universidade de aveiro
departamento de eletrónica, telecomunicações e informática

Aveiro Tech City Living Lab

AI-Powered Platform for Smart City Issue Detection & Resolution

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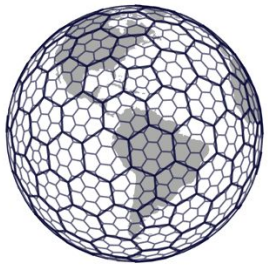
Index

- Contextualization
- Our Solution
- Implemented Work
- Requirements & Usability
- Demo
- Performance Tests
- Future Work



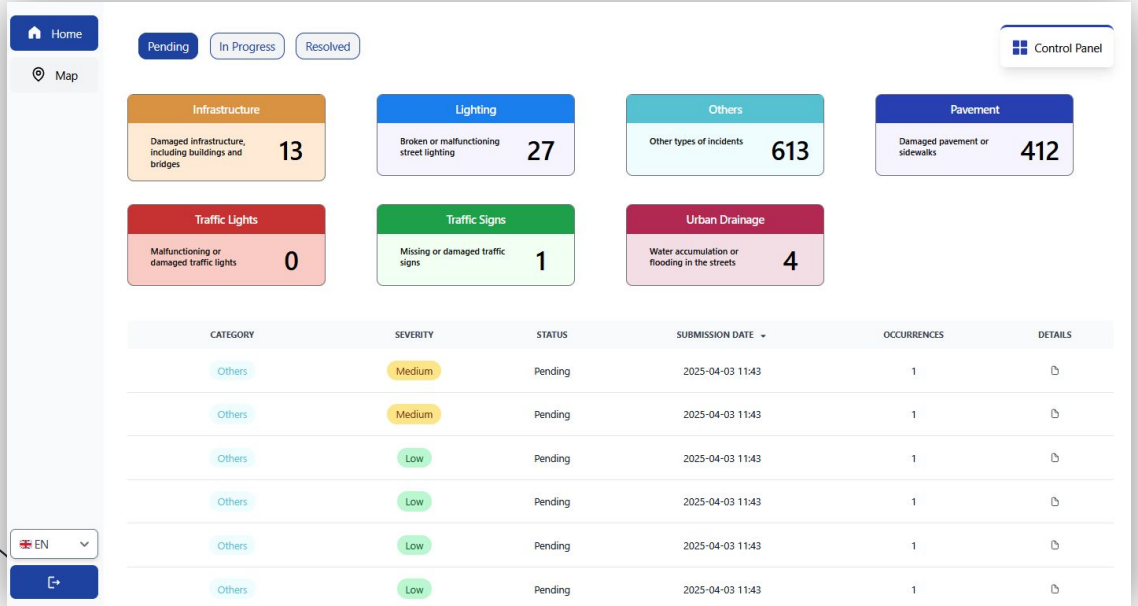
Contextualization

- **Manual incident reporting** – Citizens report incidents manually, often through inefficient channels like phone calls or emails.

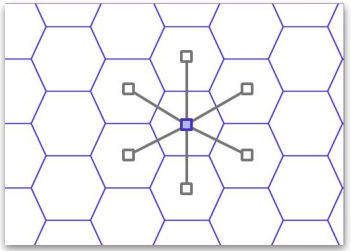
- **Lack of real-time validation** – Authorities have no automated way to verify whether an incident has been resolved.

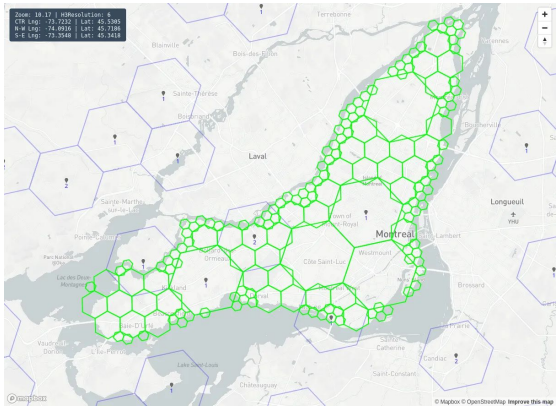
- **Unstructured issue management** – Authorities lack an organized information system to track and prioritize the most urgent and recurring urban issues efficiently.

Our Solution



Implemented Work – H3





(lat, lon) –> H3 cell

Average area in m^2

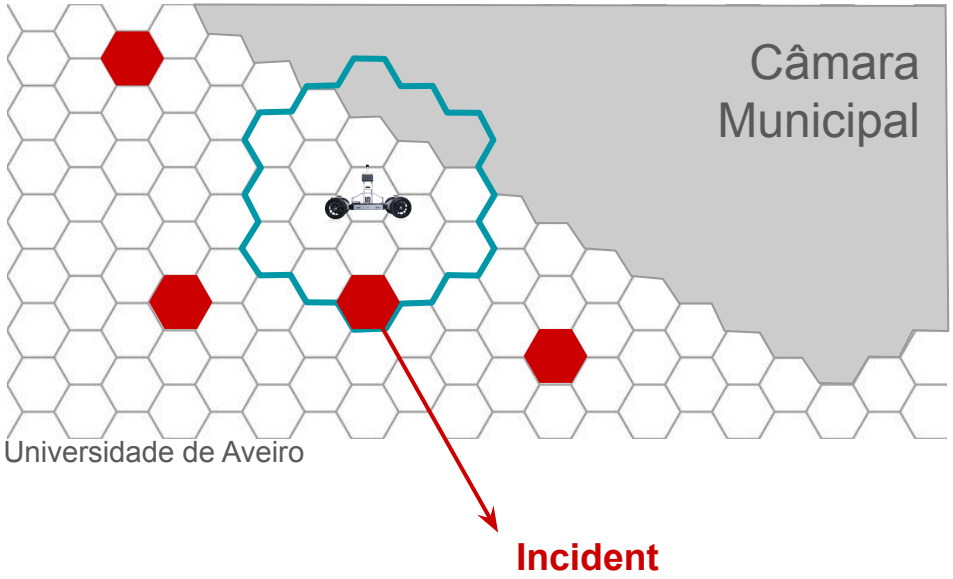
Here are the same areas, but in m^2.

Res	Average Hexagon Area (m^2)	Pentagon Area* (m^2)
0	4,357,449,416,078.392	2,562,182,162,955.496
1	609,788,441,794.134	328,434,586,246.469
2	86,801,780,398.997	44,930,898,497.879
3	12,393,434,655.088	6,315,472,267.516
4	1,770,347,654.491	896,582,383.141
5	252,903,858.182	127,785,583.023
6	36,129,062.164	18,238,749.548
7	5,161,293.360	2,604,669.397
8	737,327.598	372,048.038
9	105,332.513	53,147.195
10	15,047.502	7,592.318

Problems:

- How to aggregate problems?
- How to scan problems with O(1)?

H3-Index Solution



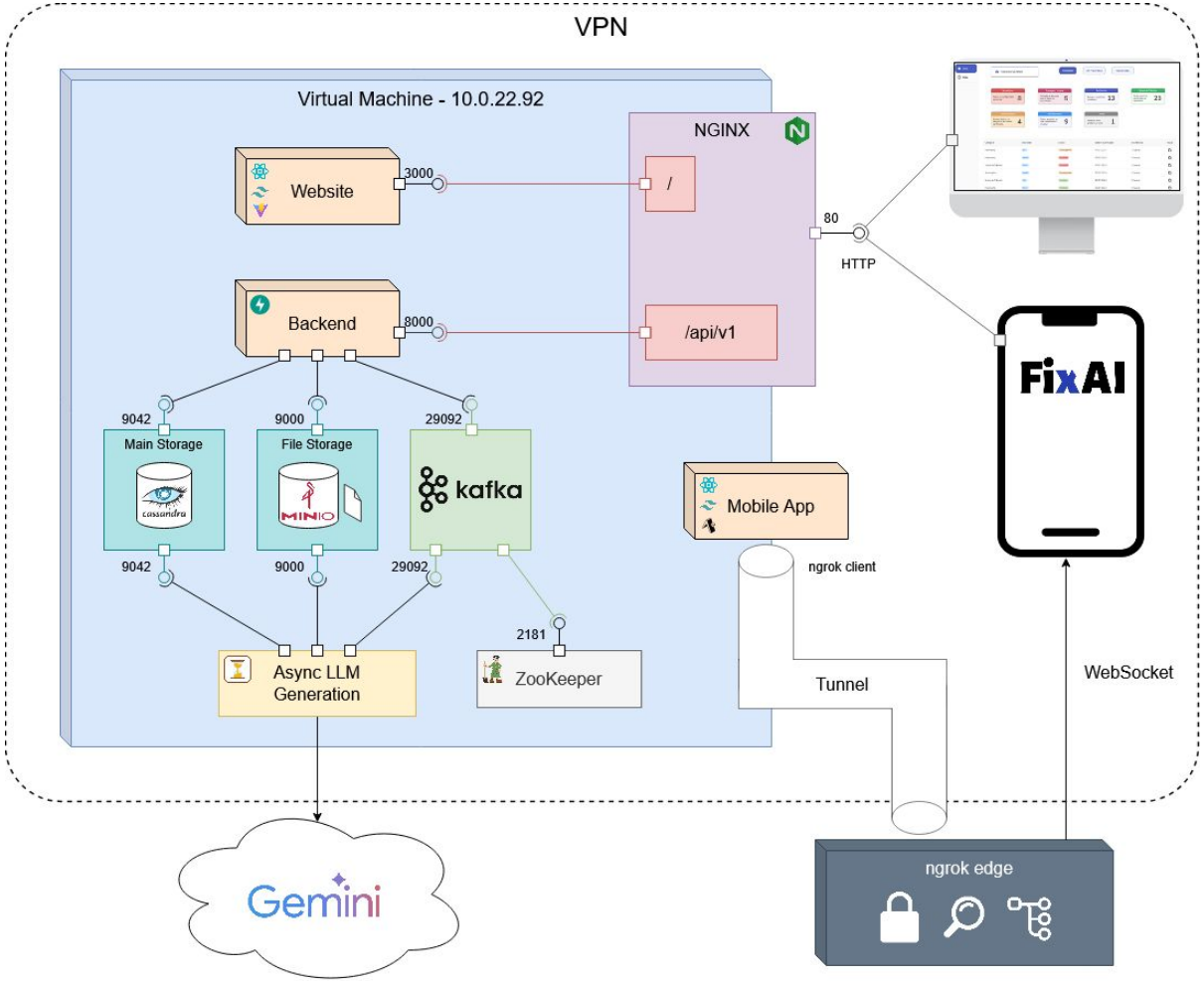
Solution:

key: h-index
value: (organization, incident_id)

Problems:

- How to aggregate problems?
- How to scan problems with O(1)?

Initial Deploy



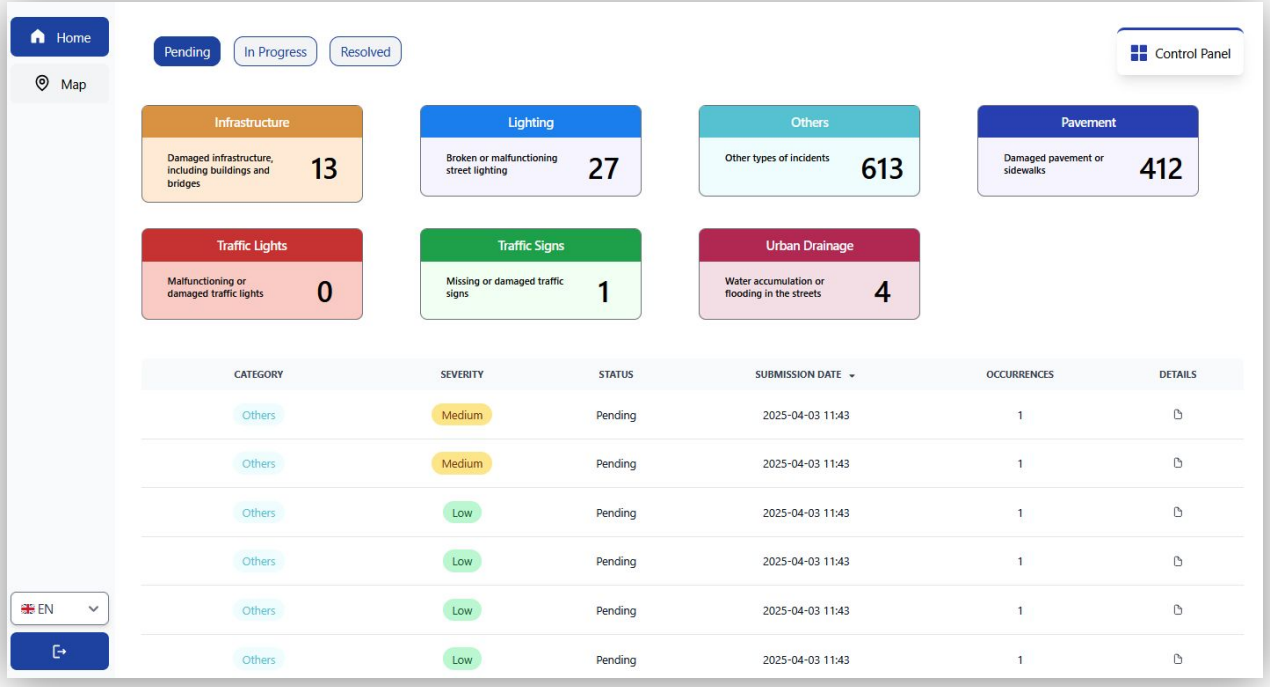
Requirements & Usability - CMA

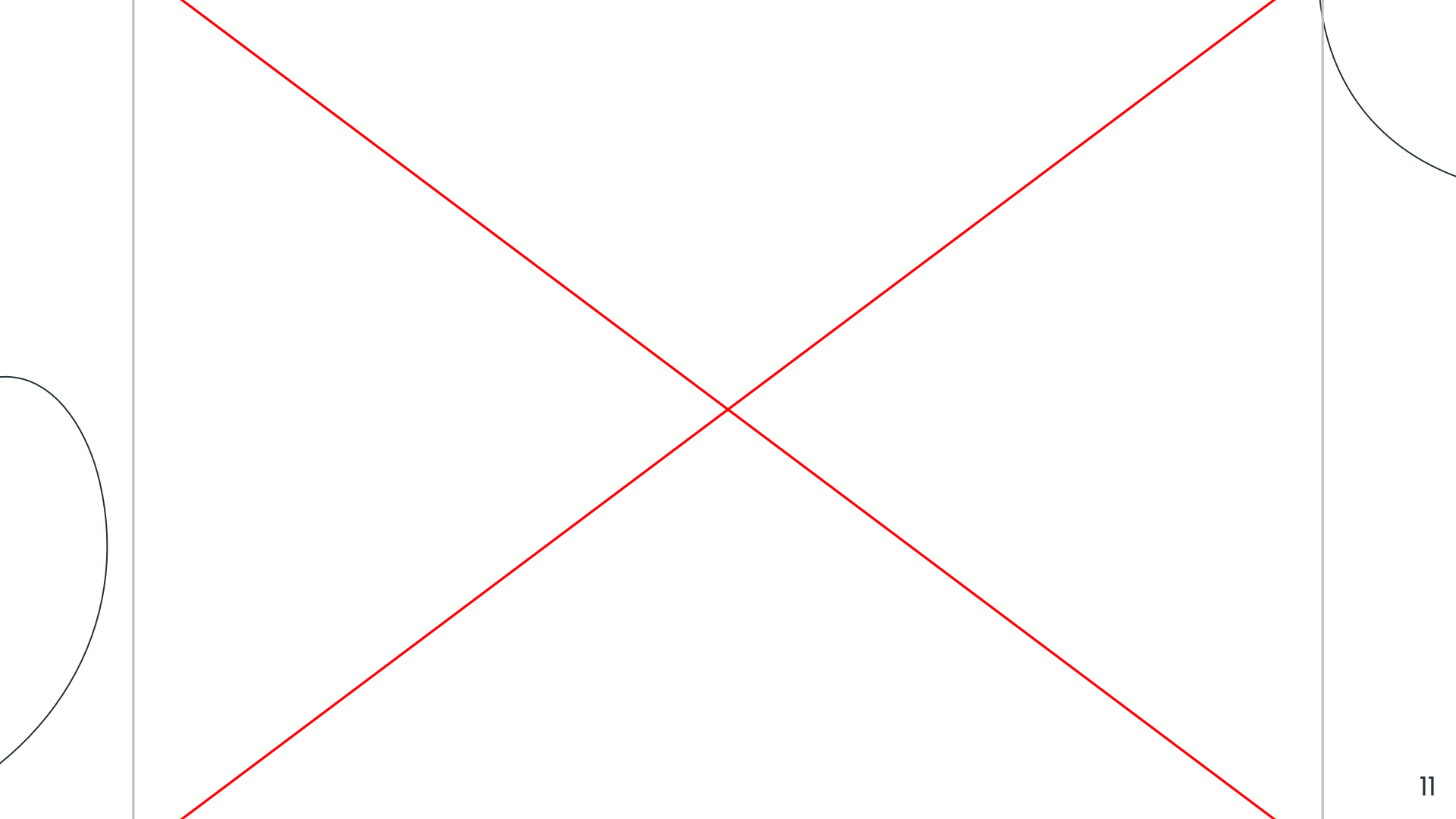
- **Requirements:**
  - 180 entries per day
  - Group incidents in the same location
  - Notification to the citizen
  - Define its own categories
  - Managing information

- **Usability:**
  - Very intuitive
  - Photo-taking button on the home page

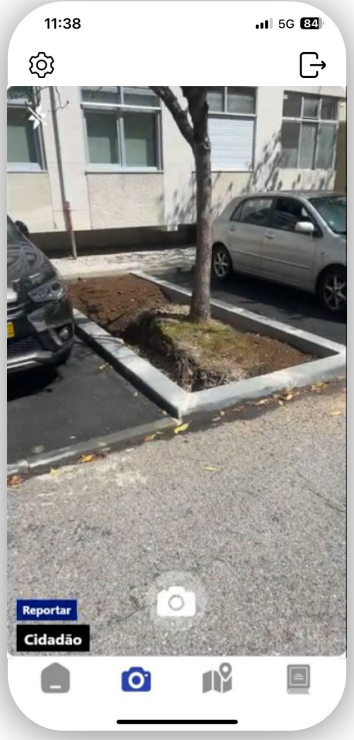
Demo

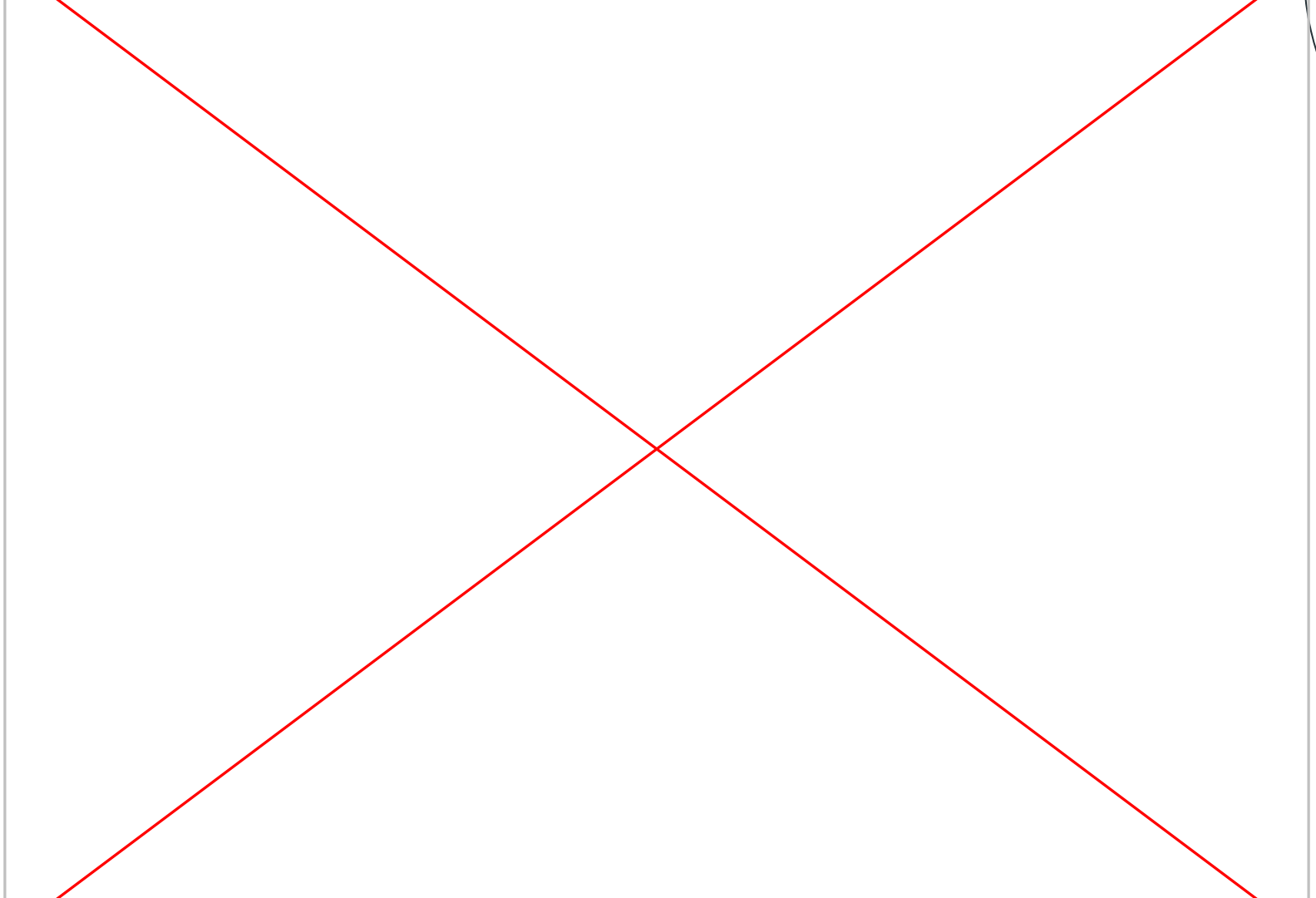
Table with Incidents and Update



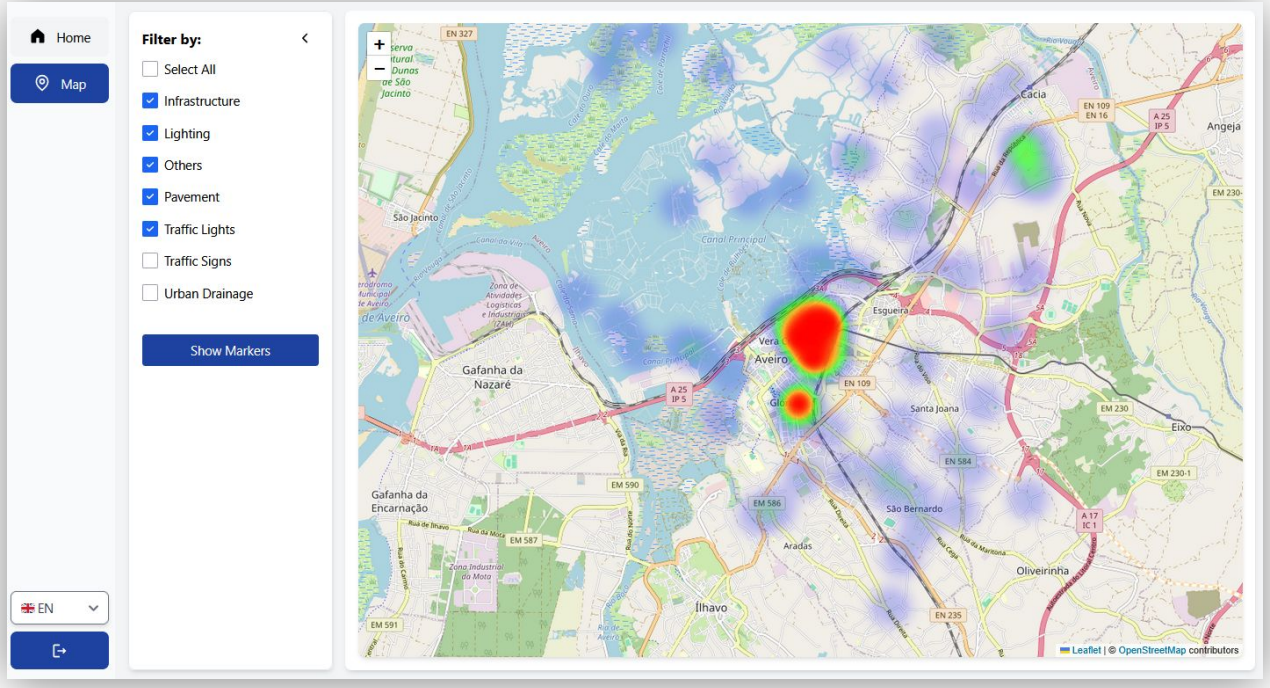


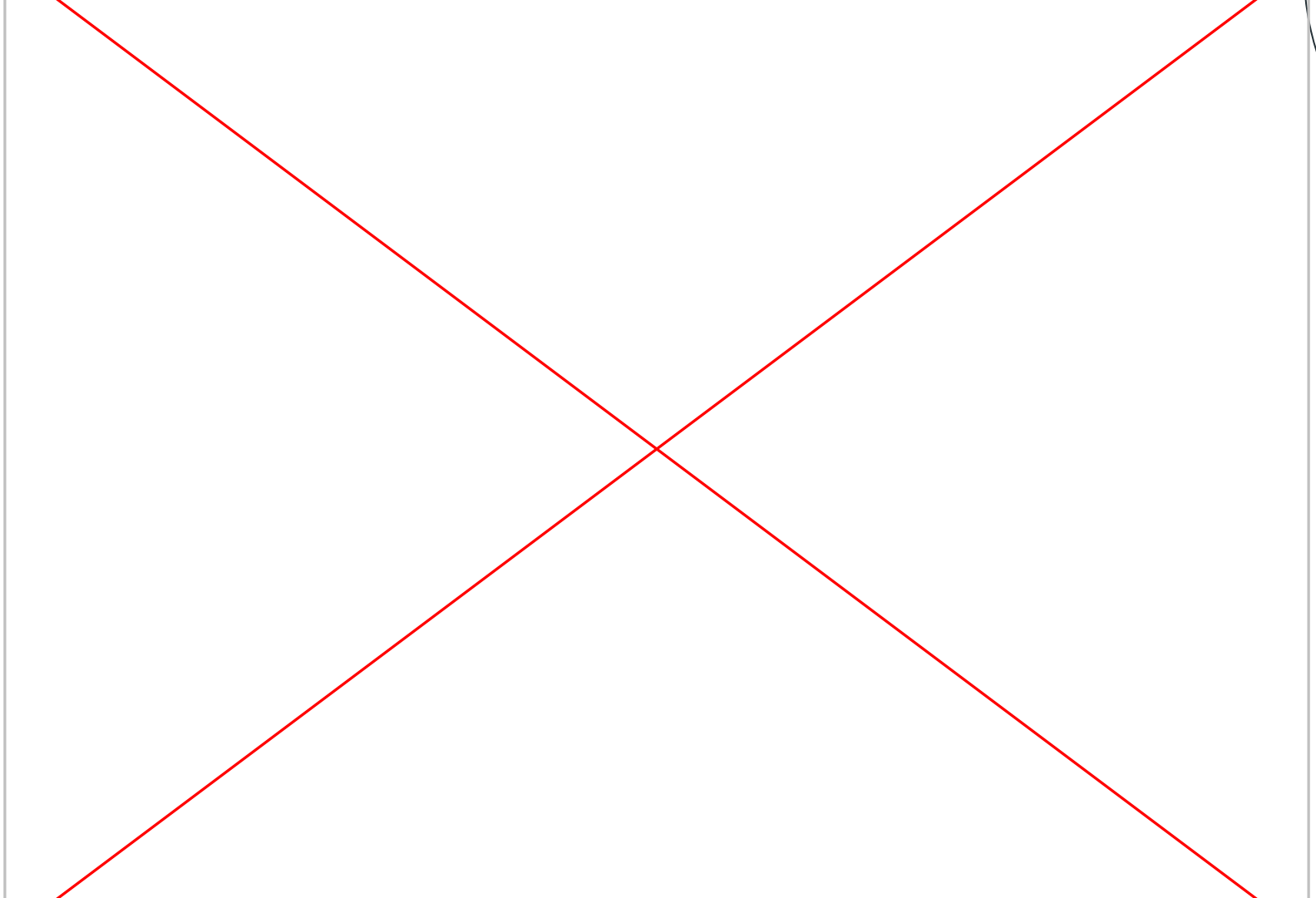
User Reporting an Existing Incident



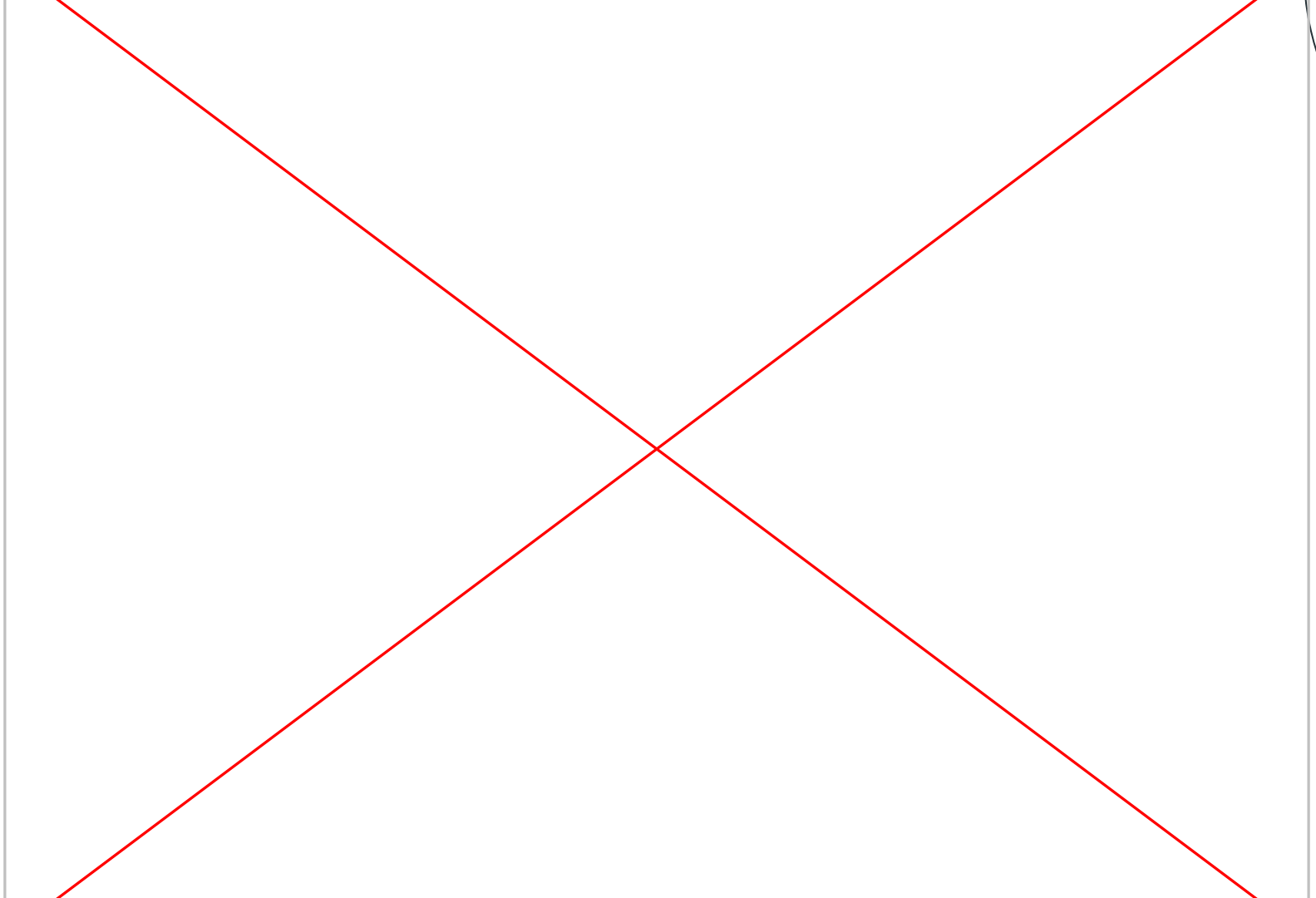


Map Incident Review and Resolution



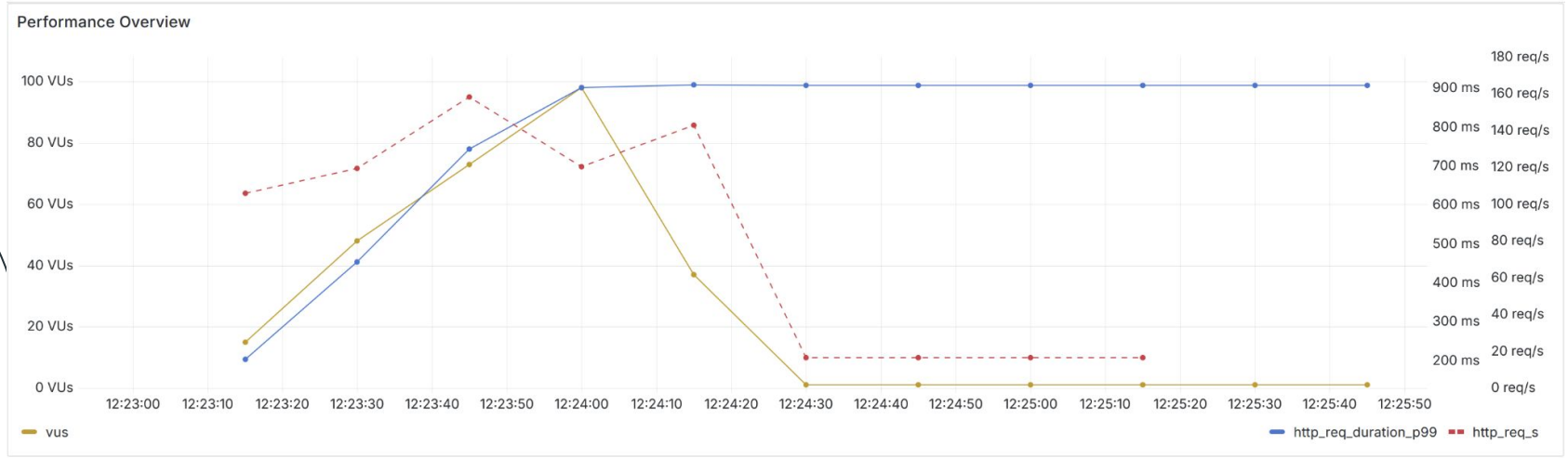


User Verifies Incident Resolution



Performance Tests

- VUs in k6 simulate users performing actions, e.g., fetching photos.



Performance Overview

HTTP requests	HTTP request failures	Peak RPS	HTTP Request Duration
9783	No data	16.7 req/s	907 ms

Future Work

- Aveiro Tech City Living Lab Integration
- Problem Aggregation
- Kubernetes
- Certificates
- Stable Version Deployment

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Questions?

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