



**EUROPEAN
CONGRESS**
SEVILLE
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Clean, resilient and
connected mobility.

Safe AI for ITS applications in motorway management

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SIS 39: Intelligent Traffic Management: the 'A' in AI

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ITS and Traffic Management in Autostrade



- Road Operator in advanced Digital Transformation
 - Focus on Digitalisation for
 - Road Information Institutional Service Provider
 - Road Network Management
 - Among several internal and external TCCs Collaborative ITS Services development
- Directly involved in
 - Standardisation Projects and Organisations (NAPCORE, DATEX II, CEN, ISO)
 - Deployment Projects (Eu Corridors, C Roads, etc.)

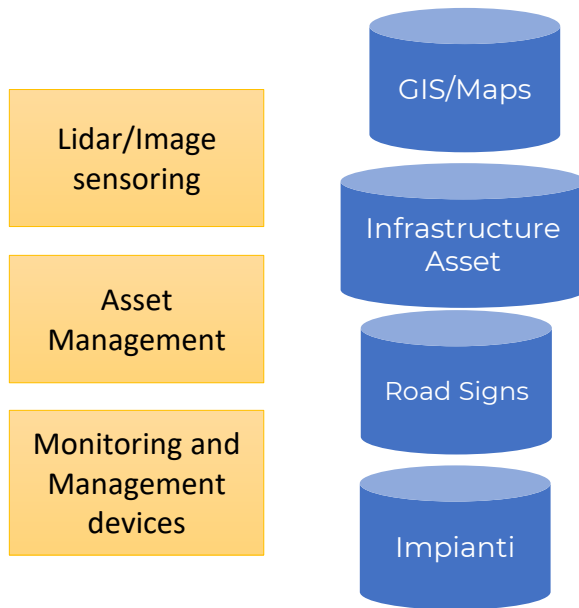
• 3000 km Network
• 46.111 Million Km travelled in 2022
• 9 operated (+ 3 owned) Traffic Management Center + 1 Traffic Information Center

• Operating Several TM ITS Services: VMS, C ITS, Roadworks Accident and Emergency Management, Tunnels Safety System, Dynamic Lane Management

Overall Road Management System

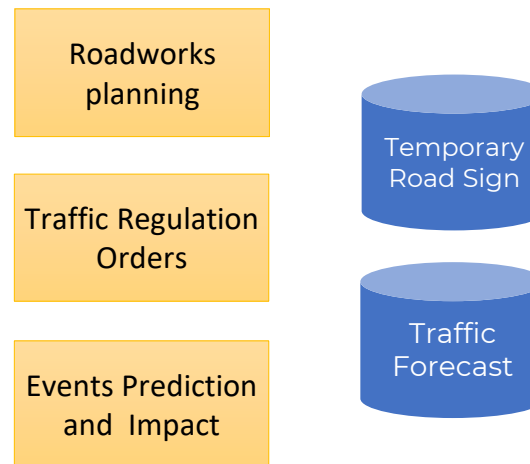
BUILDING

Infrastructure and Maintenance
Design



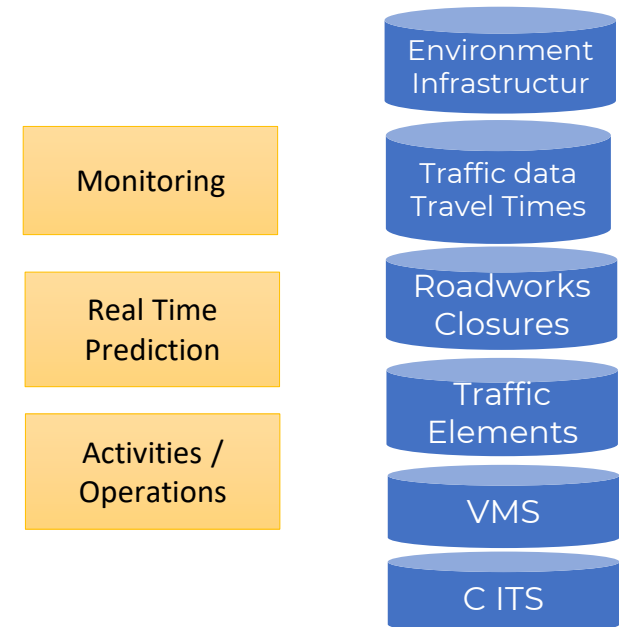
PLANNING

Planned
Traffic Management



OPERATION

Real Time Traffic
Management



ITS SERVICES to external stakeholders

Road & Traffic
Information

Open
Data

Collaborative Traffic
Management
Services

AI for ITS services / application

**Based on AI definition Motorways
Operators are running AI systems since
decades:**

- ❑ AID systems, image recognition cameras.
- ❑ Tunnel Safety systems, AID + KB based algorithms
- ❑ Traffic prediction, forecast, estimates.
- ❑ Decision Support System to manage specific Infrastructure.
- ❑ Cybersecurity and AI for Cybersecurity enhancement
 - ❑ Automatic cybersecurity attack recognition
 - ❑ C ITS Applications

Interest for AI in ITS Services deployment is increasing, due to huge expectations and very strict commitments in general ITS and CCAM objectives

- ESG Impact
- Safety
- Mobility Efficiency



Trustworthiness in AI for ITS

Trustworthiness: Security combined with performance, level of service and quality.

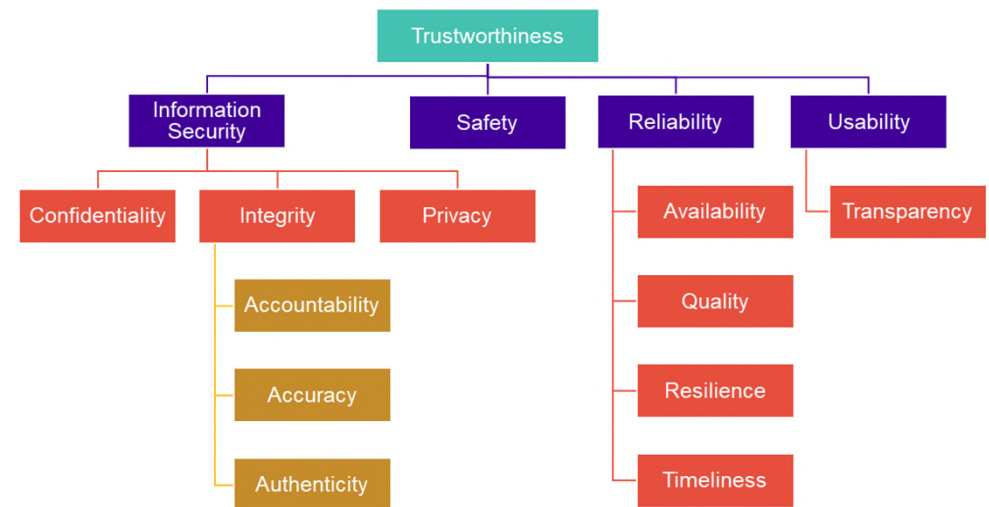
- **Data Quality** and **Reliability**
- **Robustness** and **Resilience** of Systems

AI applications may interact:

- Single systems interact among them and trust each other
- AI SoS (System of Systems) quality assessment is not a combination of the single sub-systems

Issues

- Potential attackers, data poisoning, hallucinations



Trustworthiness dimensions as by ISO/IEC TR 24028:2020

Safety Issues and Traffic Management

Roads and Motorway are designed to operate in a safe way

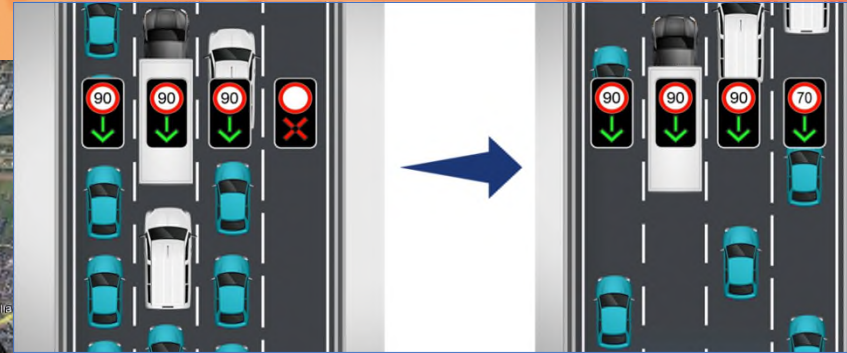
- **Safety by Design** approach is used to grant maximum safety
- **Traffic Regulation combined to infrastructure design** is to grant safe roads
- **Cars/Drivers needs to follow rules** to avoid accidents and grant safety: automated vehicles are designed for specific **ODDs** (Object Design Domain)
- **Traffic Management** is to grant smooth traffic, improving general network services, avoiding risk situations
 - Speed limit
 - Lane usage
 - Specific conditions, tunnel management, lane management



in a motorway connected automated vehicles running through, electronic devices variable message signs, cameras, sensors, enhanced management



A4 – Milano – Brescia



Enhance Capacity from 3 lanes to 4 lanes

Segment

Segment

A8/A9 Milano Viale Certosa interchange

Cormano

Sesto S. Giovanni

HM & DLM Management highlights

- **AI technology had been supporting Traffic Monitoring and Management (AID, LOS prediction) since many years**, helping enhancing capability of early incident management, traffic forecast and predictions to enhance road network capability, not harming safety, health, environment and business:
 - **Network capability is increased**
 - **System failure impact get back to standard network capability**, reducing LOS but not harming safety.
 - **Safest driving conditions**, enabled by speed limit reduced to 90km/h on HM/DLM Zone.
- **AI techniques are used in a supervised way to enhance and support the capabilities**, systems are monitored and checked and procedures are developed to control the service quality and outcome and quality enhancement and risk management processes are operated.
- **We support AI Act in assessing the needs for safe reliable systems:**
 - Related to Risk Assessment the impact on AI based system development need to be supported **not hindering the developments, granting for safe reliable system** to be operated under Risk Management and quality enhancement procedures.

Conclusions

- **AI role is to reduce impact, improve performance and not to jeopardise safety**
 - Application Impact: local, regional, national network.
- **Safety by Design principle in an qualitative improving cycle**
 - Plan, Act, Check, Do quality enhancement cycle.
 - Risk assessment: Monitoring, Evaluation, Mitigate, Review.
- **Involvement in AI Act guideline development**
 - ASPI and ASECAP COPER 3 supports TM20 monitoring the AI Act Guideline development in EU
 - In the overall ITS Ecosystem working with the different stakeholders
 - ASECAP work assesement of AI in ITS for motorway

THANK YOU!



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Safe System design

- **High Risk AI System definition is related to «Safety Component»**

As regards the management and operation of critical infrastructure, it is appropriate to classify as **high-risk the AI systems intended to be used as safety components in the management and operation of critical digital infrastructure**

Safety components of critical infrastructure, including critical digital infrastructure, are systems used to directly protect the physical integrity of critical infrastructure or the health and safety of persons and property but which are not necessary in order for the system to function.

Critical infrastructure: AI systems **intended to be used as safety components in the management and operation of critical digital infrastructure, road traffic**, or in the supply of water, gas, heating or electricity.

- **System are designed for safety:** Safety by design principles
- **Operational Design Domains(ODD):** conditions defined to operate a system to perform and achieve security and safety conditions: e.g. speed limits, lane usage by vehicle categories,