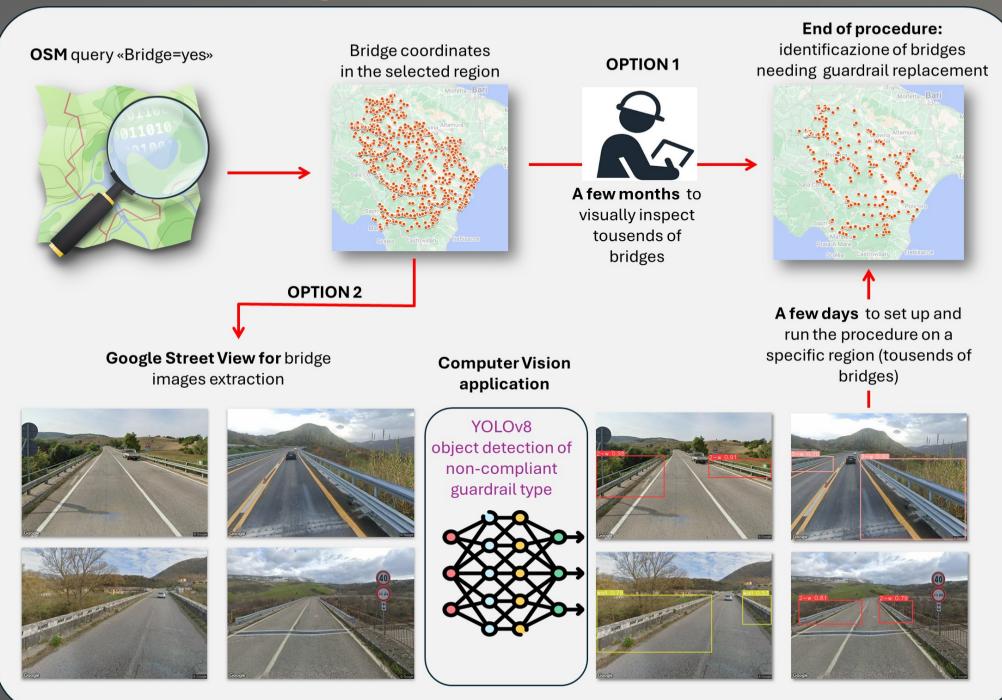
## Framework for regional assessment



Automated
Recognition of
GUardrail
Systems



## **Process automation**



Automated
Recognition of
GUardrail
Systems

WorkSheet 1 - Bridge database construction and GSV image extraction

Macro 1 – Extracting bridges from OSM

```
[out:json][timeout:25];
(
  way["bridge"="yes"](bounding_box);
  relation["bridge"="yes"](bounding_box);
);
out body;
>;
out skel qt;
```

2.5 Execution Google API requests for each bridge, saving GSV images into a specified folder

Macro 3 – Inferring extracted images with

Macro 2

- 2.1 Importing data from CSV generated and dowloaded from OSM;
- 2.2 Assigning unique bridge IDs
- 2.3 Calculating bridge lenghts from Lat. & Lon.
- 2.3 Calculation of Atan2 (as heading values in Google API request)
- 2.4 Generation of Google API requests for eac bridge

Macro 4 - Importing data labels deriving from inference into Worksheet 2 featuring 11 columns (IDs, 5 classes names, 5 confidence values):

WorkSheet 2 - Class predictions

Macro 5 –

- 5.1 Setting up pivot table for prediction data analysis
- 5.2 Filtering bridges needing guardrail replacement
- 5.3 Exporting data to Google Mymaps for bridge geographical visualization

WorkSheet 3 - Cost computation

Macro 6 –

- 6.1 Calculating bridge length needing guardrail replacement
- 6.2 Calculating cost for bridge needing guardrail replacement
- 6.3 Prioritization based on Road Type and Length

2

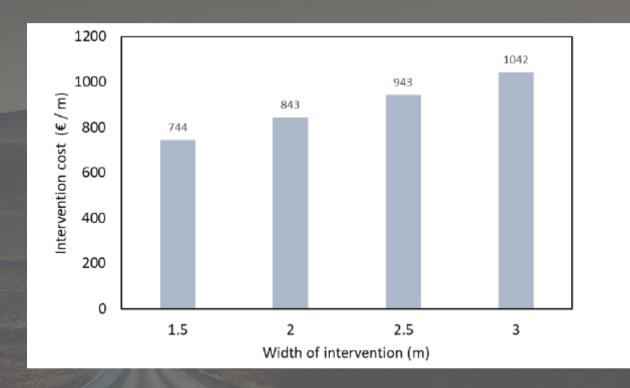
5

Giuseppe Santarsiero

## Cost computation for Basilicata region



Basilicata region



Data description	Amount	Units
Number of bridges on major infrastructures	776	
Number of bridges equipped with 3-w guardrails	454	
Number of bridges equipped Parapets, Walls and NJ	29	
Number of bridges equipped with 2-w guardrails	293	
Length of bridges equipped with 2-w guardrails	37.54	km
Length of guardrails replacement	75.09	km
Mean cost of intervention C	893	€/m
Total cost of intervention	67.05	M€

## **Strengths and limitations**



Automated
Recognition of
GUardrail
Systems

