



cyclope.ai

ARTIFICIAL INTELLIGENCE FOR ROAD SAFETY IN TUNNELS

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WHAT IS CYCLOPE.AI?

KEY FIGURES

53M

Images processed

3

products

3

patents accepted or in-progress

25

employees

OUR PRODUCTS



OUR EXPERTISE



Image processing



Artificial intelligence



At-scale deployment

OUR VERTICALS

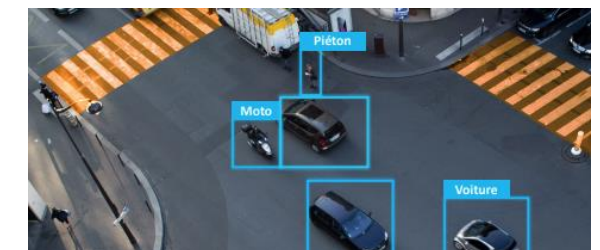
TOLL



ROAD



CITY



TUNNEL OPERATIONS



TUNNEL OPERATIONS & INFORMATION SYSTEMS



DECISION-MAKING PROCESS

- Raw data collection by sensors
- Data interpretation (human + systems)
- Triggers for rules and processes

CRITICAL INFRASTRUCTURES

- Constrained driving circumstances
- Strict regulation
- Key pillars of traffic networks



PAIN POINTS IN INCIDENT DETECTION

INSTALLATION &
COMMISSIONING



Lengthy setup

INACCURATE DATA



Unreliability and
potential distrust

HEAVY
MAINTENANCE



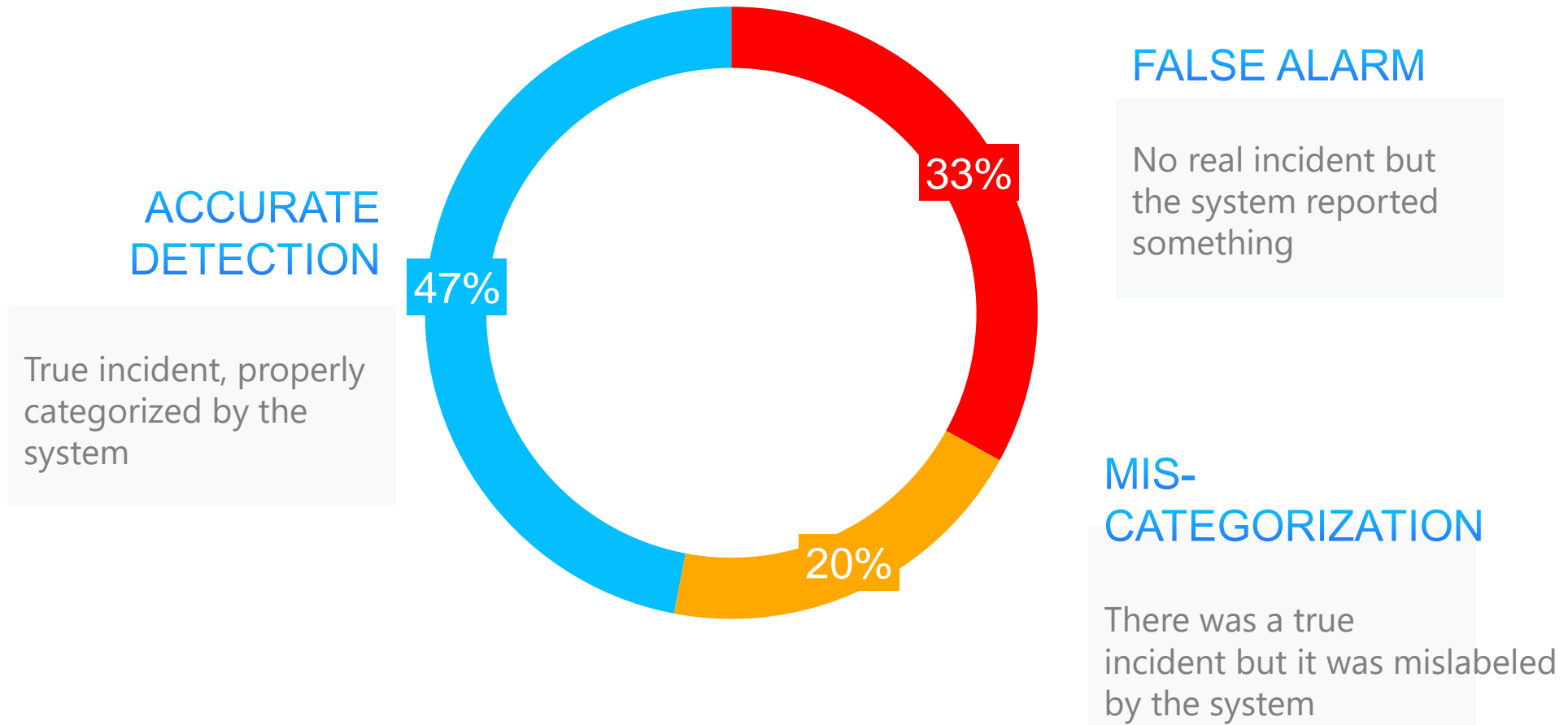
Time-consuming
masking and
configuration

DECREASING
PERFORMANCE



Non resilient
systems

UNRELIABLE INCIDENT DATA



18/11/2017 09:50:59



Inaccurate « Wrong way » alarm

01/11/2017 16:55:25



Inaccurate « Smoke » alarm

27/03/2018 02:05:42

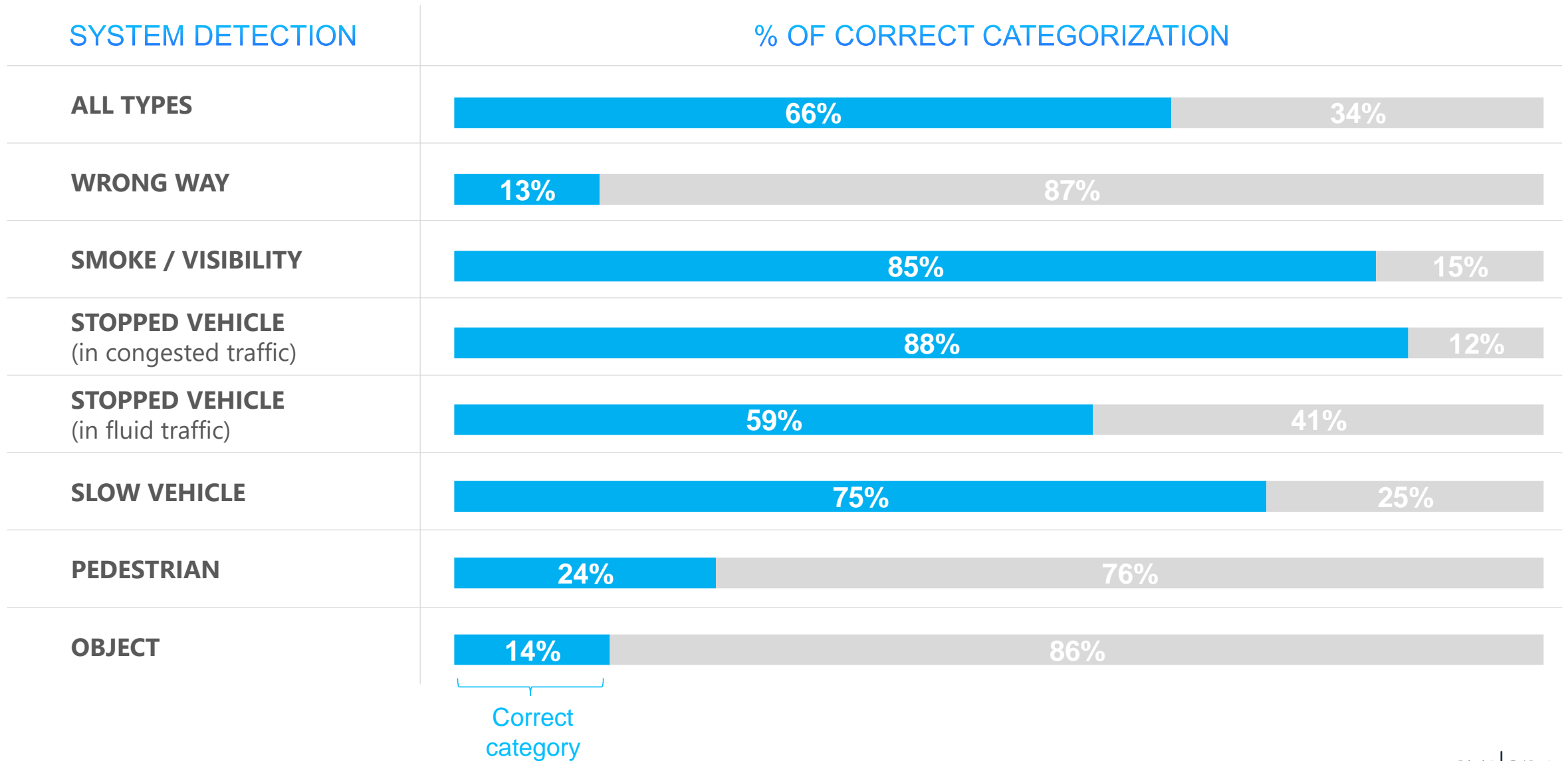


Inaccurate « Wrong way » alarm

FALSE ALARMS FROM RECURRING CAUSES

- Weather changes
- Lighting condition
- Reflections
- Incorrect installation or out-of-place camera
- ...

MISCATEGORIZED INCIDENTS



USING AI TO ENHANCE TUNNEL SAFETY

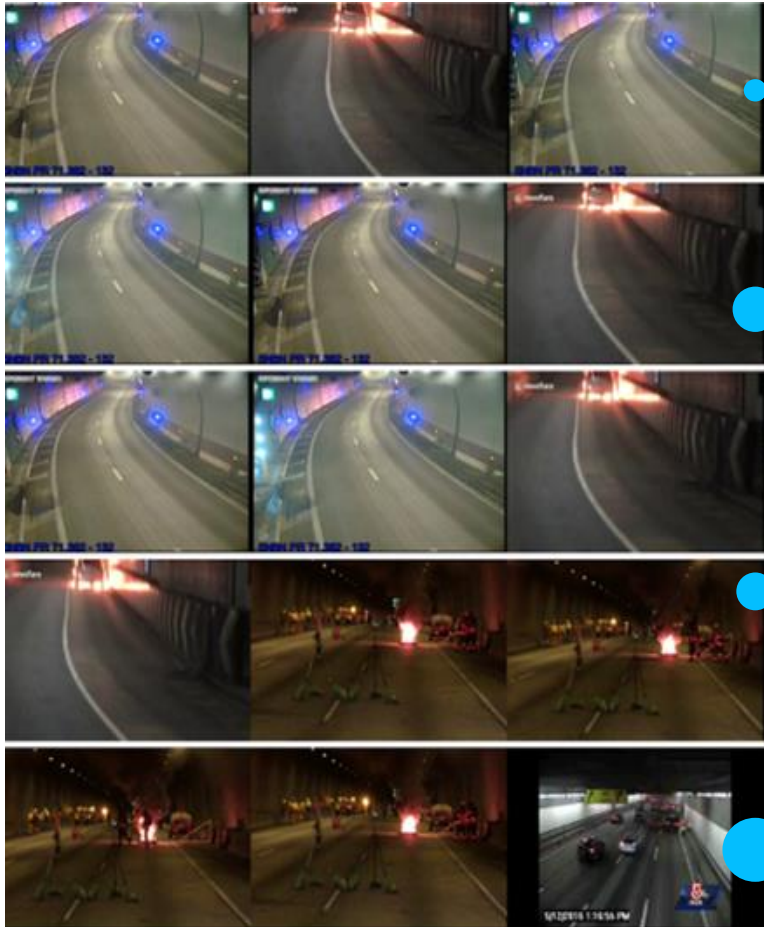


DEEP LEARNING TO A.I.D. CAMERAS

DATA
COLLECTION

NEURAL NETWORK
TRAINING

AUTONOMOUS
ALGORITHM

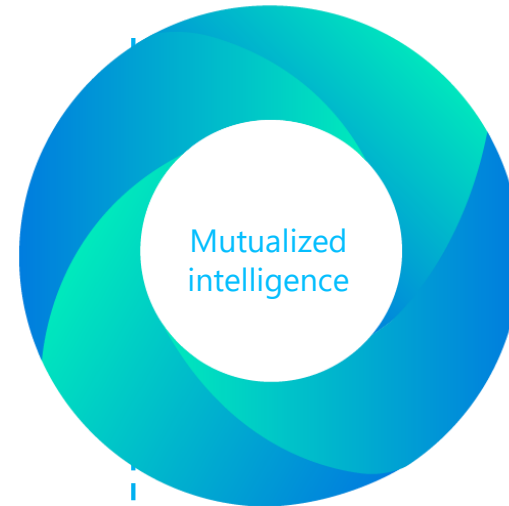


Ability to process unseen data
and situations

MUTUALIZED, SELF-IMPROVING INTELLIGENCE



Training loops



40+ km of road tunnels within VINCI Autoroutes

EVOLUTION

Enable continuous improvement of AI components (incident, segmentation, speed) and the deployment overtime

AUTONOMY

Create a sytem capable of reconfiguring itself to maintain its accuracy overtime

IMPACT

Design a user-centric solution to enhance user experience (for supervisors, installers, maintenance teams)

REPLICABILITY

Create a technical platform that can handle new infrastructure based on mutualized intelligence

DEPLOYED IN TOULON, A 3.5 KM INTERURBAN TUNNEL

PROJECT FIGURES

94

Cameras analyzed

1 year

Cloud-based tests

0

Cameras had to be replaced

22 M

Vehicles processed by our algorithms

Impact & performance (cloud solution)

>98%

Detection performance (all incident types)

2%

False Alarms in all output

Evaluation of on-premise deployment

On-site deployment will be evaluated by recognized experts in tunnel safety



3,5

KM

2

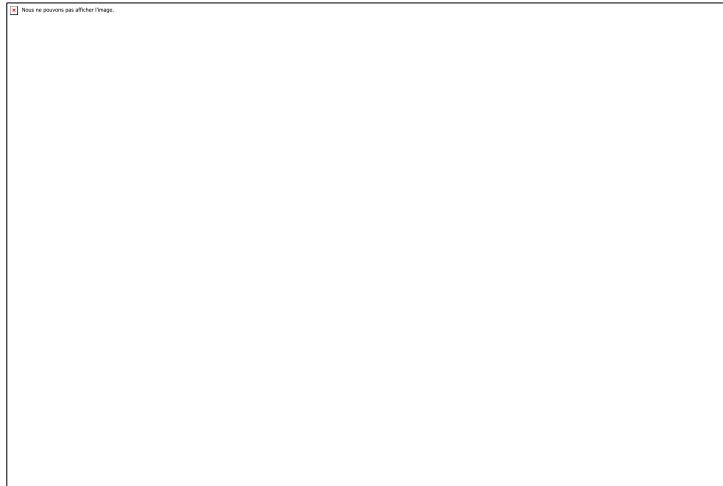
TUBES

60k

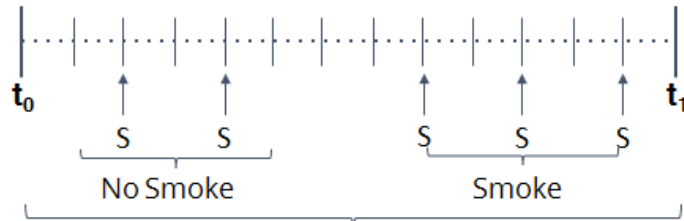
VEH/DAY

A TECHNOLOGICAL PROWESS

SMOKE DETECTION

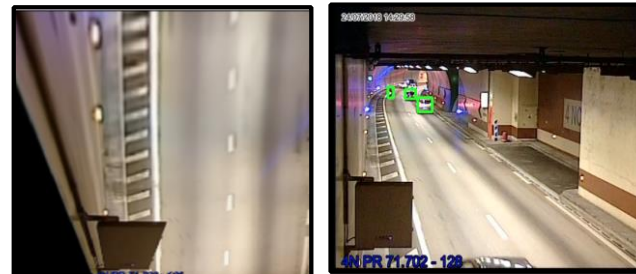


Window detection:



S: Smoke

SPEED ESTIMATION

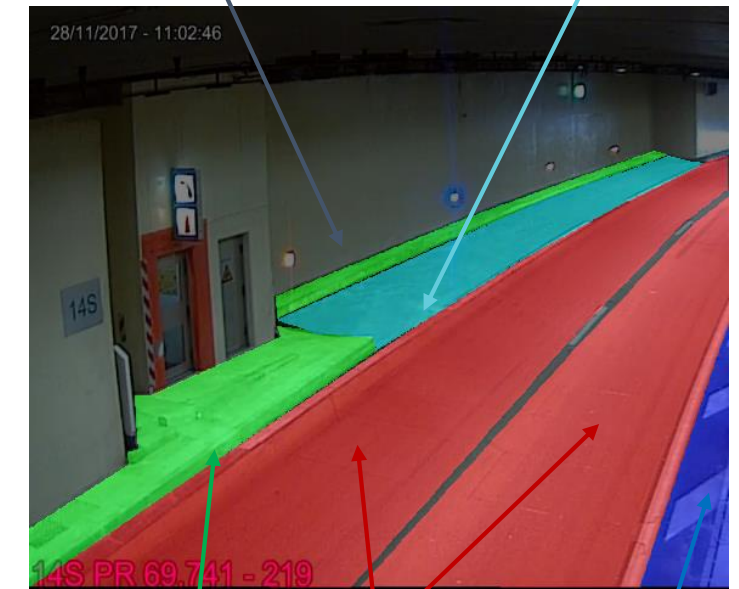


Dashes position Vehicles detection

LANE SEGMENTATION

Background mask

Parking mask



Road mask

Sidewalk mask

Emergency lane mask

A TECHNOLOGICAL PROWESS



Multi-object tracking

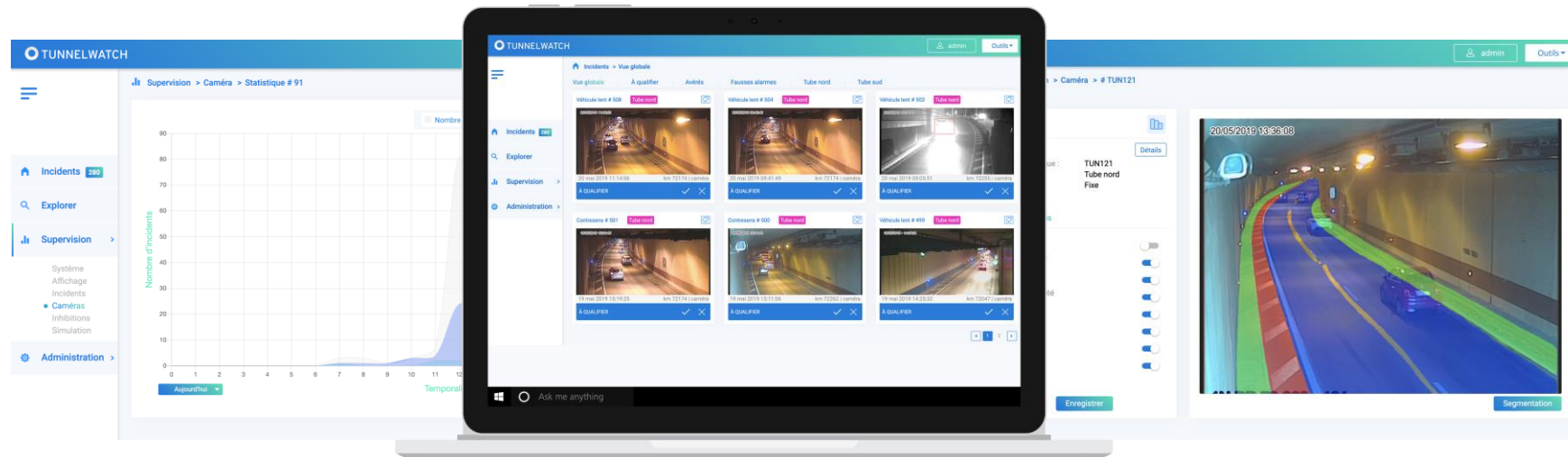
ILLUSTRATIVES



A DISRUPTIVE, TURNKEY PRODUCT



AI-POWERED TUNNEL INCIDENT DETECTION SOFTWARE

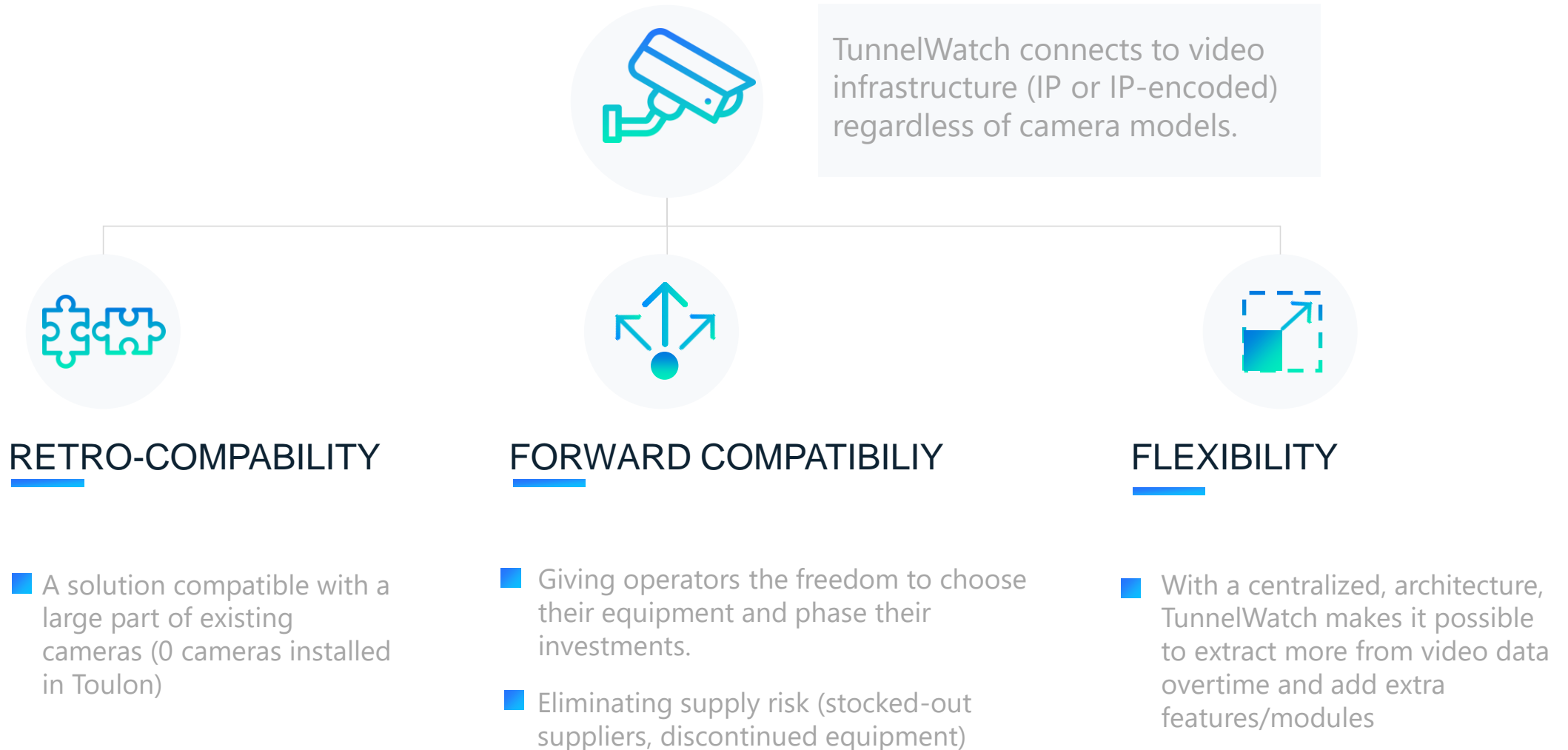


- AI-powered, tunnel supervision assistant
- Fast installation & maintenance with adaptive masking
- Intuitive, easy-to-use interface
- Continuous improvement mechanics
- Cloud-based and on-premises options available

USER INTERFACE DEMO



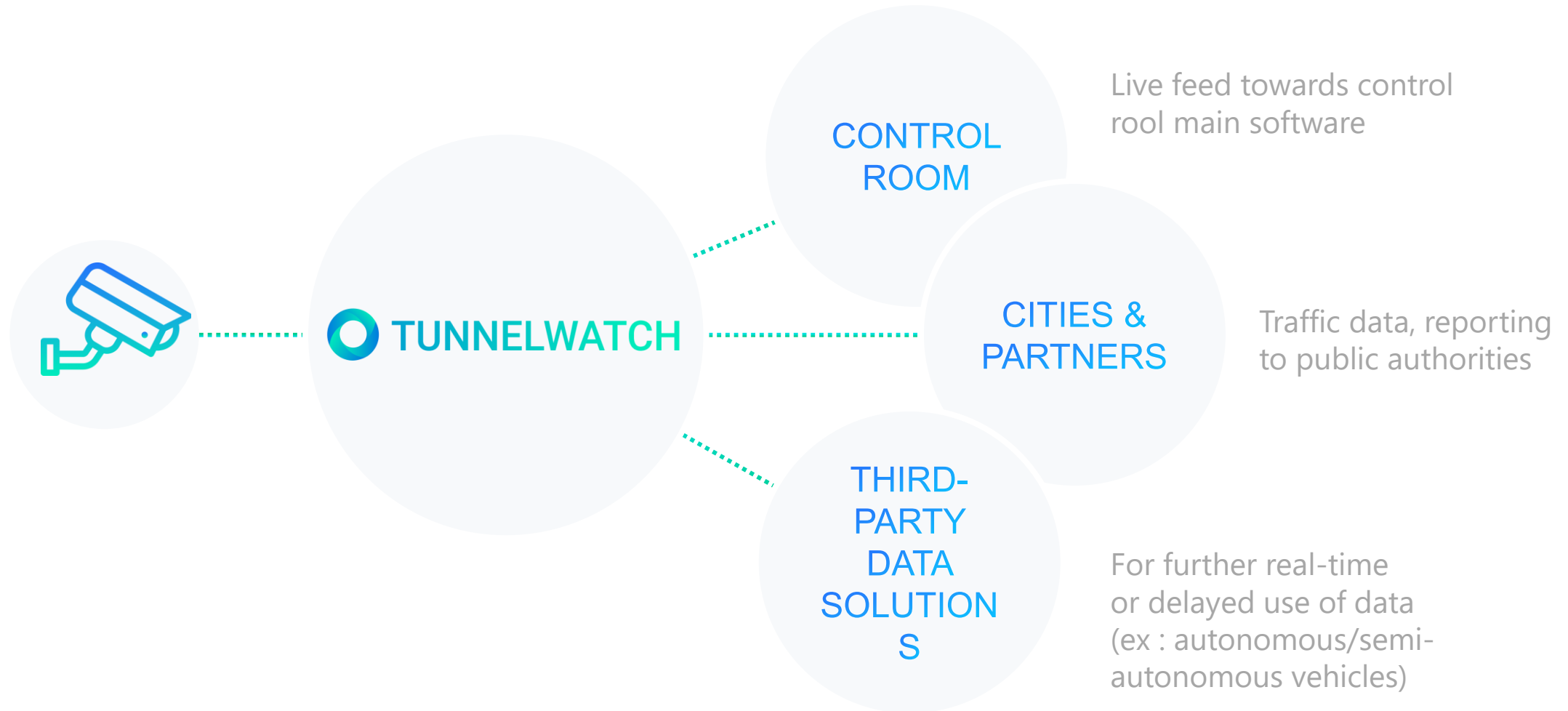
OPEN, CAMERA-AGNOSTIC APPROACH



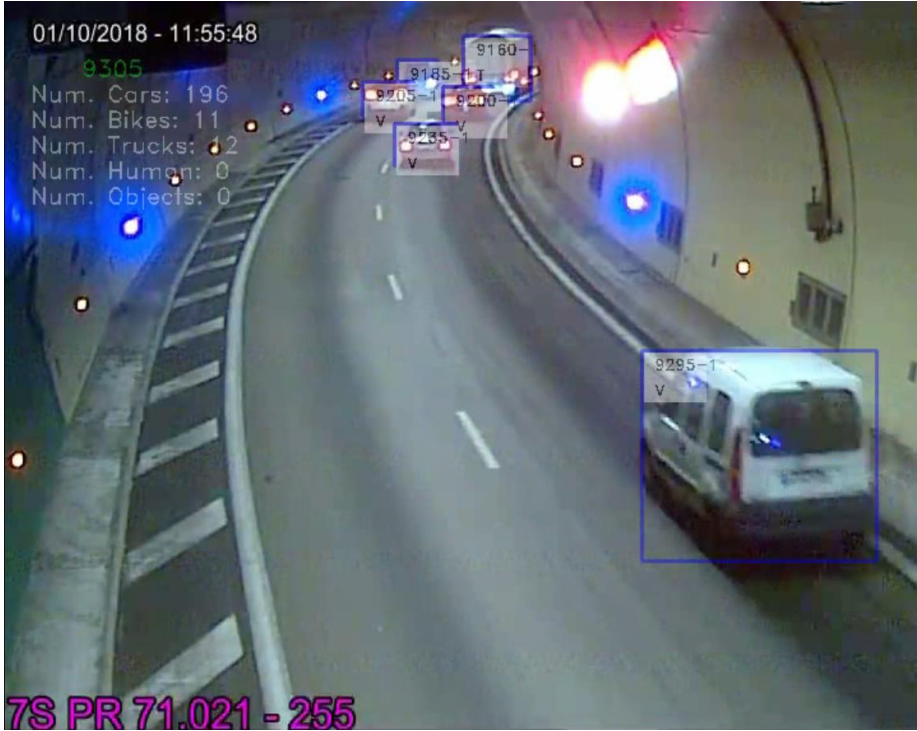
WHAT
NEXT ?
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LIVE, INTEROPERABLE DATA



TRAFFIC ANALYTICS



TRAFFIC MEASUREMENT (SPEED, CLASSIFICATION, COUNT)



AUTOMATED INCIDENT DETECTION

BUILDING A DYNAMIC I2V FEED FOR AUTONOMOUS VEHICLES



- Trajectory mapping
- Geolocation (up/downstream)
- Lane / lane change
- Speed, acceleration, brakes
- Abnormal behavior tracking

- Brake Lights OFF
- Brake Lights ON



THANK YOU !

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