : Most of the water is provided by the Ospedale's dam, which is regularly confronted to risk of drought, especially in August when the overtourism waves strikes.

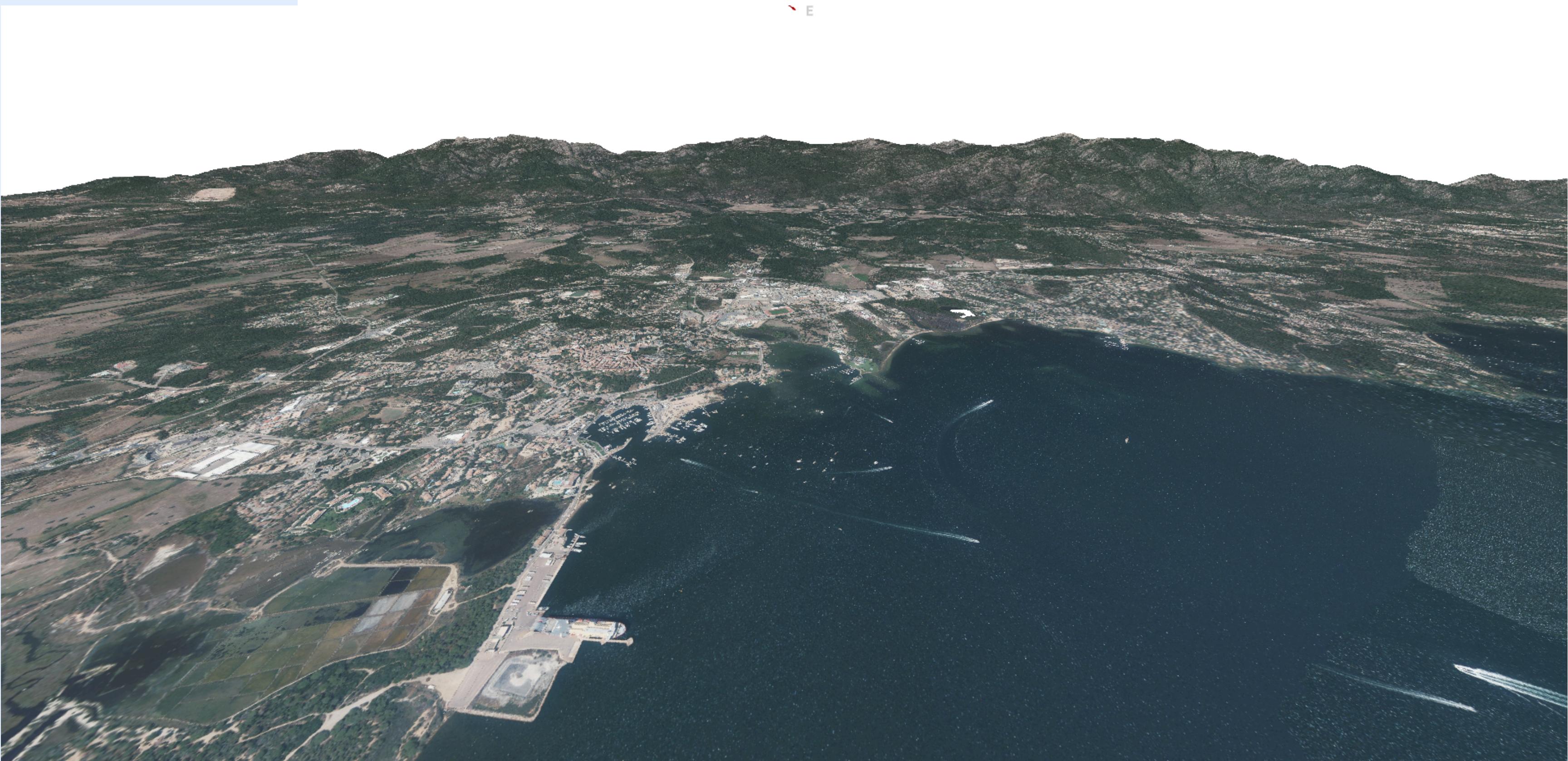
Forest Fires and floods

Other weaknesses/risks  
transport and mobility  
waste management  
energy management

# PLAN OF ACTION

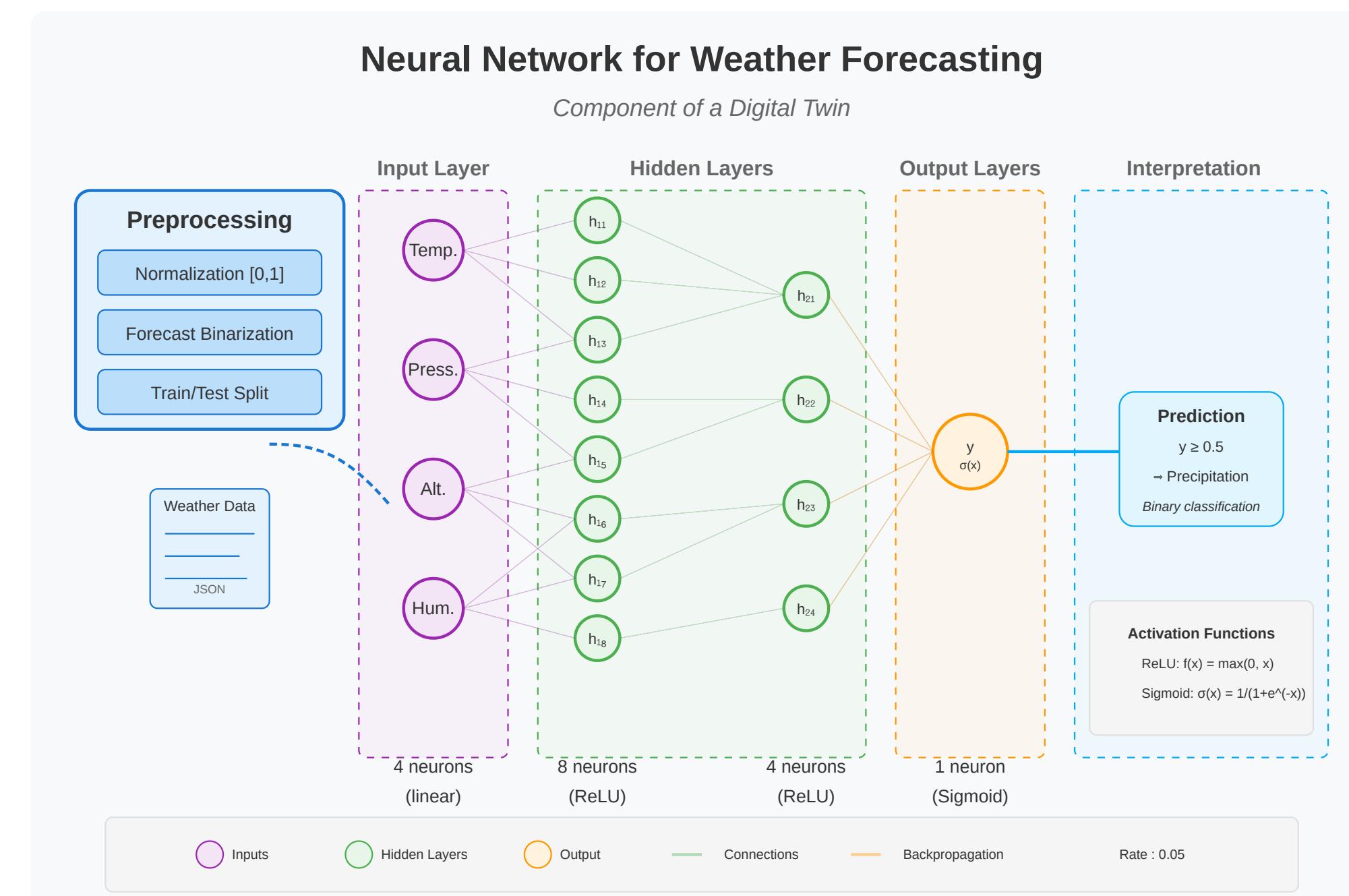


# EXAMPLE OF VISUALITON



# Example of a simple neural network for weather forecast

4 inputs neuron, 8+4 hidden neuron, 1 output neuron



# **Interactive Demo of a shadow twin**



**THANKS FOR  
YOUR  
ATTENTION**