8 November 2023

SAFETY WEBINAR

Objects left on the Line

Ignacio Jardí

How can we use the AI to develop better risk insights and help improve safety on the line ?
AI uses cases in railway maintenance

uic

INTERNATIONAL UNION
OF RAILWAYS

Ferrovial. Construction experience

Since 1927...
More than 90 years of experience...
More than 50 countries in the 5 continents

5,200 km
of New Railway Track

10,000 km
Railway Track
Maintenance

4,500 km
of toll highways

30,400 km
maintenance and re-
pavement of roads

15,540 km
new roads and
expressways

+ 12.1 million m^2
industrial buildings

+ 13.5 million m^2
non residential
buildings

+ 19 million m^2
residential buildings

540 km
tunnels

+ 169 km
of Metro
(included 155 stations)

4,115 km
channels

6,400 km
water pipelines

3,850 km
gas and oil pipelines

140
hospitals

148
dams

230
water treatment plants
(RO, STP, WTP)

33 km
quays and ports
infrastructure

40
airports

20
football and Olympic
stadiums

112
hotels

31
hydroelectric power
stations

Ferrovial. Key figures

CONSTRUCTION ORDER BOOK (M€)

+18.7%   14,743

WORKFORCE AT YEAR-END*

24,191

*as of December 31, 2022

REVENUES* (M€)

7,551   6,910   +9.3%

2022   2021   compared to 2022

* Figures excluding Services, classified as discontinued operations.

CAPITALIZATION (M€)

17,801
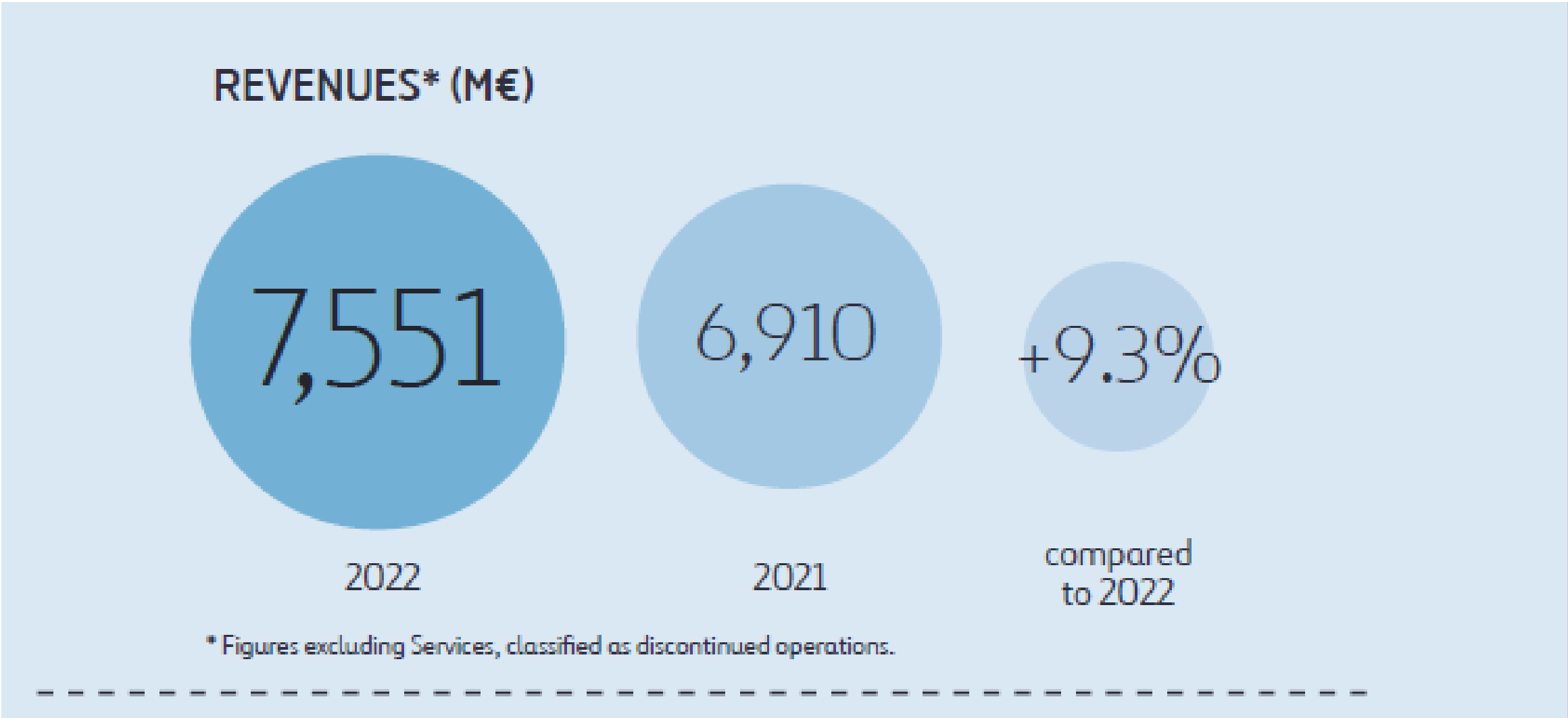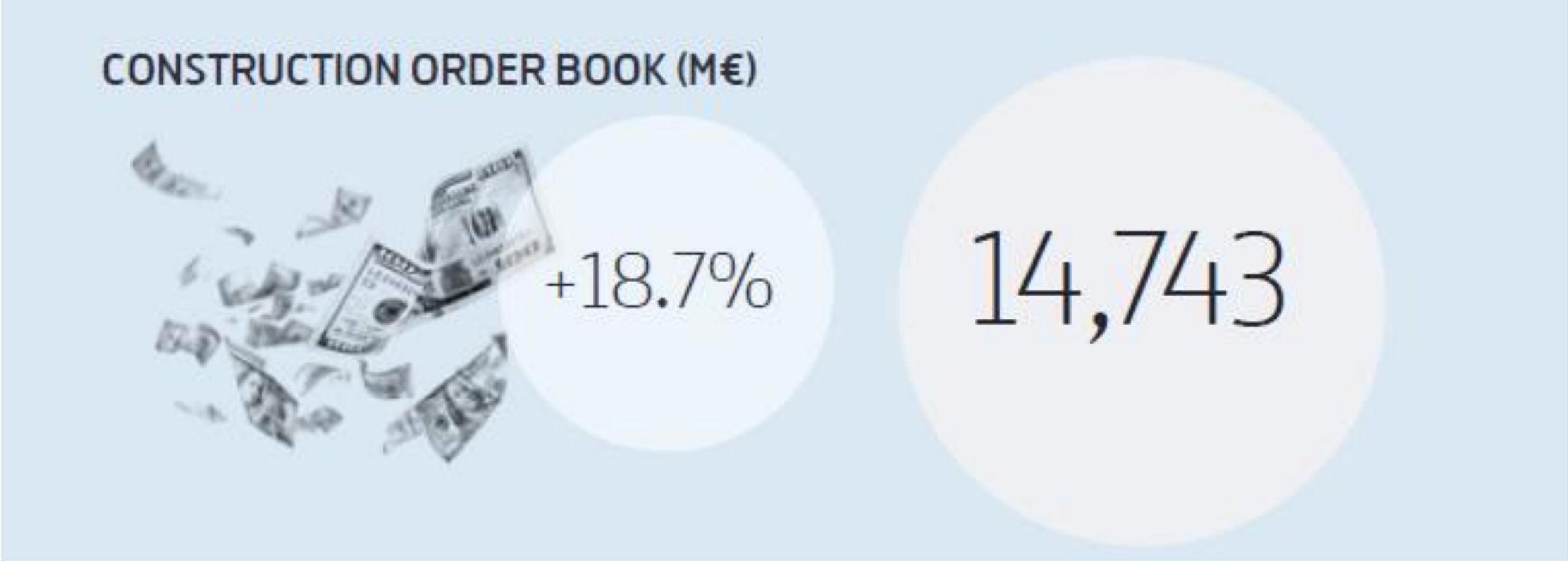
Sentinel Project

Sentinel Project 2016-2018

GOBIERNO
DE ESPAÑA

MINISTERIO
DE FOMENTO

Lessons learned

We can detect objects on the line
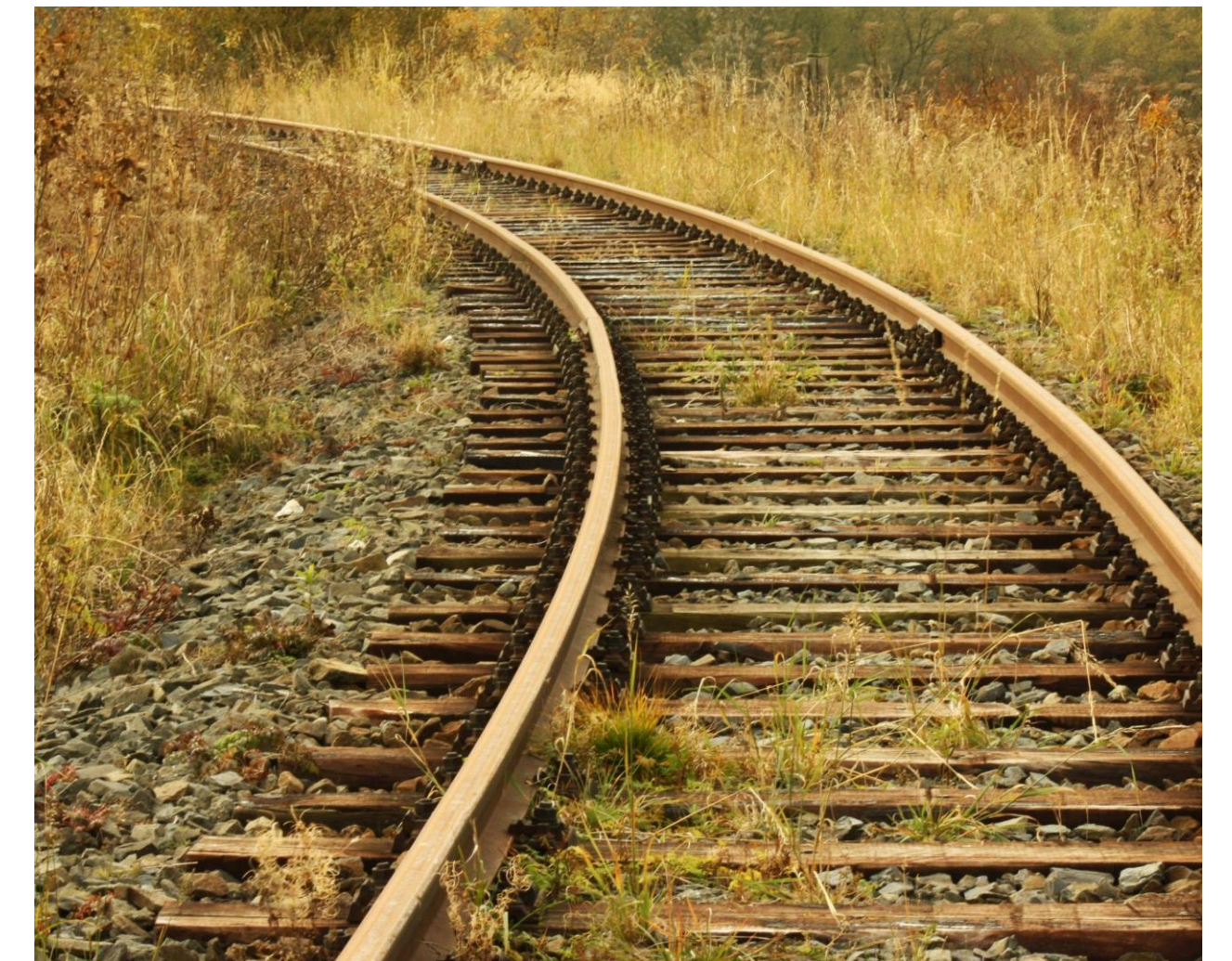
However

- Further developments were required

- Low rate of automation

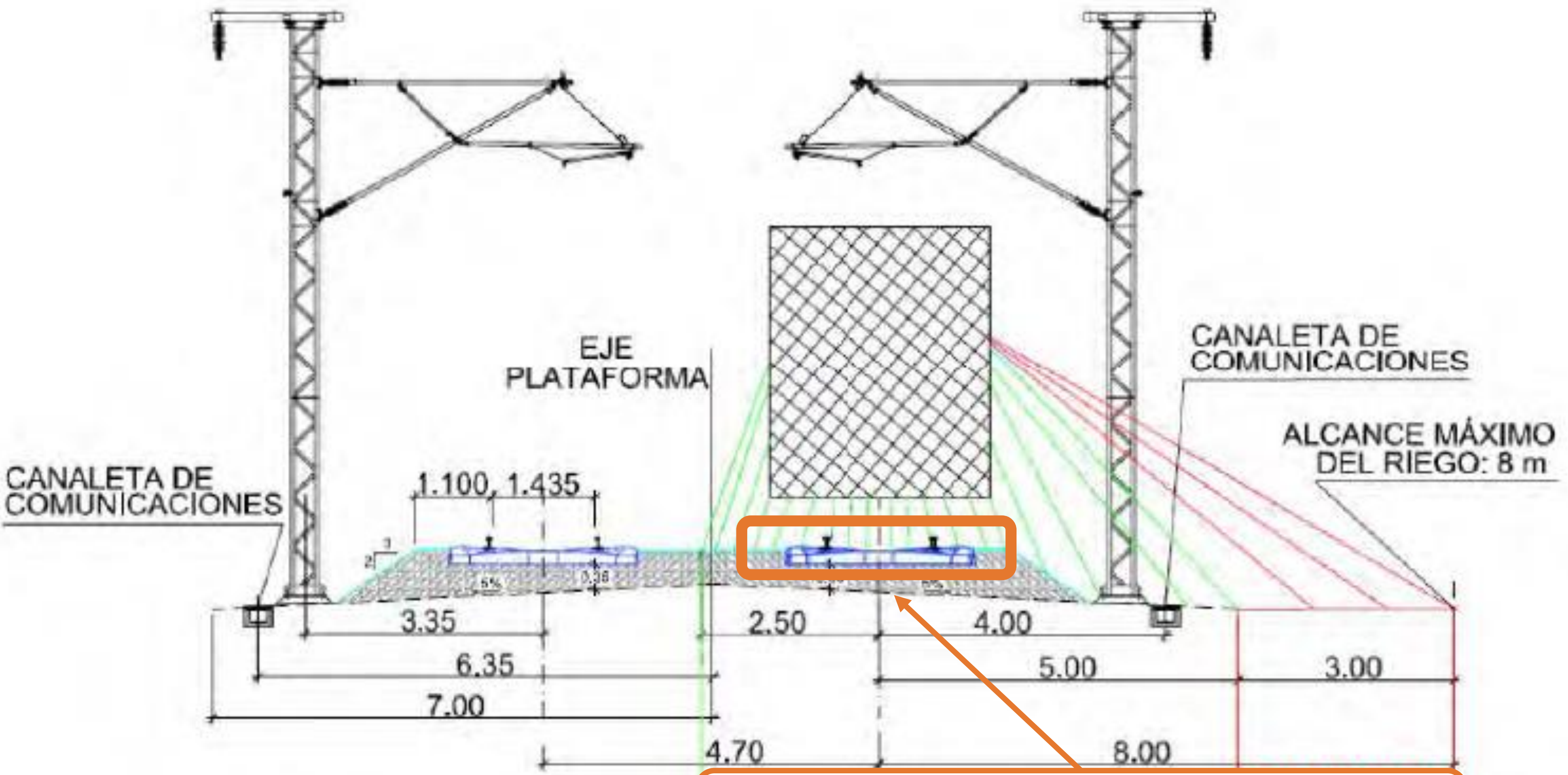- Objects had to be predefined in advance

IAVE Project

IAVE Project

Can we detect plants on a railway line?

Irrigation areas

IAVE Project

Spanish High Speed Rail Network

Herbicide train

Locomotive

Laboratory

Industrial wagon

Industrial wagon

Water tank wagons

Sensors

AI hardware & software

Irrigation system
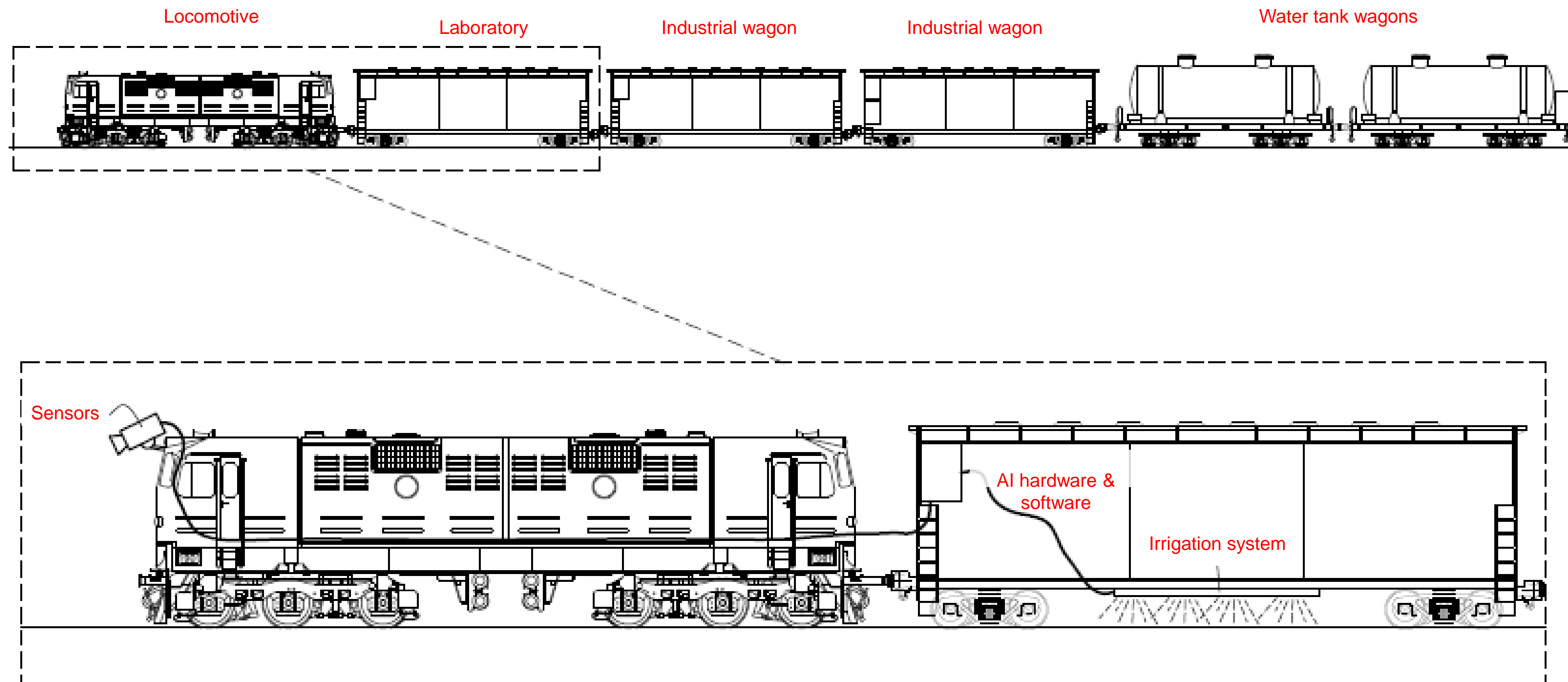
Herbicide train

IAVE Project

Phase 1. Segmentation

Phase 2. AI & Algorithms

PATENTED

IAVE Project

IAVE Project

The algorithm predicts correctly…..…………………….… **99,47%**

We irrigate things that are not plants……………………..**0,42%** ————⟶ Dana project
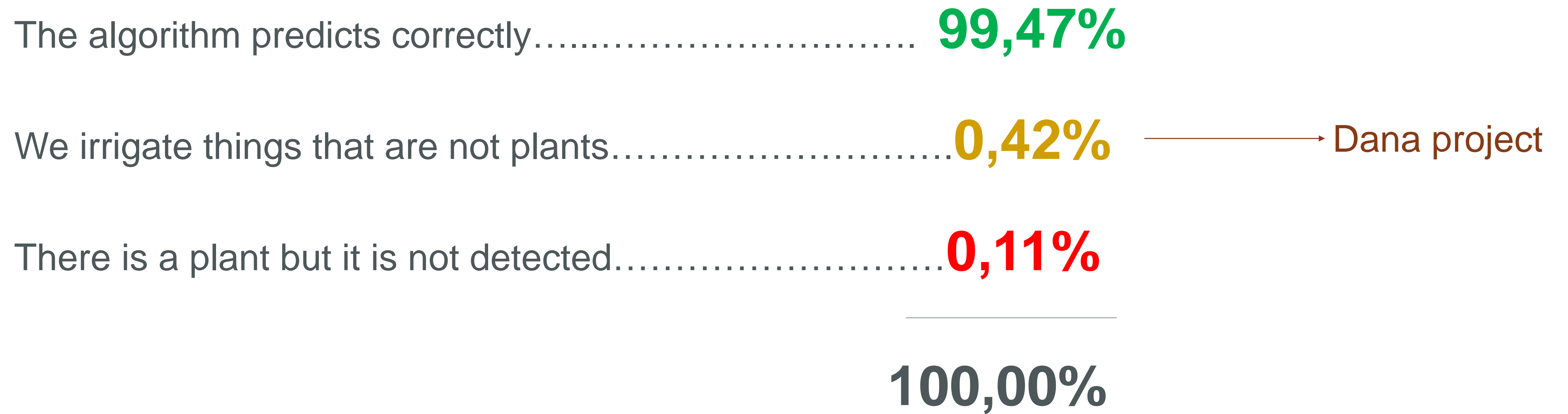
There is a plant but it is not detected…………………….**0,11%**
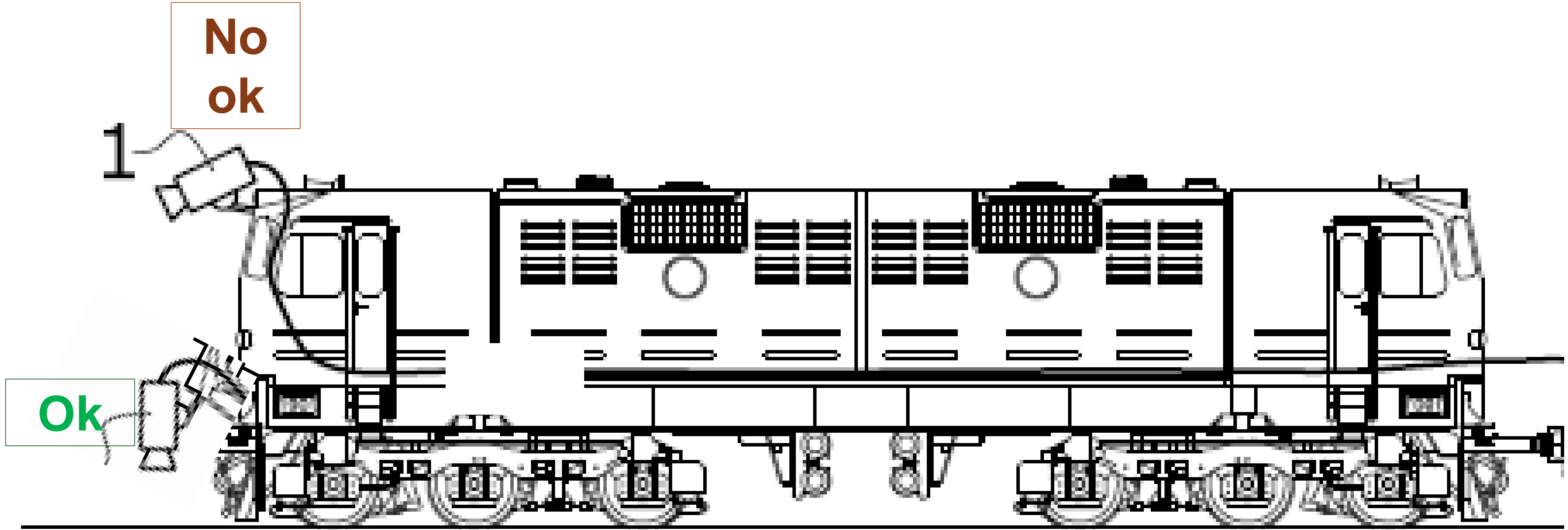
100,00%

DANA Project

Dana Project. Goal

Can we use AI to automatically detect
THINGS THAT SHOULD NOT BE
on railway tracks?

Objects
Death animals
Damaged sleepers
Missing clips or screws
Etc.

What we see

No ok

1

Ok

Dana Project. The problem

Can you send us some pictures
of incidences on the track?

I'm sending you some pictures, but they're blurry. I'm sorry.

Do you think that I take pictures of tools in the middle of the track?

There are no incidents in my site!

Do you want pictures of dead animals? Really?

Dana project

If we can´t get those images, we will have to create them

Phase 1. Geometry

Access to these images has been restricted by the company that developed them, in order to protect their industrial property rights.

If you require additional information, please contact
ignacio.jardi@ferrovial.com

Phase 2. Textures: concrete and ballast

Access to these images has been restricted by the company that developed them, in order to protect their industrial property rights.

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Phase 3. Ilumination

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Phase 4. Composition of previous phases

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Phase 5. Environmental degradation

Access to these images has been restricted by the company that developed them, in order to protect their industrial property rights.

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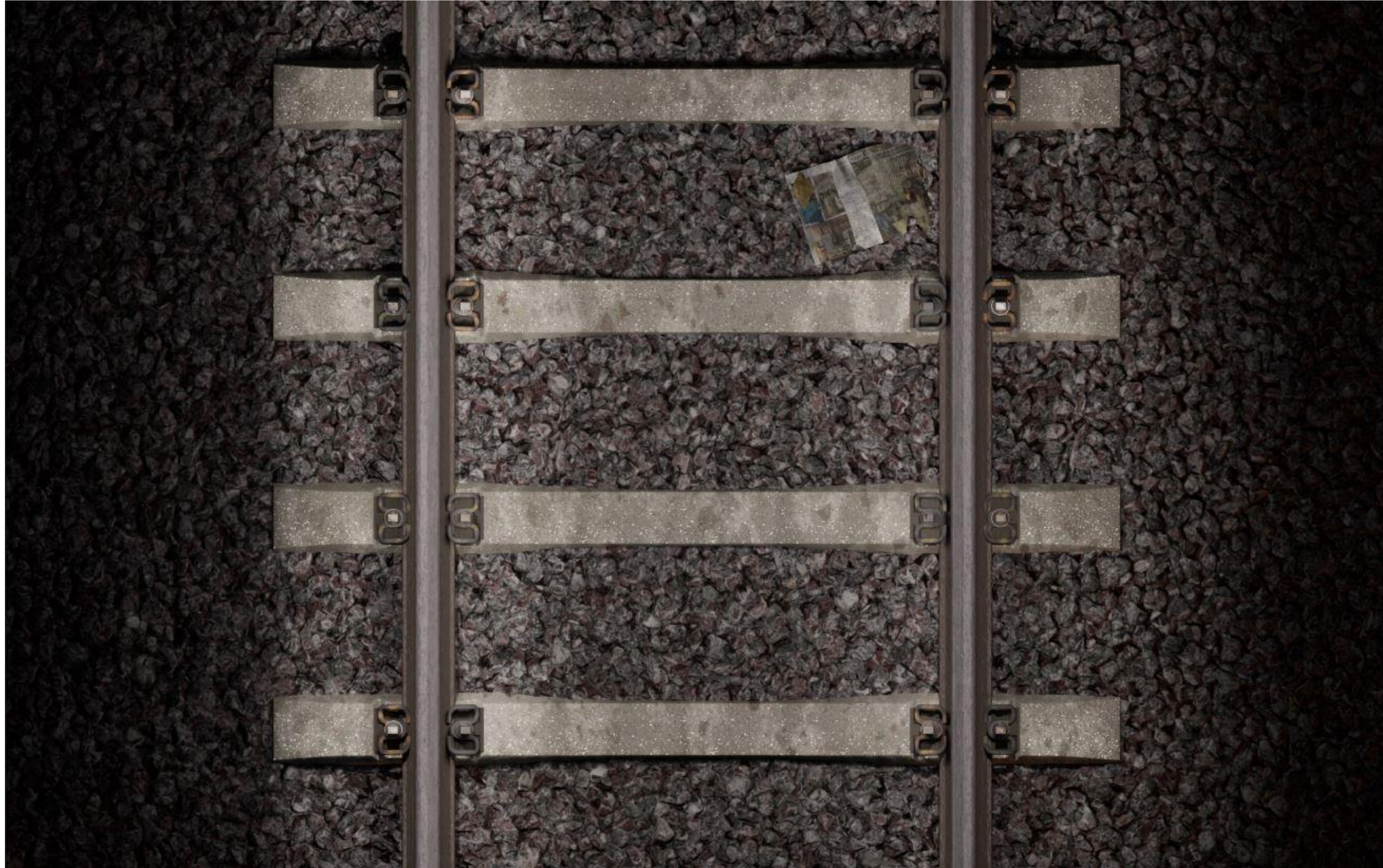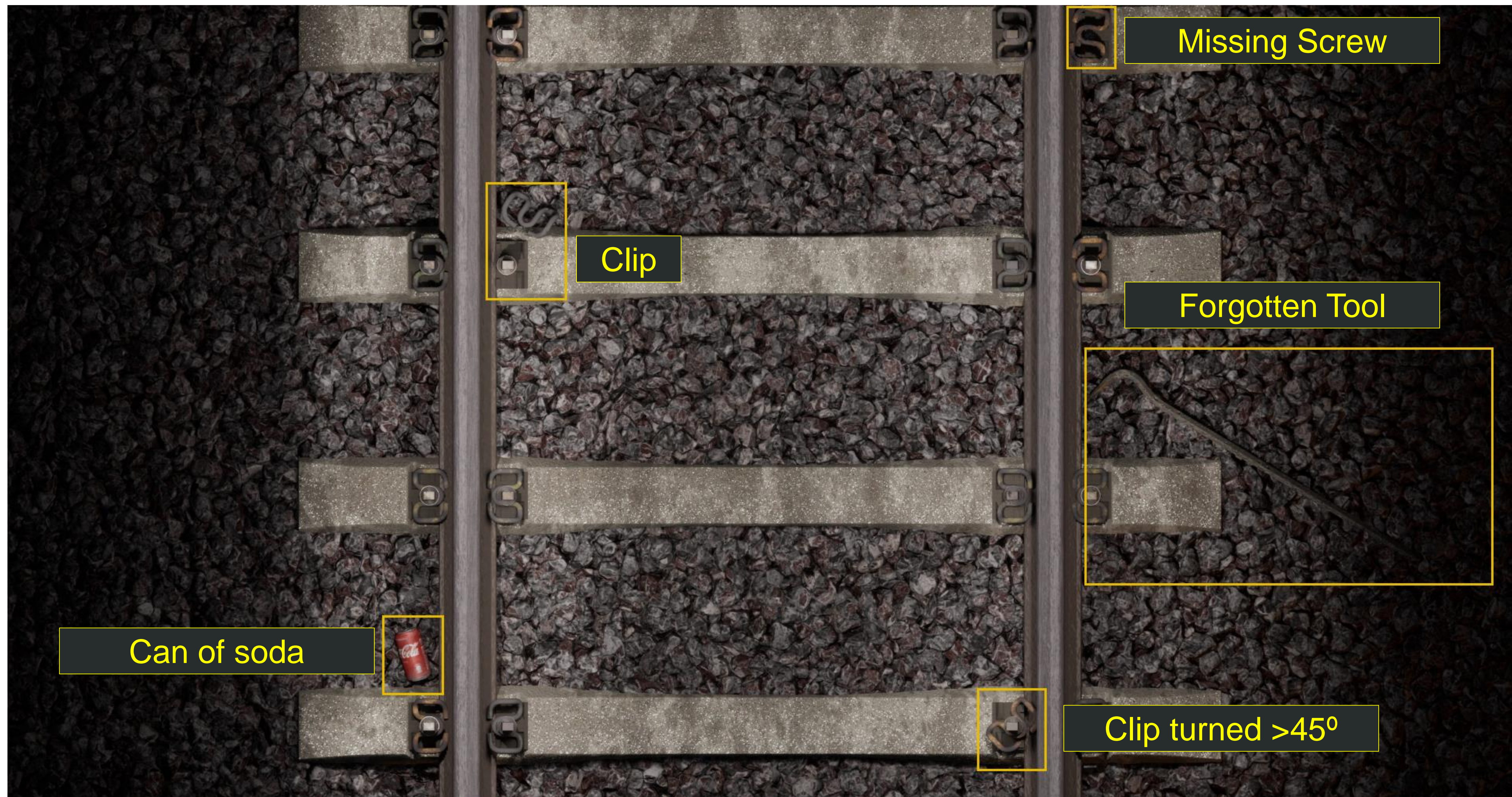
Is it real or 3D?

DANA Project

Missing clip

Superficial damage

Severe damage

Broken sleeper

DANA Project

DANA Project

Can you find five (5) things that are not ok?

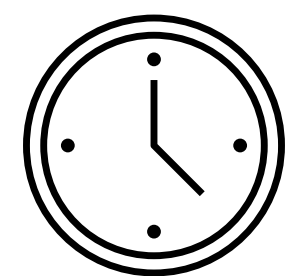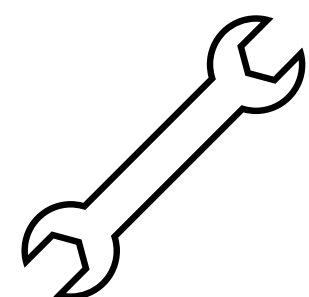# Solution

Conclusion

AI can automatically detect objects left on the line

For any kind of railway track

For any kind of ilumination (24h)

Detect tools

Check the elements on the sleepers

Analice sleepers integrity

For further information, please contact

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UIC

THANK YOU FOR YOUR PARTICIPATION!

www.uic.org

#UICrail