

USE OF **IoT** IN TRANSPORTATION SOLUTIONS

UN/CEFACT Conference on "Internet of Things (IoT)"

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AGENDA

INTRODUCTION

Connected vehicle

Use cases

Telemetry - Data collection

SPACE ANALYTICS

Explication

Needs

CASES OF SUCCESS SINGULARITY PLATFORM

Mobility - Connected vehicle Platform

Safety - Speeding and level Crossings

NEW PROJECTS

IoT Platform DGT 3.0

Document Management Module Based on Geolocation

CONCLUSIONS

CONNECTED VEHICLE

What is it

“ Vehicle (any) that has one or more wireless connection systems, data transmission and communication with the outside, together with a sensor system that collects information from the vehicle itself.

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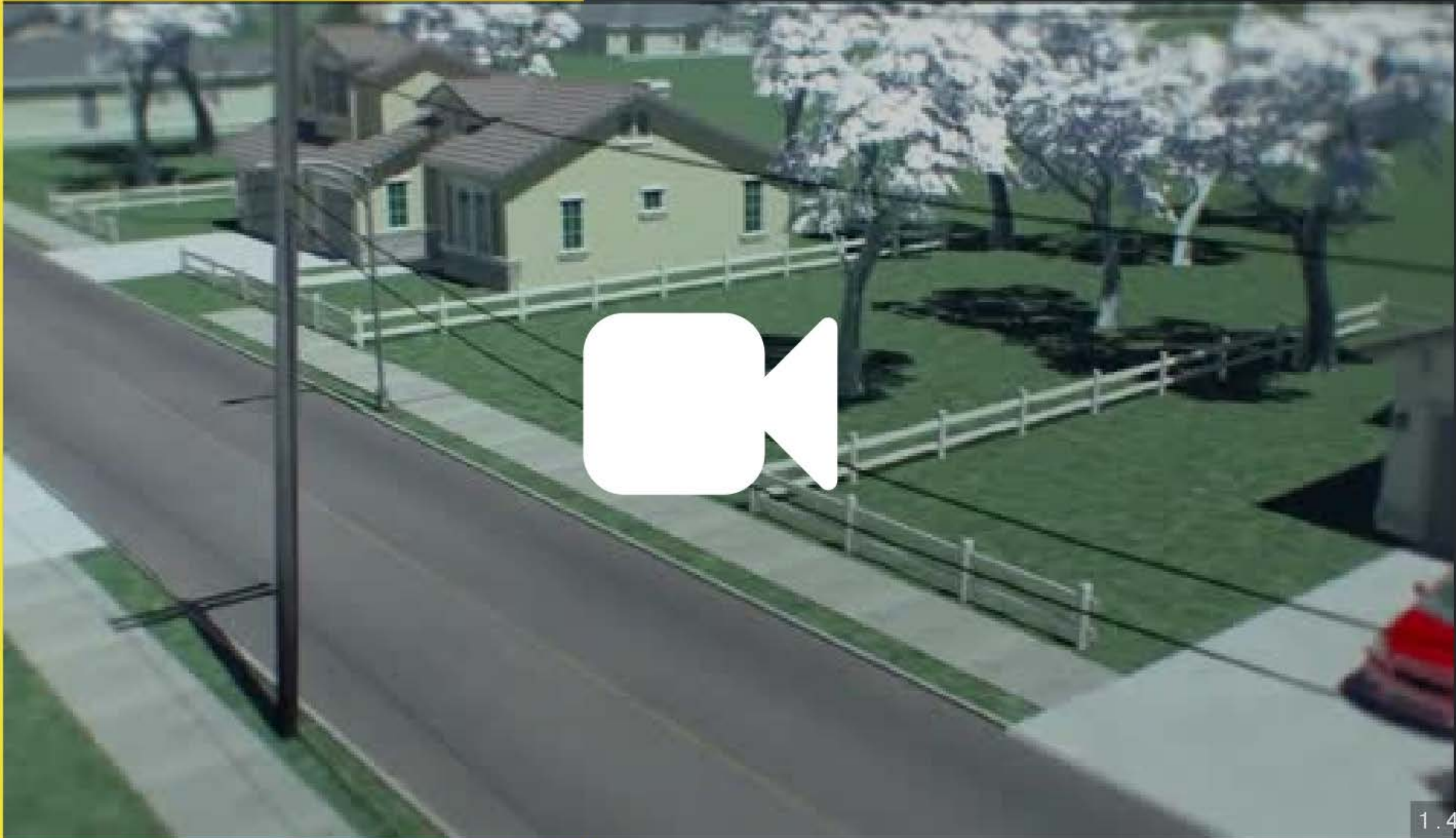
- Collects real-time information
- Central intelligent cloud
- Returns information and events



CONNECTED VEHICLE

Use Cases

Road safety



CONNECTED VEHICLE

Use Cases

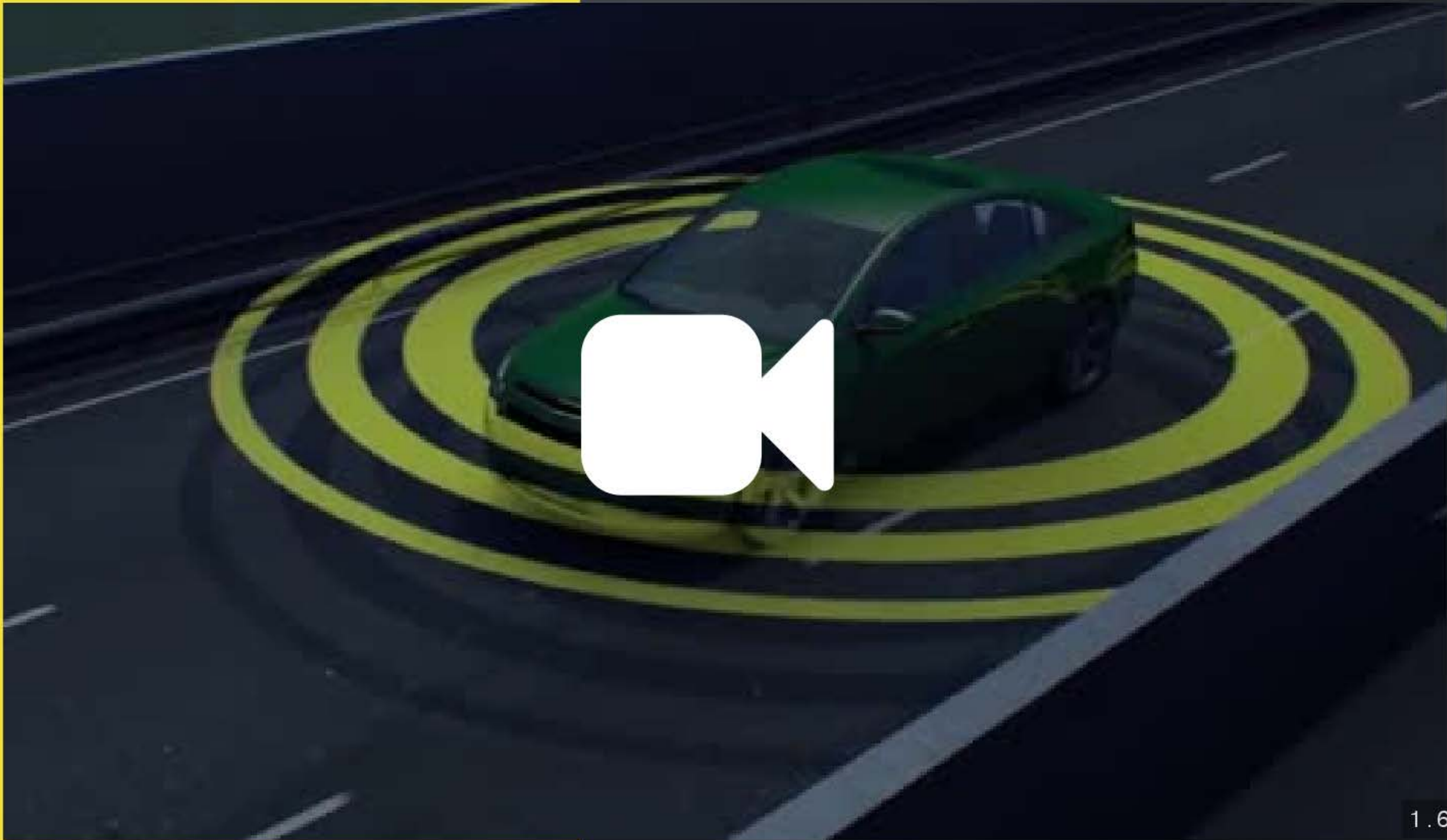
Emergency



CONNECTED VEHICLE

Use Cases

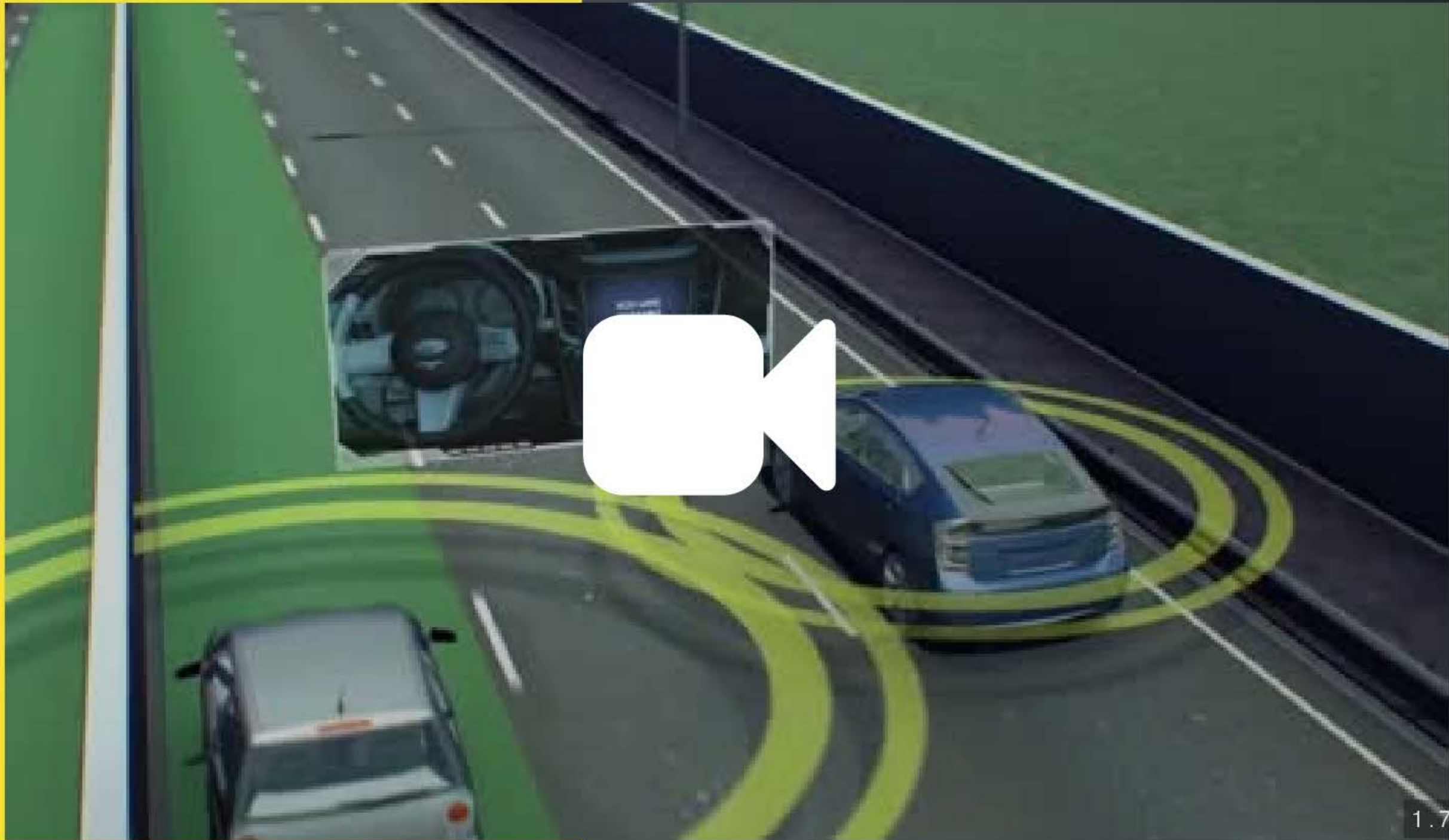
Meteorology



CONNECTED VEHICLE

Use Cases

Environment



CONNECTED VEHICLE

Use Cases

Mobility



TELEMETRY

Data Collect

“ For road safety and connected car in general, only a subset of data is necessary.

```
{
  "id": "550e8400e29b41d4a71644665545147d",
  "token": "550e8400e29b41d4a71644665545478e",
  "deviceType": 1,
  "lon": 3.776991,
  "lat": 40.310347,
  "occupants": 2,
  "speed": 25,
  "mode": 80,
  "use": 80,
  "event": 1,
  "value": "12",
  "ts": 1440422940
}
```

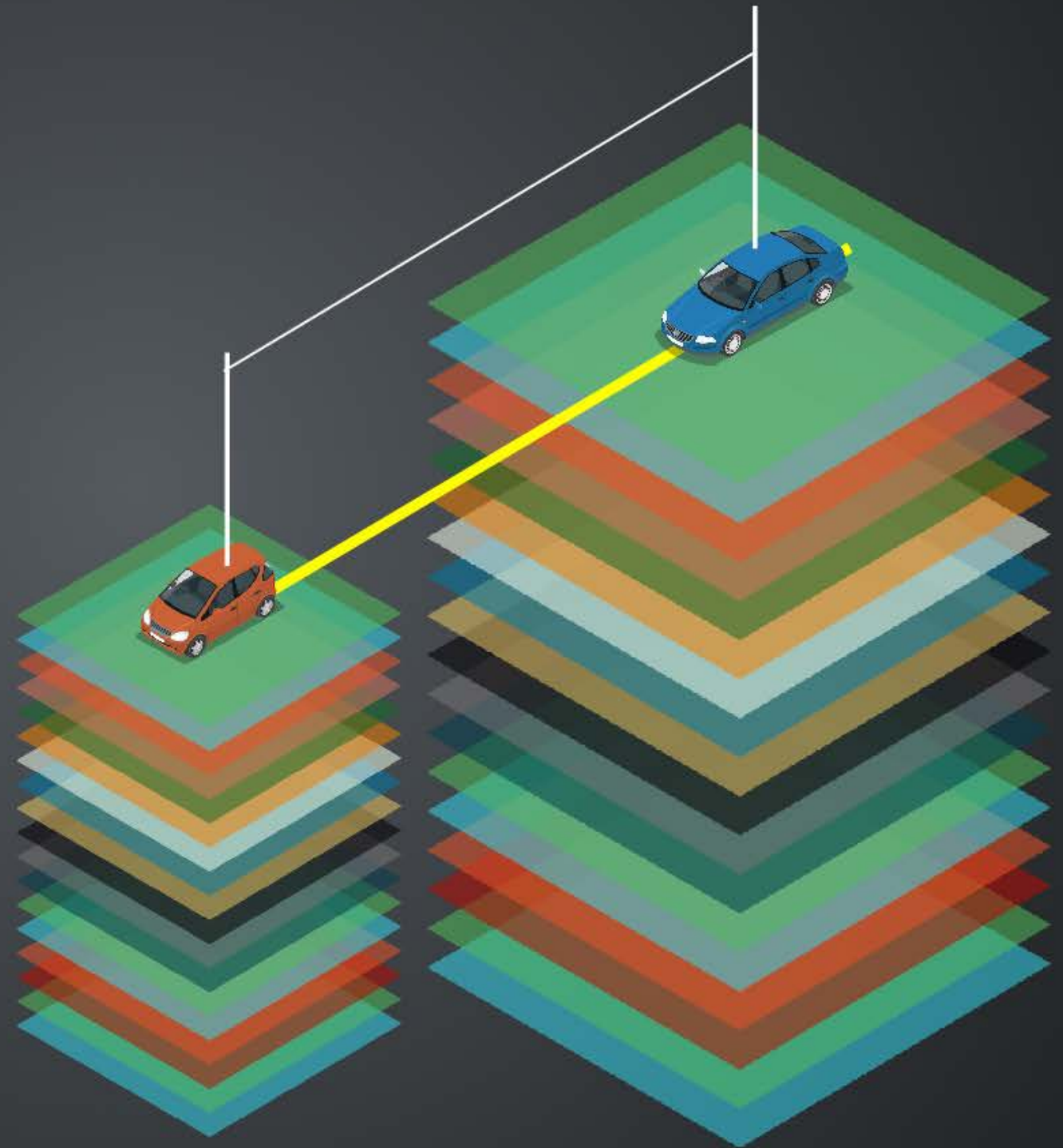
“ Traditionally the connection has been oriented to the collection of vehicle data.



SPACE ANALYTICS

Explanation

“ Locate the vehicle in its environment and use the layers of spatial context to determine different parameters.



Meteo
Glare
Ramp
Plann
Maxim
Statist
Interm
Gauge
Bus lin
Dange
Cycling
Incide
Points
Limit l
Groun
Railwa
Urban
Interur
...

SPACE ANALYTICS

Explanation

“ Need for layers of information with a spatial component of precision.

Origin of open sources with interoperable standards:

- IGN
- Public organisms.
- Organizations

Owners:

- Vehicle manufacturing companies.
- Geo Companies

SPACE ANALYTICS

Explanation

- 1.- Raw positions
- 2.- Analysis of the environment
- 3.- Identification of routes
- 4.- Track isolation
- 5.- Spatial correlation
- 6.- Correction of uncertainty
- 7.- Real travel



SPACE ANALYTICS

Need for high precision

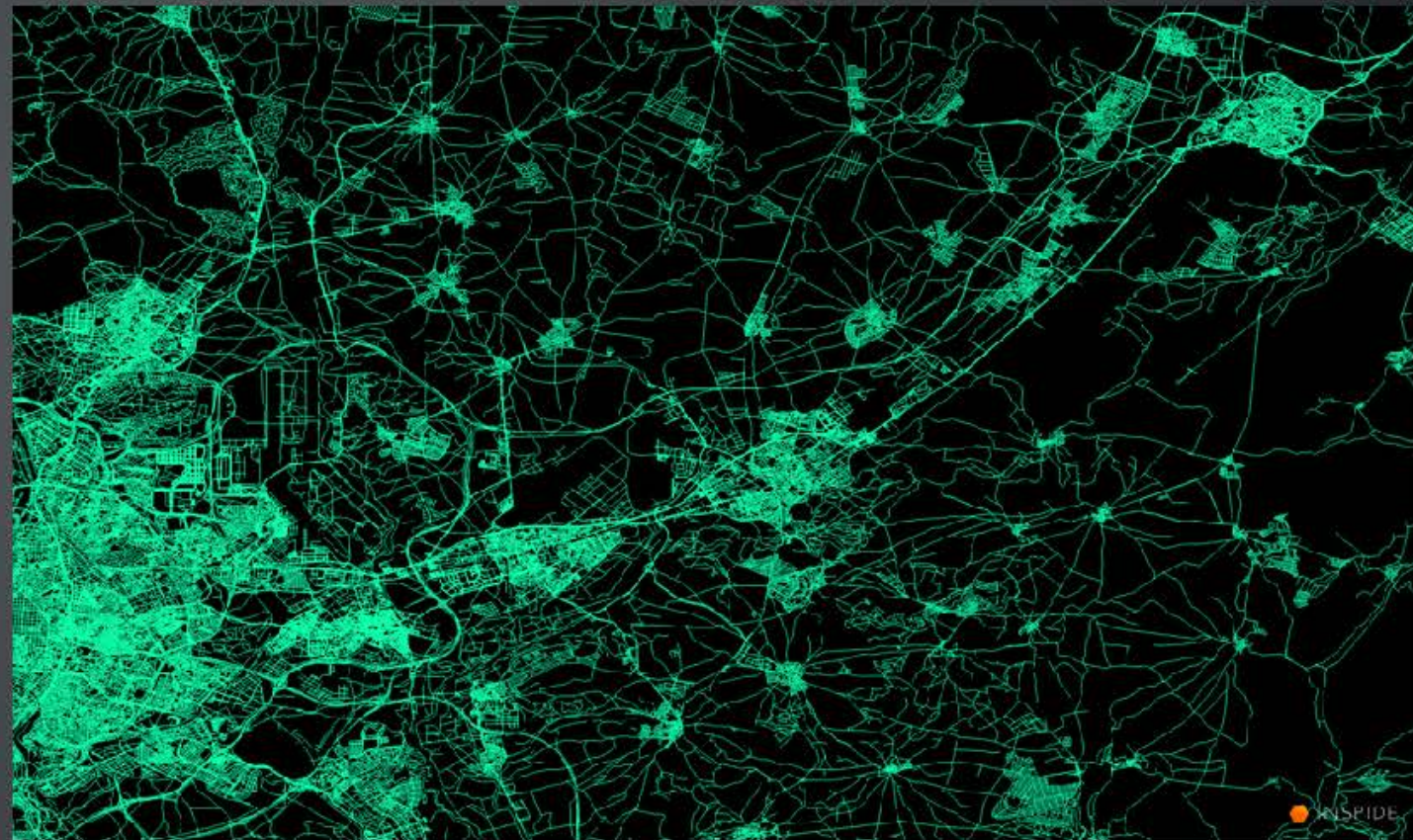
***“ Mobile Mapping:** It offers a cloud of high precision and high density points combined with high resolution panoramic images. It provides precise orientation and positioning in a dynamic environment.*



SPACE ANALYTICS

Use of high precision cartography

// Geometries treated: 3.2 Million urban and interurban geometries (crossings, streets, detours, tunnels, etc.) processed in real time in less than 1 second



Guadalajara and Madrid (Spain)

SPACE ANALYTICS

Use of high precision cartography

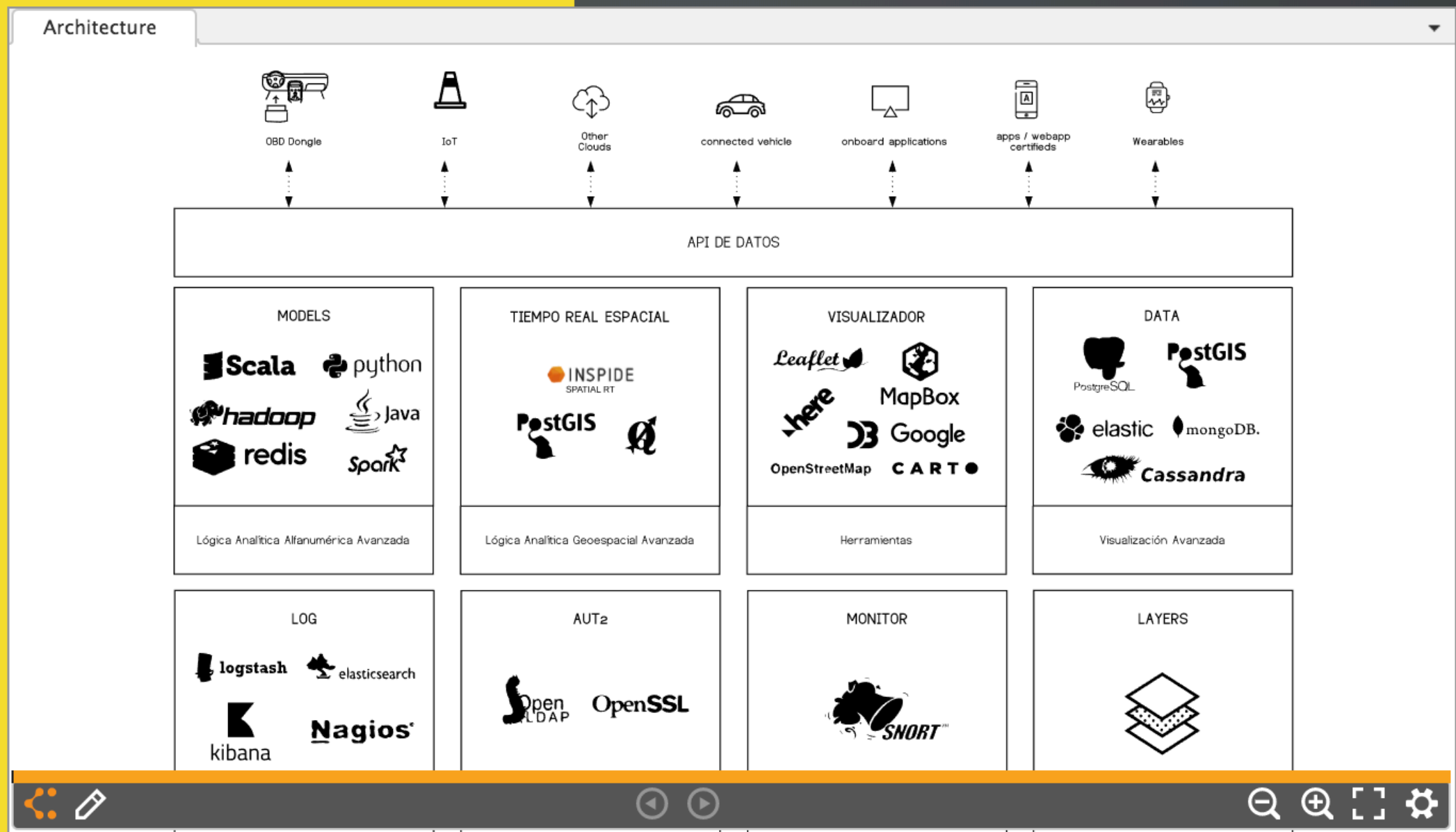
// Superposition of maximum speeds (tracks and vehicle): High precision and updated cartography is essential in order to have speed limitation data.



CASE OF SUCESS

SINGULARITY PLATFORM

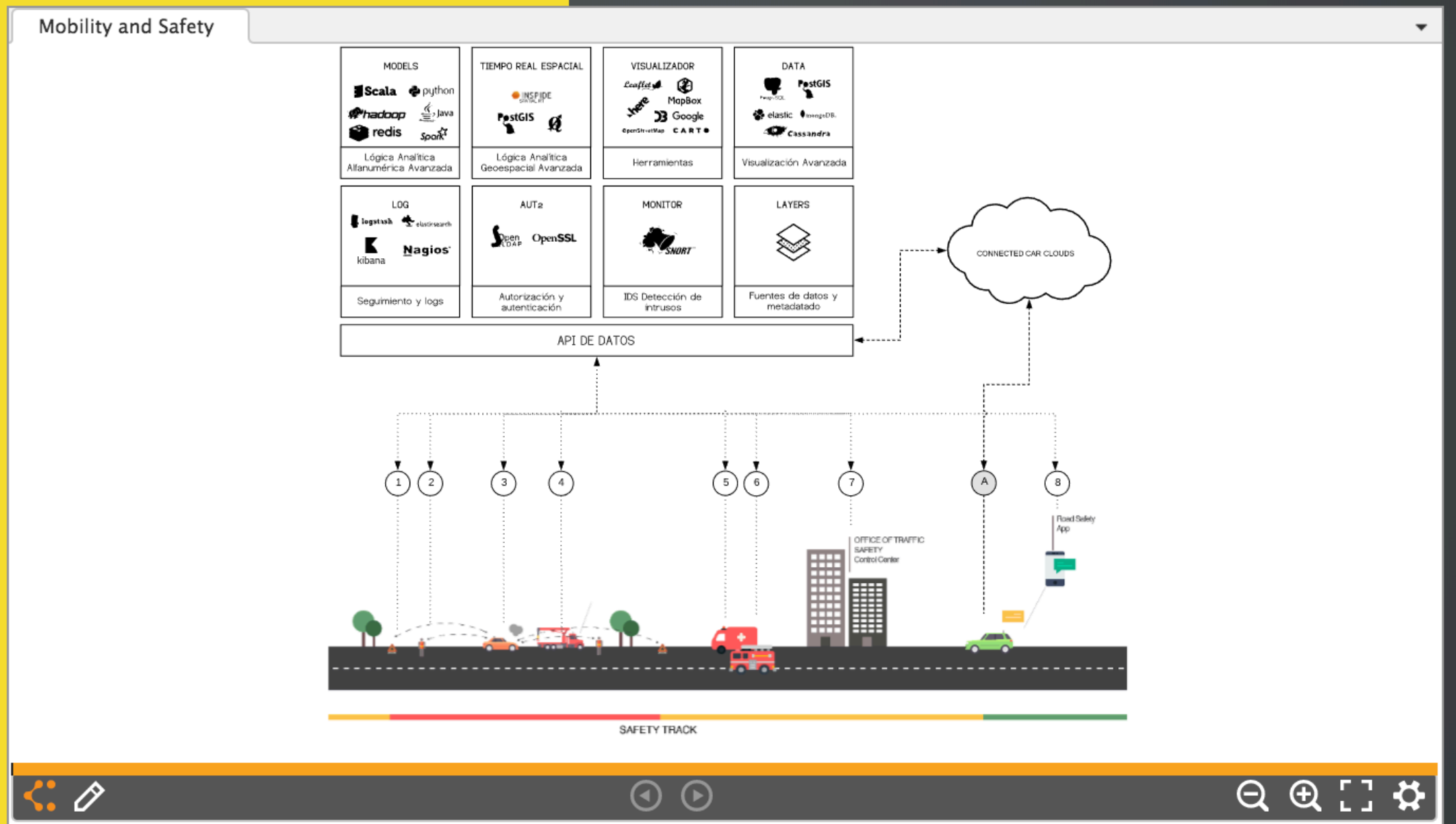
Architecture



CASE OF SUCESS

SINGULARITY PLATFORM

Mobility and Safety



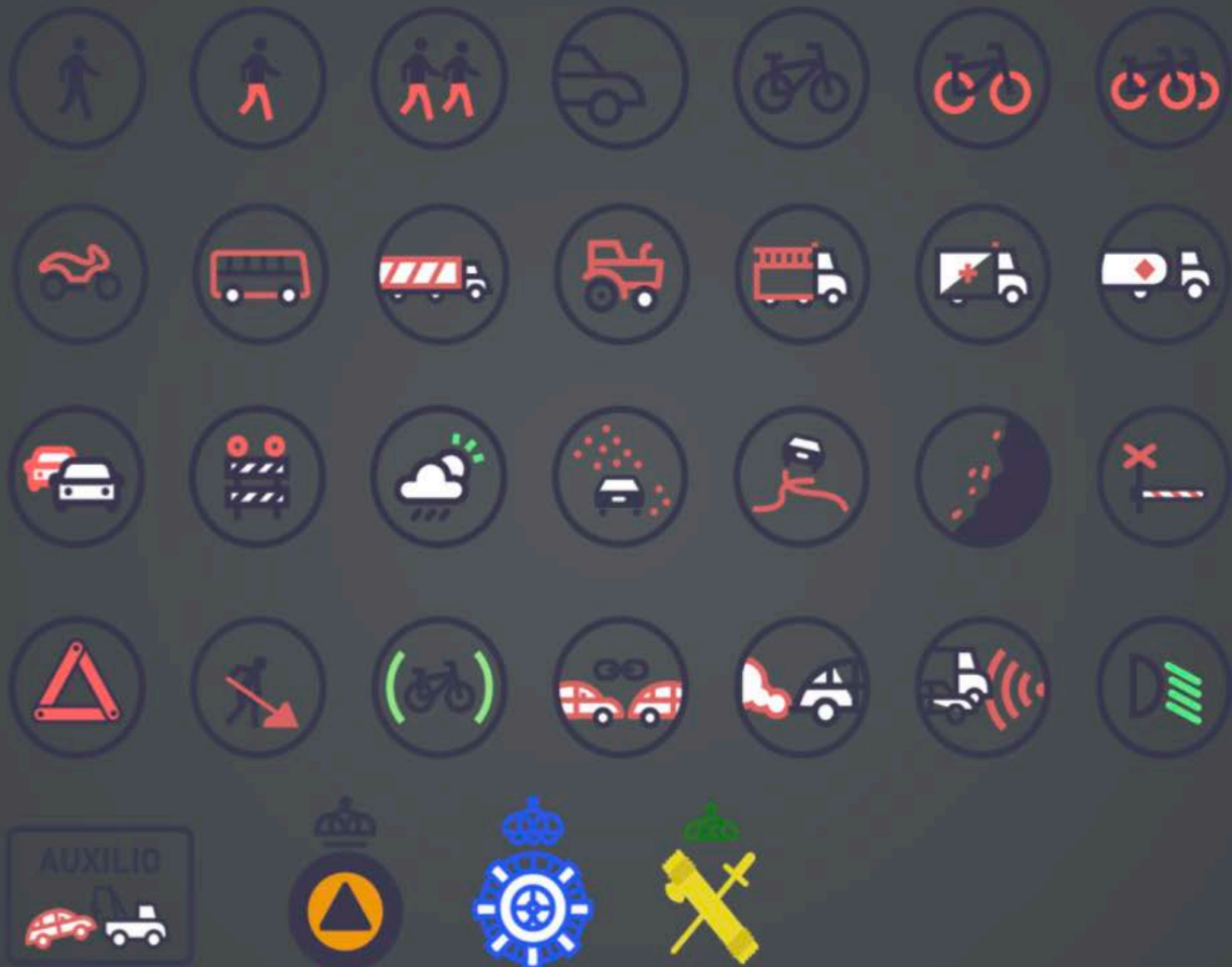
CASE OF SUCESS
SINGULARITY PLATFORM
Mobility - Connected vehicle

“ At every moment, for all users and entities, it takes into account all layers of geospatial context information. If the user's risk exceeds a certain value, he sends a personalized notification to help the user make a better decision in favor of safety and mobility.



Multiple Use Cases
Multiple modes of transport and use

INSPIDE



CASE OF SUCESS SINGULARITY PLATFORM Mobility - Connected vehicle

“ Big Data platform of advanced spatial analytics in which powerful open source technologies are integrated to offer real-time intelligent mobility services under the Software as a Service concept.



t response <1 s (true real time)
2M6 Road Entities
INSPIRE interoperable standards
Single DGT provider (Spain)



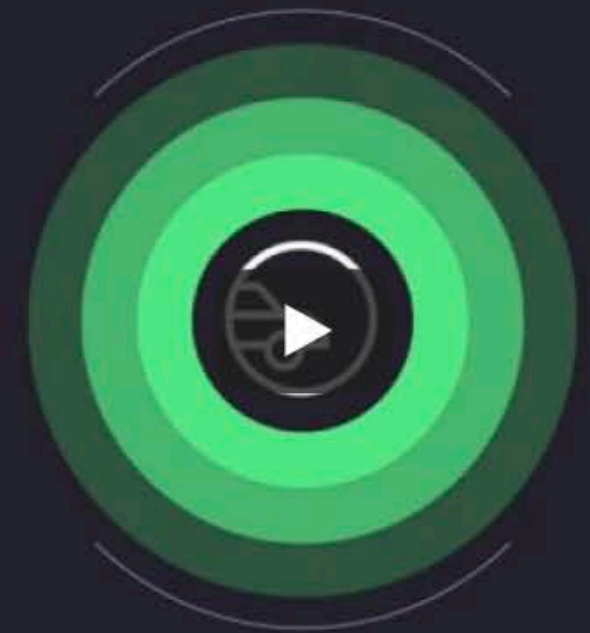
y protege



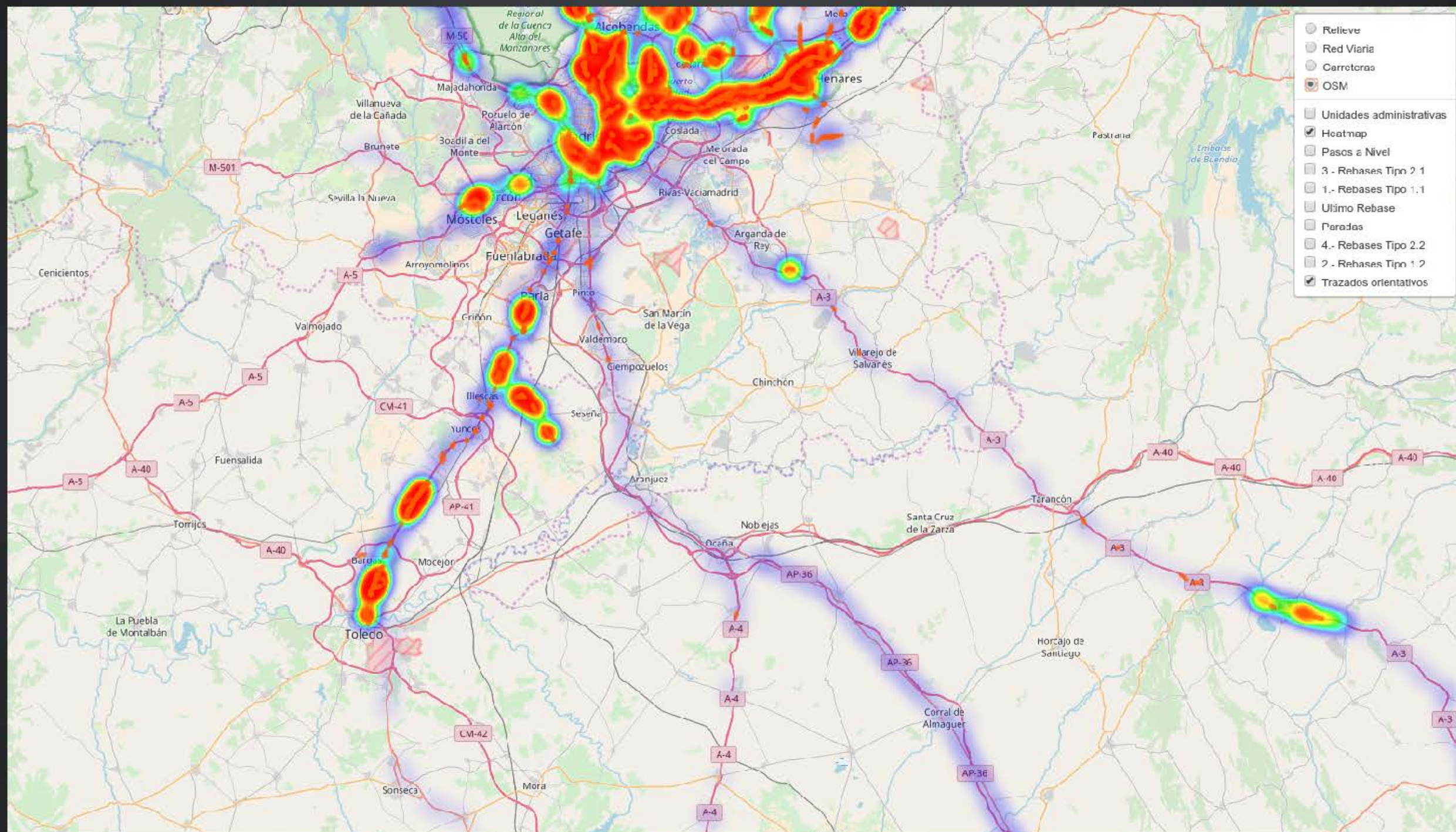
Comobity valora en tiempo real tu posición

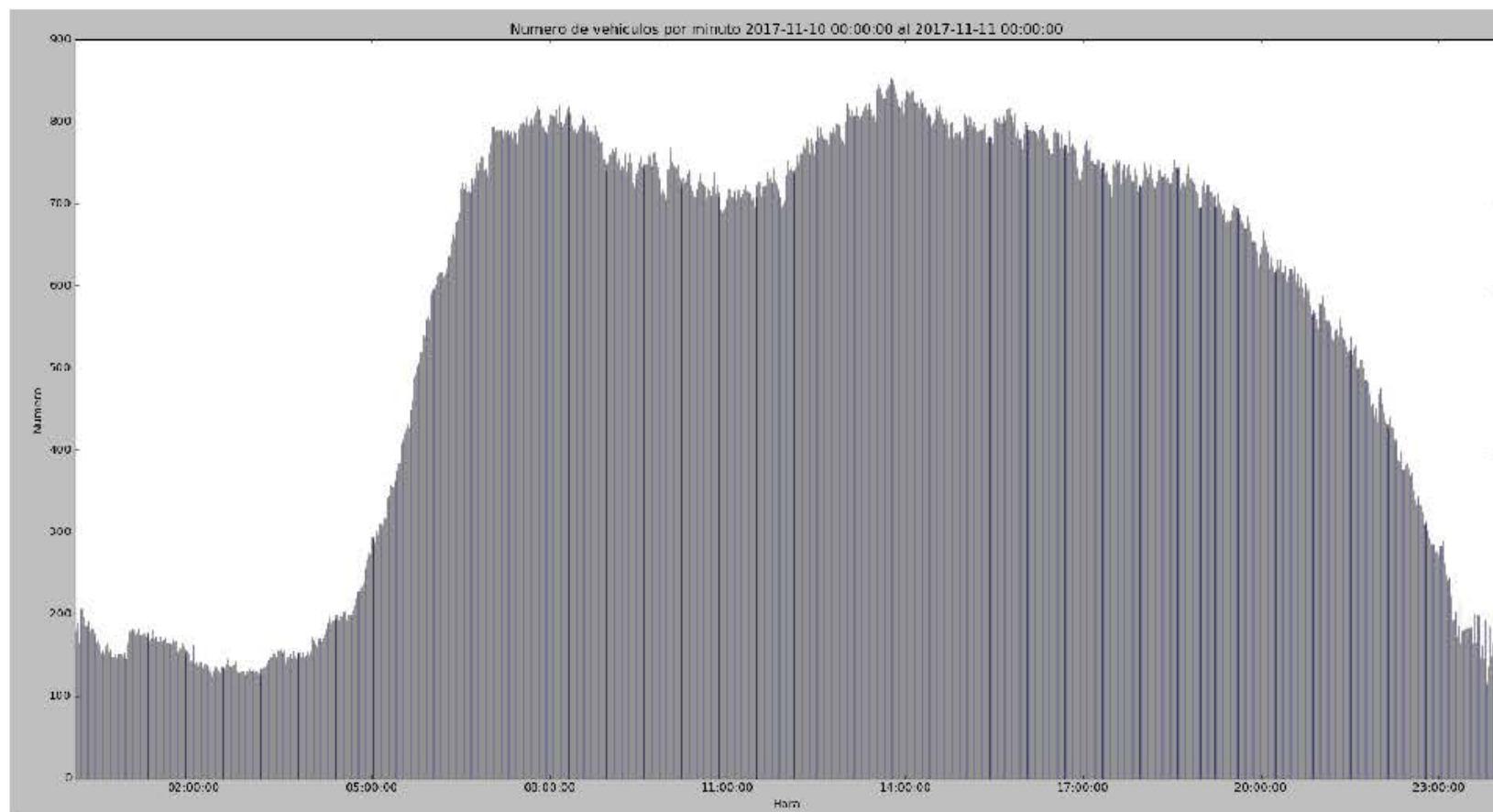
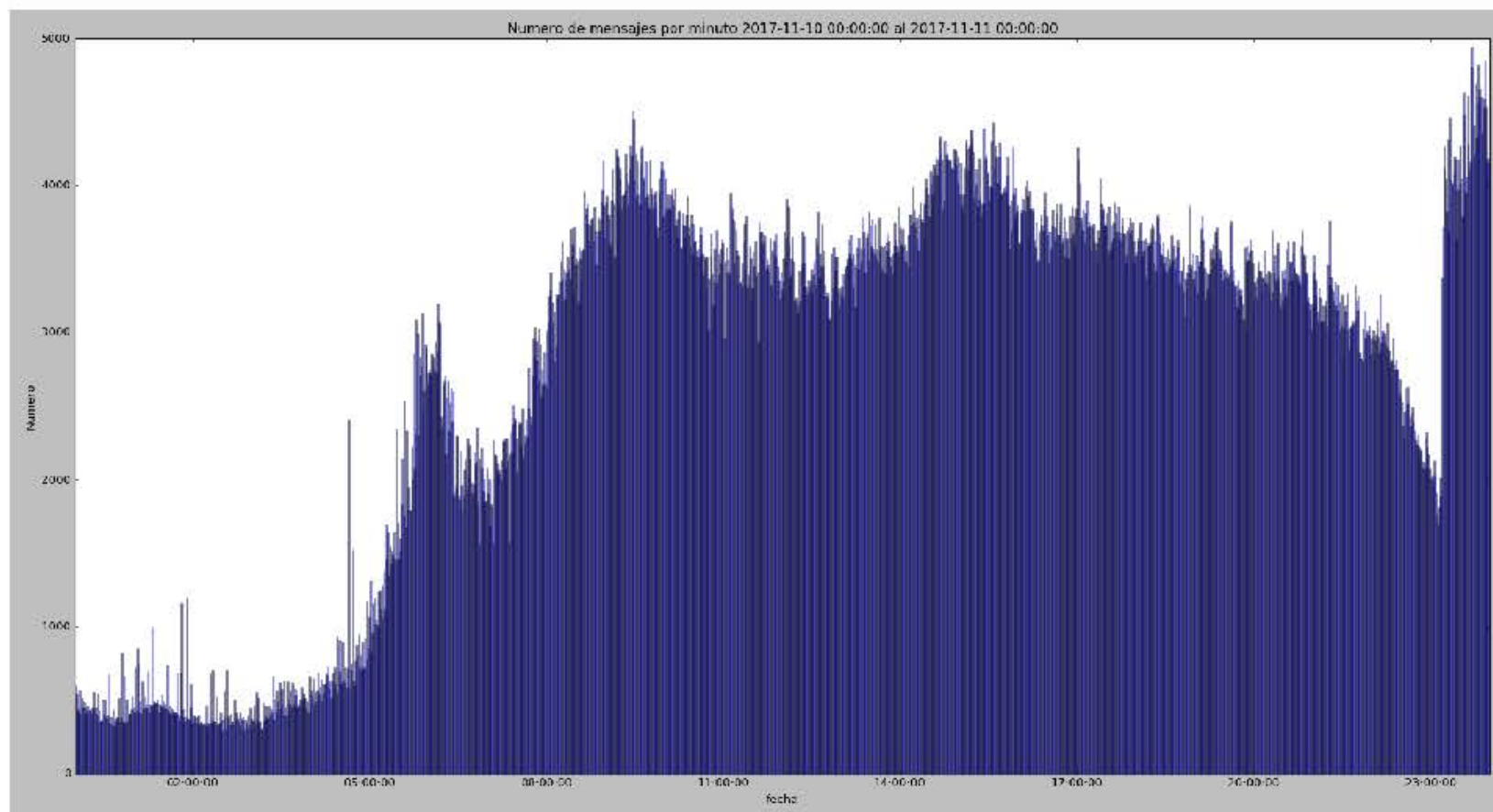
1:27

Comobity



1:23





CASE OF SUCESS

SINGULARITY PLATFORM

Safety - Level Crossing

" The goal is to solve the problem of warning to drivers in advance to take precautions when they are approaching a level crossing.

Avoid accidents due to the occupancy level crossing for vehicles that have been stopped on the railroad

" Improve road and railways safety, reducing level crossing accident impact



- Signaling its location on the road by traffic signals in a passive way.
- Closing by detecting the proximity of a train by an active way.

ALSA



CASE OF SUCESS

SINGULARITY PLATFORM

Safety - Level Crossing

“ Notify drivers a nearby Level Crossing.

- *Notify to Infrastructure Managers about the interception of a Level Crossing by a vehicle when the driver indicates incidents.*
- *Notify to Infrastructure Managers about the interception of the track, at any point, by a vehicle when the driver indicates incidents.*

“ Improve road and railways safety, reducing level crossing accident impact



- More than 24000 on board devices confirmed
- National road and railways coverage
- Availability to use European cartography
- National 911 Level Crossing
- System in production environment ready to send Singularity to Car

ALSA




GPS accuracy on board better than 5m at 120 km/h


Two kind of notifications

Vehicle: Notifications are sent based on the vehicle speed, specifying the name of the road and where KP is located.

Infrastructure Manager: The position of vehicles is computed in real time, and if its driver declares an incident, the system is able to identify if he is located within the Level Crossing



Infrastructure Manager notification área



Vehicle notification distance

NEW PROJECTS

IoT Platform DGT 3.0

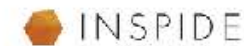
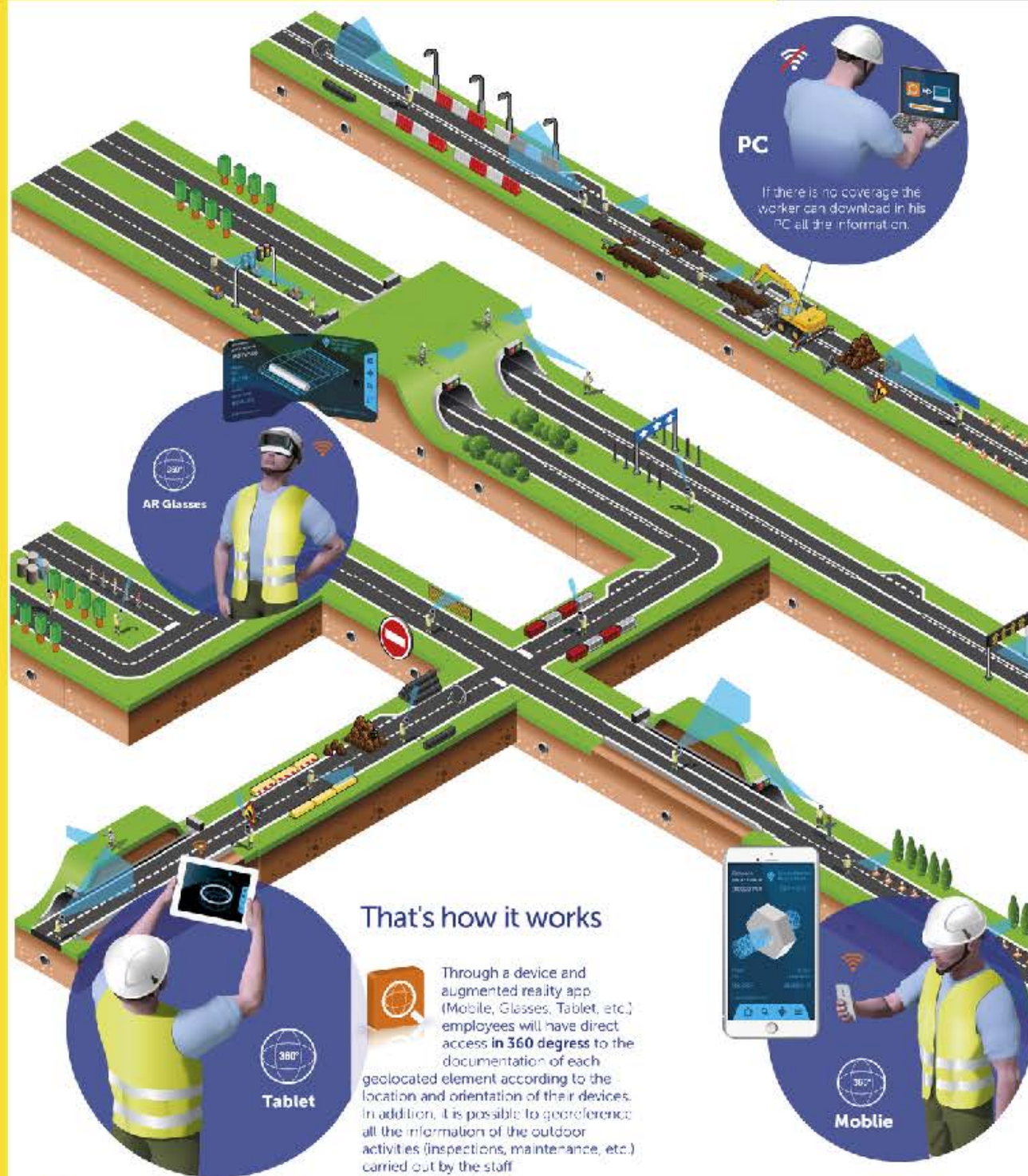
2M IoT devices

Spain 2018-2022



NEW PROJECTS

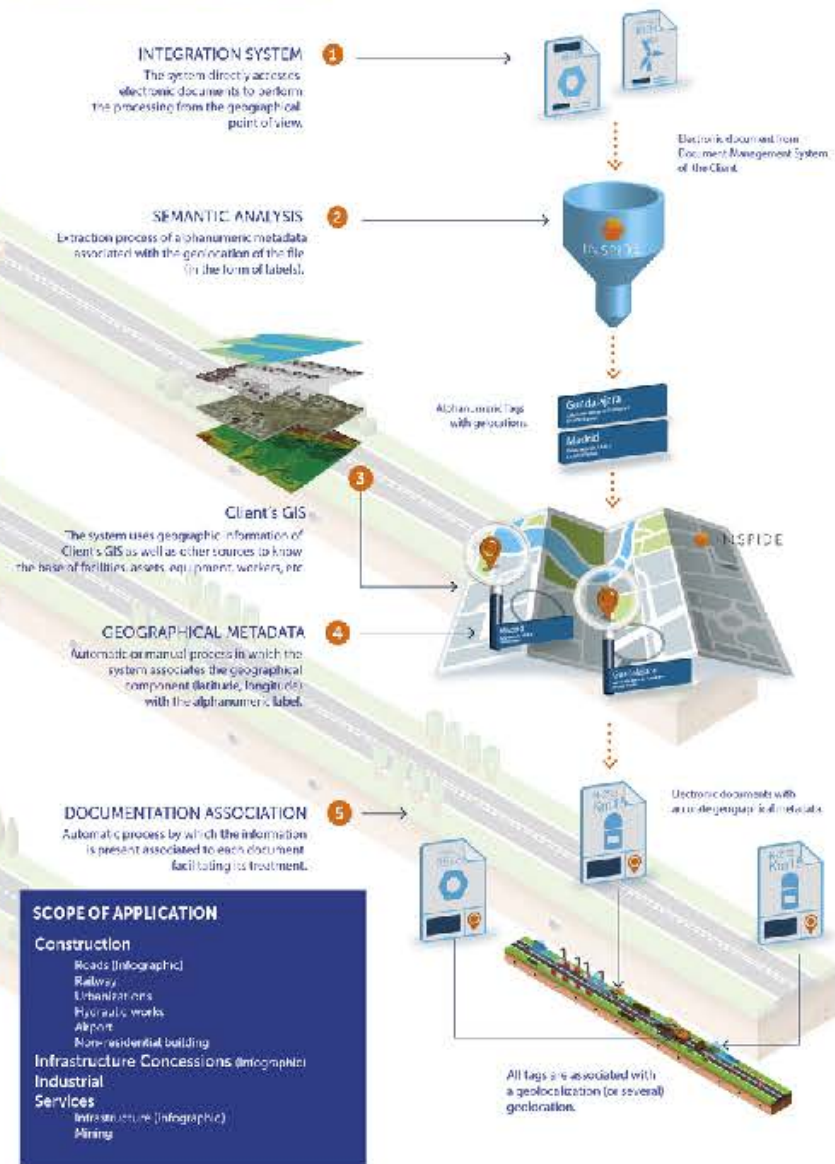
Document Management Module based on geolocation



DOCUMENT MANAGEMENT MODULE BASED ON GEOLOCATION

Infographic: Search and Georeference all the information in field inspections of materials (photographs, documents, job orders, job reports, job incidents and maintenance reports, etc.).

What we do, step by step



CONCLUSIONS

// Need to..

- New geolocated data sources (need for collaboration between public and private entities).
- Cartographic update
- Standardization in the exchange of information.
- Submetric precision.
- Precision positioning
- Security measures in the positioning signal.
- Advanced functions provided by Galileo.

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