

ANAS VISION FOR ROAD MAINTENANCE ACTIVITIES:

strategy for a transition from *traditional civil work* to *innovative infrastructure*

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Pavement Maintenance Division

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- **Introduction**

Network needs analysis

Investment chain management

- **Maintenance strategy for pavements**

Approach to maintenance activities

Technological & digital support

- **R&D, Monitoring and Planning**

Current picture

- Innovative materials
- Pavement Management System – Anas

Future works

- Road Asset Management

Introduction

**Who is ANAS and
what are its network' needs?**

NETWORK NEEDS ANALYSIS



**NATIONAL ROADS
& HIGHWAYS
32.000 km**

**of which
1.300 km
of highways and junctions**

7.500 Km
of roads transferred to ANAS
by local administrations



1.800
TUNNELS



15.000
BRIDGES



1.244
SERVICE BUILDINGS



1
CENTRAL CONTROL
ROOM



21
LOCAL CONTROL
ROOMS



38
LOCAL OFFICES

**EXPERIMENTAL LABORATORY
CENTER**

R&D of innovative solutions



**NATIONAL ROADS
& HIGHWAYS
32.000 km**

**of which
1.300 km
of highways and junctions**



7.500 Km
of roads transferred to **ANAS**
by local administrations

44.000 km (2019-2024) of paved lanes

- Managing and processing the large amount of data available about pavement conditions
- Uniforming quality and safety standards on the entire road network under management

Funding

Design

Contract

Production

Check

Program Agreement MIMS* – ANAS (2016 -2020)

5,1 billions €
for planned maintenance

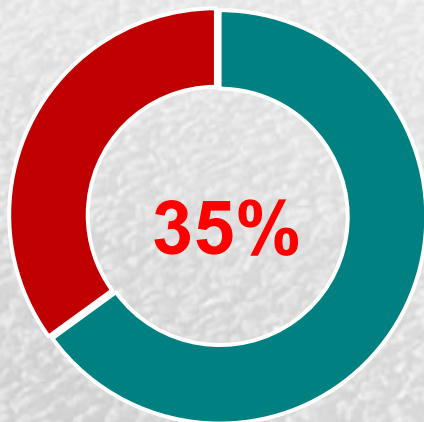


new CdP

work in progress

MULTI-YEAR BASIS

**Road
pavements**



around 1,8 billions for road pavements

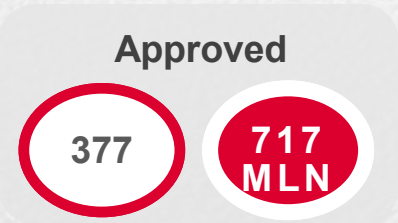
Other fundings (≈ 1,5 miliardi €):

- Local roads
- Extra-plans of planned maintenance
- Infrastructure Fund
- Budget law 21-24
- FSC (funds for development and cohesion)

INVESTMENT CHAIN MANAGEMENT



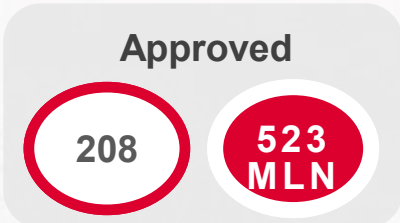
PROJECTS
2019



PROJECTS
2020



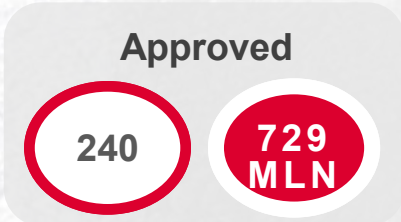
PROJECTS
2021



PROJECTS
2022



PROJECTS
2023



TOTAL

1233 approved projects

€ 3.033.000.000,00



Funding

Design

Contract

Production

Check

Stop potholes

TENDERS
PAVEMENT
2018

TENDERS
PAVEMENT
2019

TENDERS
PAVEMENT
2020

TENDERS
PAVEMENT
2021

TENDERS
PAVEMENT
2022

DG 18/18
12 lots

275
MLN

76
contracts

380
MLN

76
contracts

380
MLN

76
contracts

380
MLN

DG 14/22
16 lots

160
MLN

DG 33/18
12 lots

360
MLN

DG 99/19
20 lotti

520
MLN

DG 117/20
5 lotti

150
MLN

DG XX/22
4 lots
Giubileo 2025

120
MLN

TOTAL

€ 2.725.000.000,00

Duration: **4 years**

Location: **regional**



investments by SMEs in the medium and long term in terms of **technological innovation** and **environmental sustainability** (e.g. NEW GENERATION PRODUCTION PLANTS)

Funding

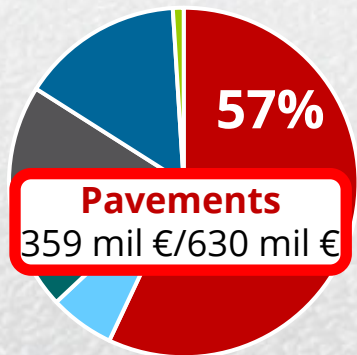
Design

Contract

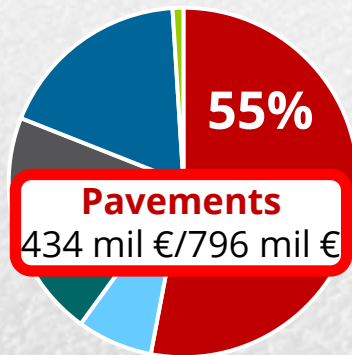
Production

Check

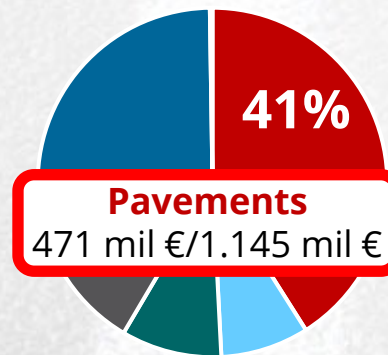
Works realized 2019



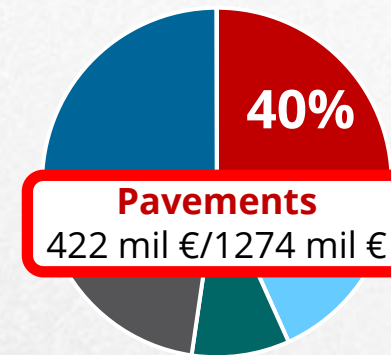
Works realized 2020



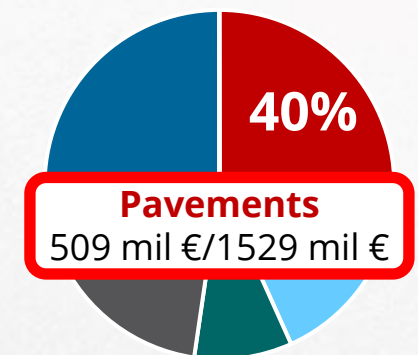
Works realized 2021



Works realized Oct-2022



Works realized Oct-2023



Other assets:

- Safety barriers
- Bridges
- Additional works
- Road markings
- Technological plants

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44.000 km (2019-2024) of paved lanes

Funding

Design

Contract

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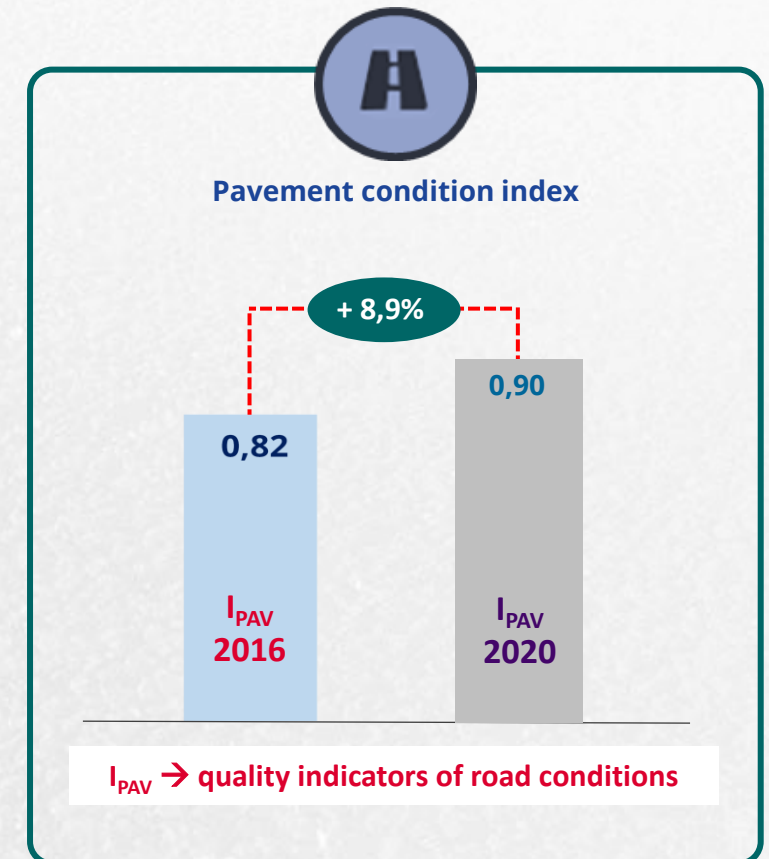
The interventions on pavements are controlled in terms of quality and quantity by the Ministry of Infrastructure, because of the strategic nature of the work in relation to user safety and comfort.

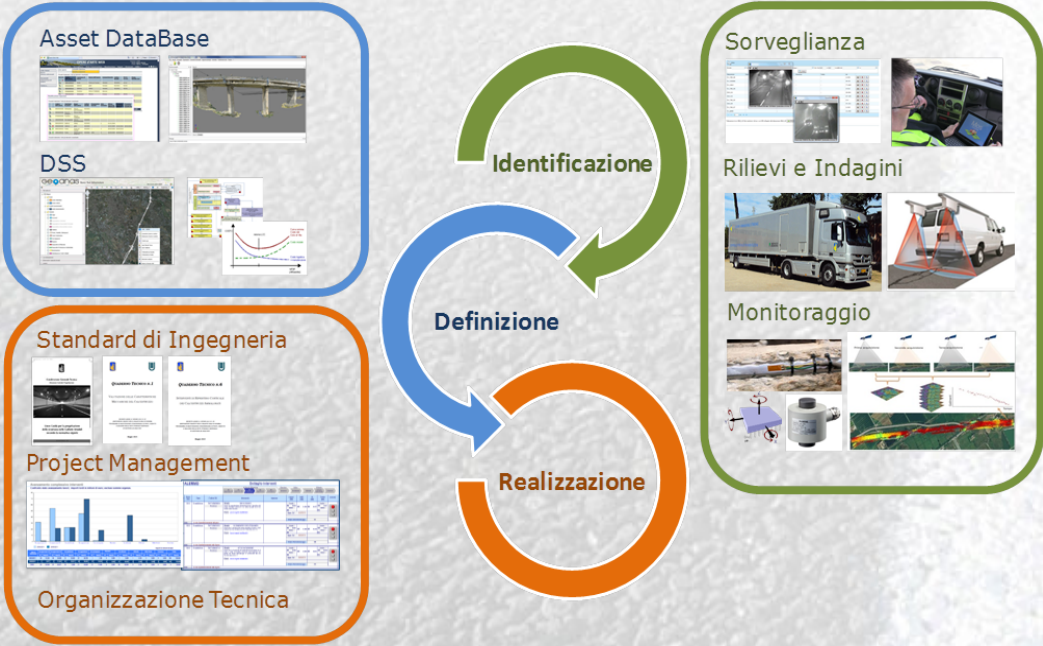
QUALITY CONTROL:

- Penalties
- Less fundings
- Reputation loss

$$I_{PAV} = 0,6 * I_{CAT} + 0,4 * I_{IRI}$$

function of adhesion (CAT) and roughness (IRI)





Goal:

- end of emergency logic
- multi-year planning



PREDICTIVE MAINTENANCE

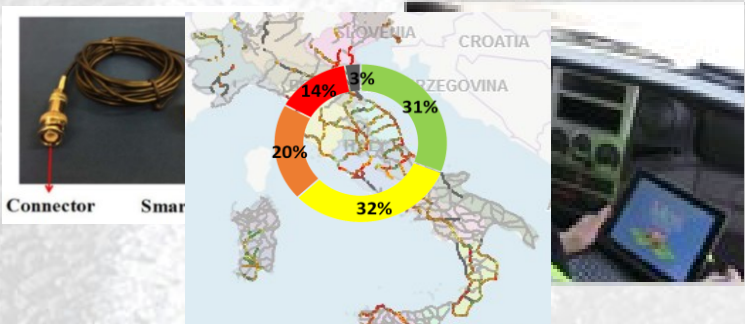


TECHNOLOGICAL & DIGITAL SUPPORT

MATERIALS & EQUIPMENTS



MONITORING



INTER CONNECTIONS



RESEARCH & DEVELOPMENT ON INNOVATIVE MATERIALS

RECYCLING: re-use of high amount of RAP for the production of new bituminous mixtures (COLD RECYCLING)



CEMENTITIOUS FILLER : study on an innovative cement-based material that can substitute traditional asphalt mixtures



LOW-NOISE EMISSION PAVEMENTS: study the effect of asphalt rubber both through DRY and WET application



DURABILITY: mixtures with high durability performance through the use of polymeric compound, nano-polymers, asphalt rubber ...



PLASTICS: reuse of "light plastics" in the production of hot bituminous mixtures



OPEN-LOOP MATERIALS: mixtures made exclusively with artificial and recycled materials (derived from industrial processes, such as: milled, basalt fibers, sands deriving from the waste-to-energy processes of MSW, grits deriving from the production of steel and recycled plastic compounds)



..... Smart materials, sensors, DSS (Decision Support System) ????

PREDICTIVE MAINTENANCE



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MATERIALS & EQUIPMENTS



MONITORING

Connector

Map of Italy showing monitoring data by region:

Region	Percentage
Lombardia	14%
Emilia-Romagna	20%
Campania	32%
Apulia	31%
Other regions	3%

Smart

TSD

INTER CONNECTIONS

Diagram illustrating road infrastructure and connectivity, showing various road types and their interconnections.

anas
GRUPPO FS ITALIAN

View from inside a vehicle showing the road ahead and the Anas logo on a distant structure.

Conceptual model

Where

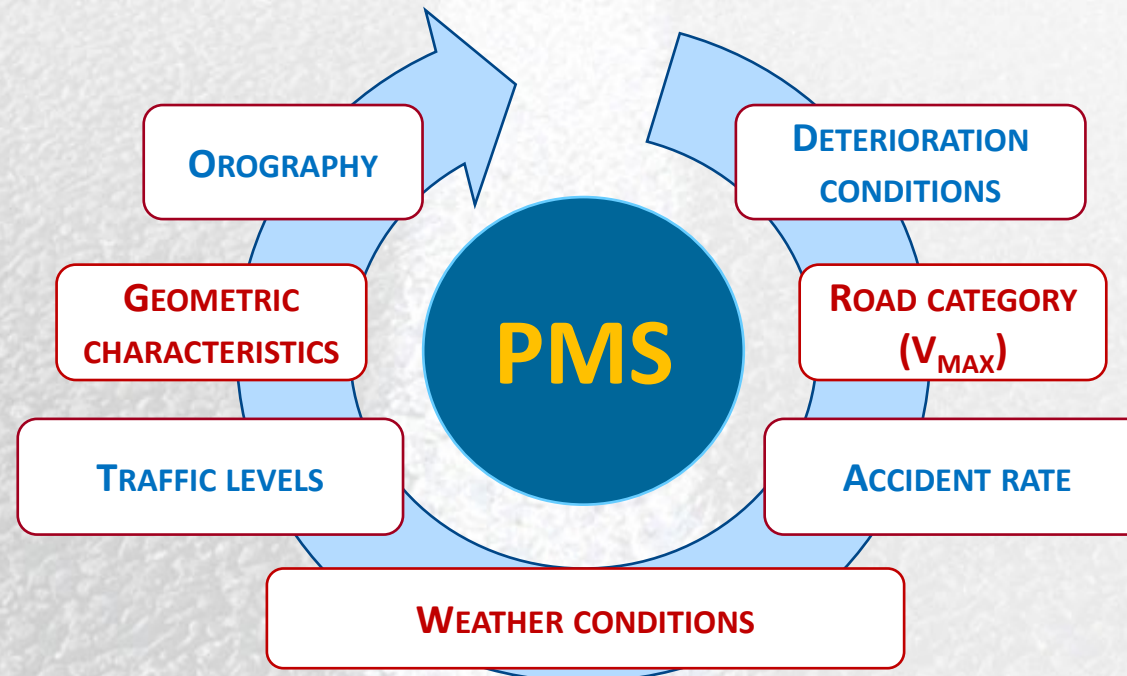
How

When

How much

For each direction and each lane (current and historic data)

**INVENTORY
DATA**



**CONDITION
DATA**

Conceptual model

DATA
COLLECTION



NETWORK STATUS
ANALYSIS



DATA ELABORATION
AND DECISION-MAKING



INTERVENTION
PLANNING

1. TECHNICAL PARAMETERS ACQUISITION

(local and network data): *inspections; monitoring; reports*

2. STATE INDECES

for each parameter

3. GEOMETRIC AND GEOGRAPHICAL INDICATORS, PHOTOGRAPHIC DOC., WEATHER CONDITIONS

*data georeferencing, archiving and standardized display (SYNTHETIC or
DETAILED format)*

4. PREDICTIVE MODELS

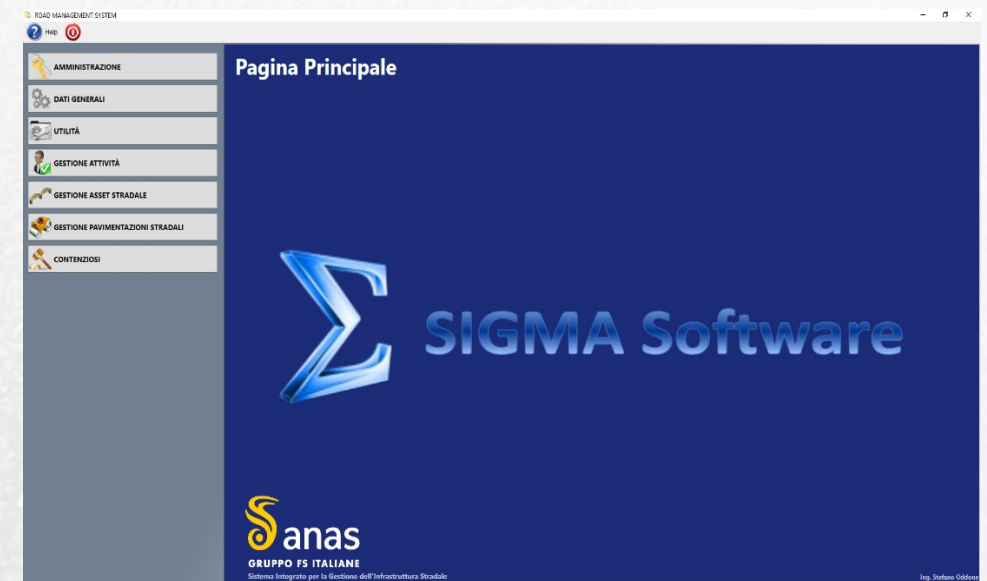
calculation and analysis

5. IMPOSITION OF BOUNDARY CONDITIONS

technical and economic



MAINTENANCE
PLANS



Functional and structural performance monitoring and automatic distresses acquisition



HIGH PERFORMANCE EQUIPMENT

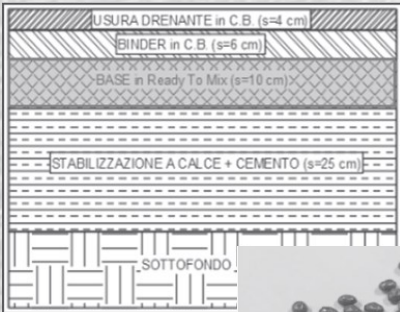


PREDICTIVE MAINTENANCE

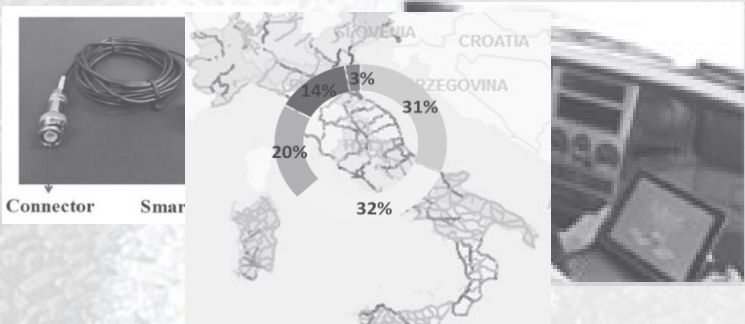


TECHNOLOGICAL & DIGITAL SUPPORT

MATERIALS & EQUIPMENTS



MONITORING



INTER CONNECTIONS



HIGHLIGHTS AT THE BASIS OF THE NEW EUROPEAN POLICY 2020-2027

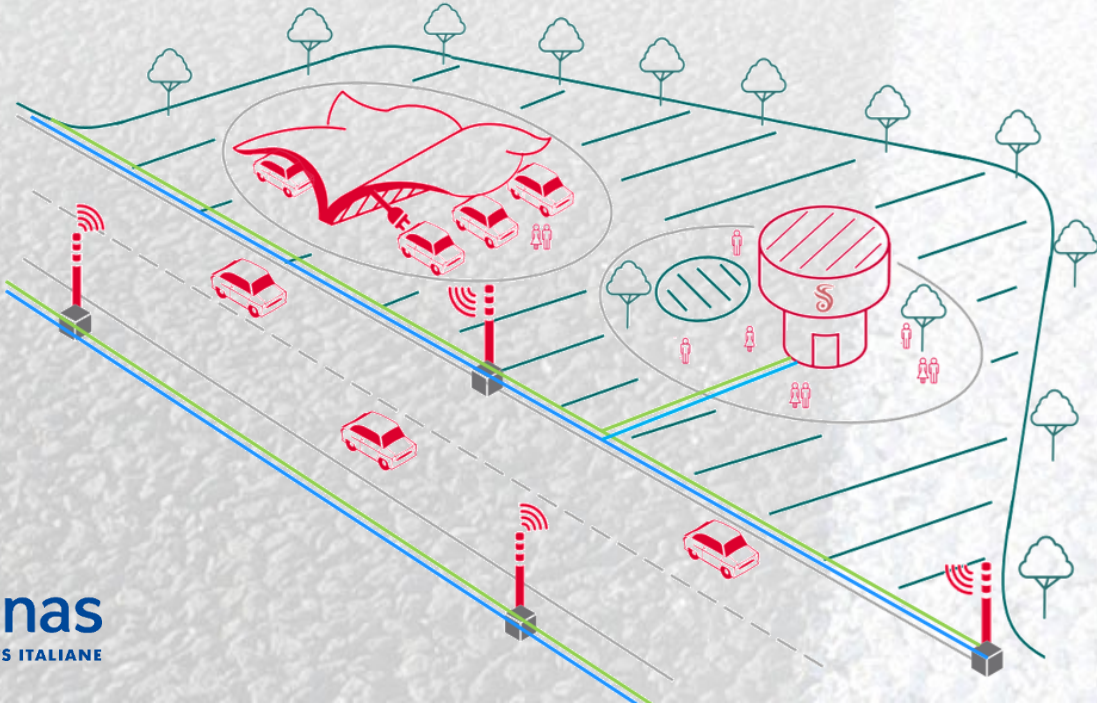


«Connectography»



“connections” of real and intangible infrastructures, both indispensable for the new geography of living, market, people and vehicles flows, and for improving the accessibility to cities, ports, airports, etc ...





SMART ROAD

SMART CITY

INFOMOBILITY

BROADBAND CONNECTION

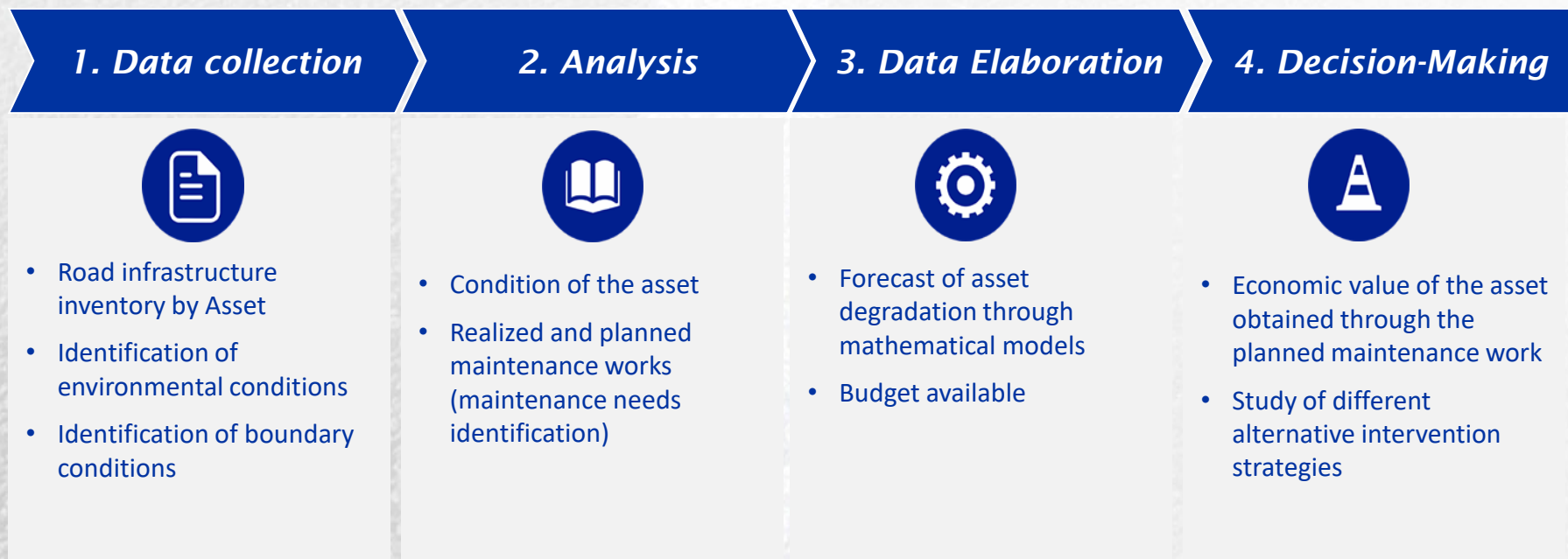
Future works

Work in progress



Model for the planning and management of maintenance interventions (RAM System) → allows to start a radical transformation of the management and surveillance system of the various network assets

The RAM model can be summarized in a 4-step process:



**OPTIMAL TECHNICAL AND ECONOMIC PLANNING OF OVERALL SCHEDULED
MAINTENANCE INTERVENTIONS FOR ALL ASSETS**

Conclusions

**GO BEYOND THE TRADITIONAL CONCEPT OF
INFRASTRUCTURE AS A MAJOR MATERIAL WORKMADE
OF STEEL, CONCRETE AND ASPHALT**



**NOT ONLY A TRANSFER SYSTEM, BUT A WAY THROUGH
WHICH TO IMPROVE USERS' LIVES**



Thank you for your attention

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