



Republic of North Macedonia

Ministry of Transport
and Communications

Development of National ITS Strategy for the Republic of North Macedonia

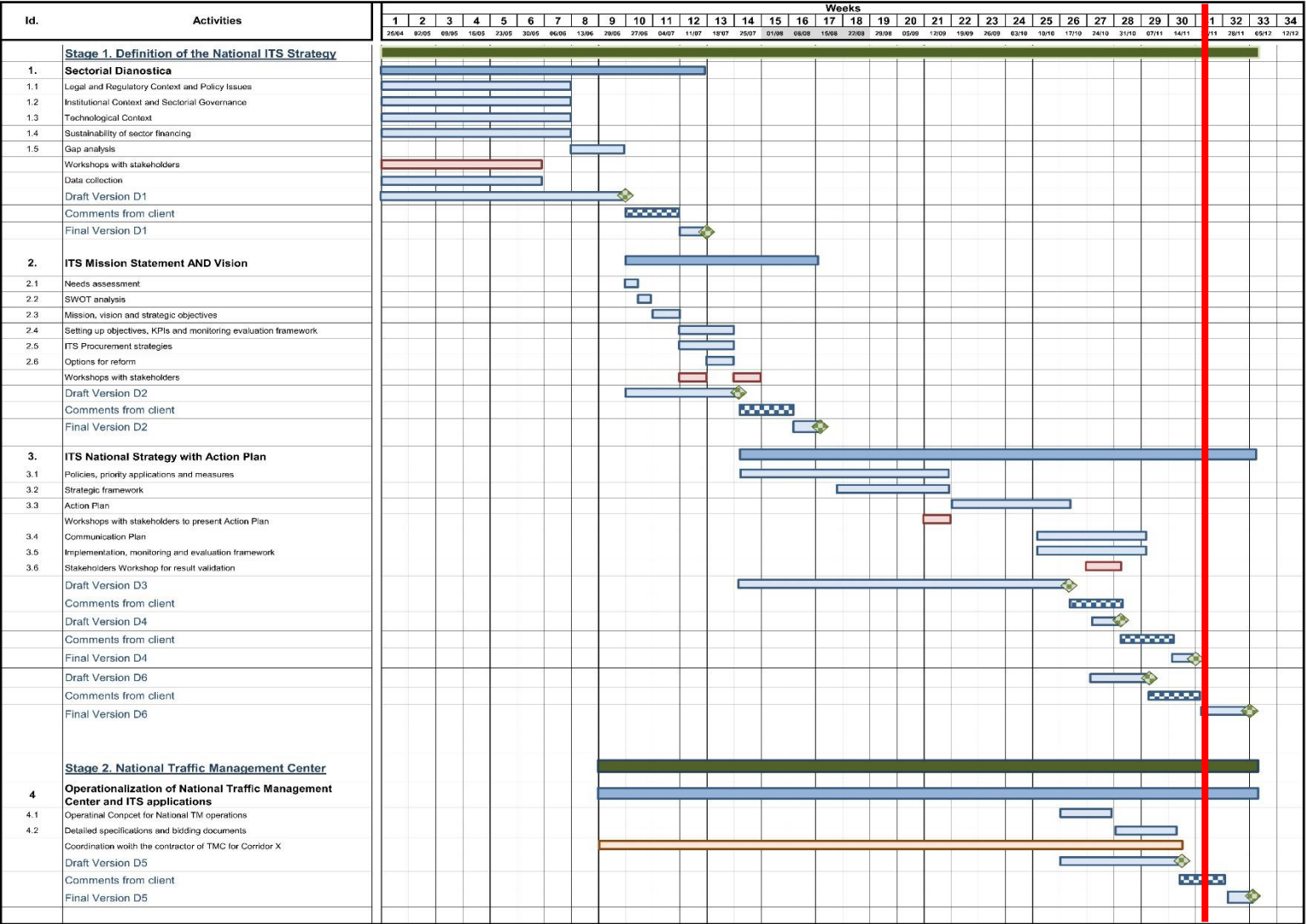
Workshop during World Bank mission – 12/05/2022

Agenda

1. Project progress
2. National ITS Strategy
3. Action Plan
4. ITS applications for NTMC



1. Project Progress

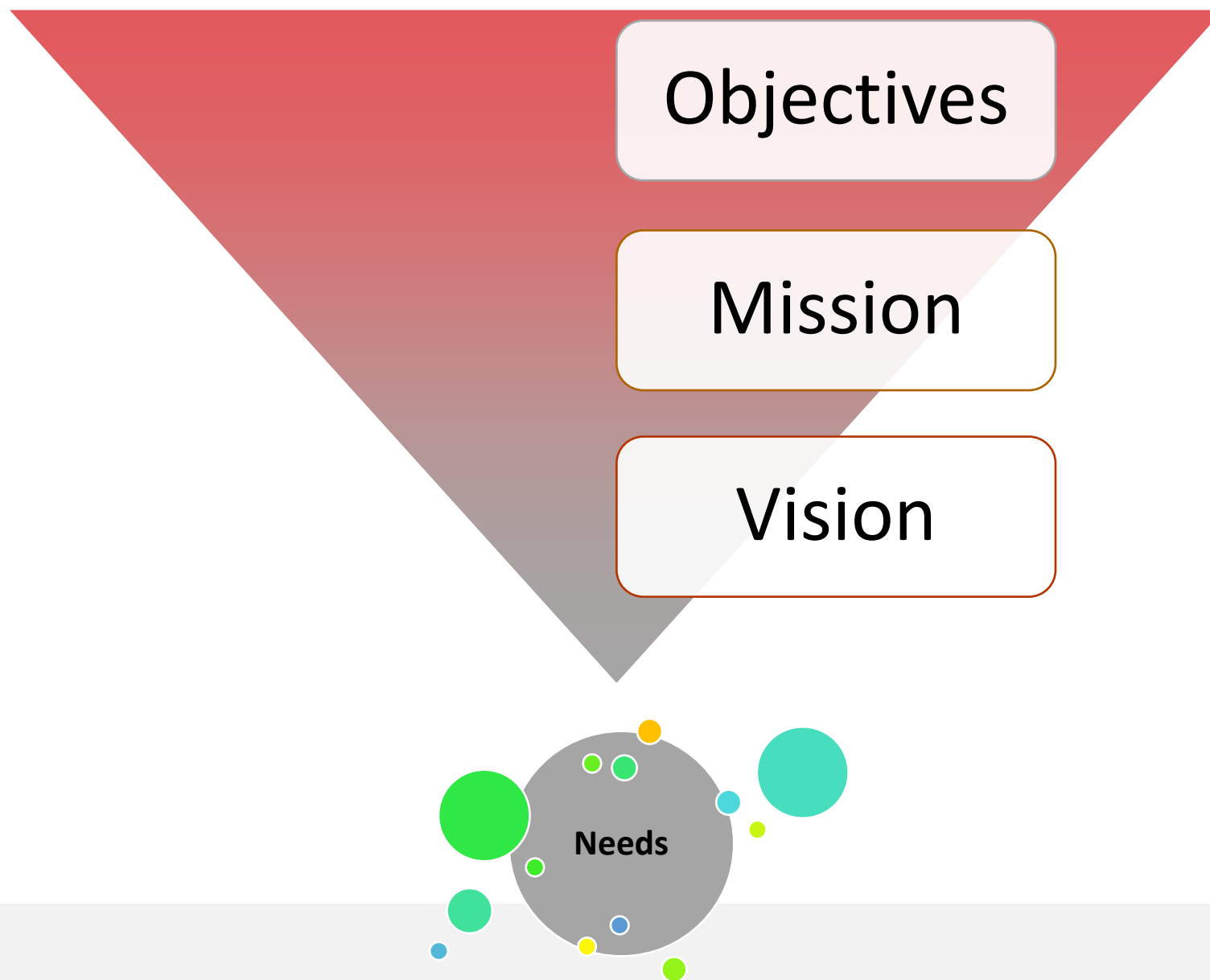


Deliverable	Draft Version	Final Version
D0.	12/05/2022	14/06/2022
D1.	25/06/2022	24/08/2022
D2.	28/07/2022	16/09/2022
D3.	21/10/2022	It corresponds to D6
D4.	21/11/2022	No comments
D5.	02/12/2022	23/12/2022
D6.	25/11/2022	23/12/2023

Extended 2 weeks for additional time for PSC in August to share their feedback

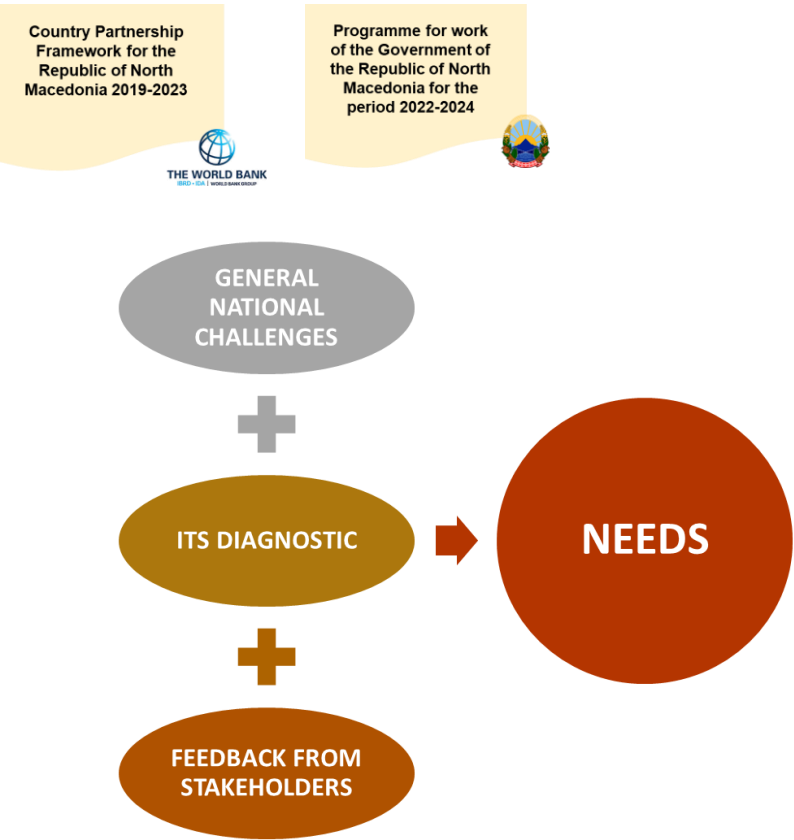


2. National ITS Strategy



2. National ITS Strategy

NEEDS ASSEMENT



Need 1	Macedonian legal and regulatory framework, aligned with Europe, that supports the implementation of ITS.
Need 2	An institutional organization to lead, promote and regulate the development of ITS.
Need 3	Promote the development of commercial activities related with ITS, encouraging public and private investments
Need 4	Improve the quality of all modes of transport and mobility services.
Need 5	Improve mobility and transport management capabilities.
Need 6	Improve the access to mobility information.
Need 7	Reduce the number and fatality of accidents on road and street networks, including railway level crossings.
Need 8	Reduce the contribution of mobility and transport on air pollution.
Need 9	Promote multimodality in public transport.
Need 10	Promote the creation of a Macedonian innovative cluster working on technological solutions applied on mobility and transport

2. National ITS Strategy

VISION



European country with a mature framework of interoperable ITS solutions, implemented to cover Macedonian needs according to the European context and International standards and best practices, that supports a sustainable, efficient and safe mobility interconnected with the European transport network.

2. National ITS Strategy

MISSION



The strategic plan defines actions on Macedonian legal, institutional and technological frameworks to establish an environment that enables and promotes the implementation of ITS solutions according to the European context for a sustainable, efficient and safe mobility:

Legal: create a specific Macedonian Legal framework for ITS in their fields, fully aligned with Europe and guaranteeing the implementation of interoperable solutions through the use of standards.

Institutional: establish a Macedonian governance structure that, integrating public and private actors, leads, regulates and promotes the development of a mature framework of interoperable ITS solutions.

Technical: implement high quality, integrated and interoperable ITS solutions and ICT facilities adapted to the Macedonian framework, to improve mobility and all modes of transport services.

2. National ITS Strategy

STRATEGIC OBJECTIVES



Objective 1 SAFETY

Avoid fatalities, injuries, and crashes from transport accidents, consequently preventing the public health risks, and social and economic losses associated with unsafe mobility.



Objective 2 EFFICIENCY

Develop a predictable, reliable, timely and cost-effective transport of passengers and goods, under one mode of transport or a combination of modes.



Objective 3 SUSTAINABILITY

Reduce the environmental impact of mobility in terms of GHG emissions and the increase in air and noise pollution to contribute to a healthy and resilient community.



Objective 4 INTEROPERABILITY

Availability of a mobility data platform for mobility managers, developers and all-users that supports their cooperation.

3. Action Plan

Defined actions

- 17 actions initially proposed by the Consortium to solve identified needs.
- 9 actions proposed by stakeholders during the workshops and approved by PSC. These additional actions come from:
 - Interpretation done by the stakeholders about national needs.
 - Alignment of North Macedonia to international challenges about Smart Mobility.



ITS organization in Europe that promotes research and defines ITS industry standards



Leading network of European cities and regions working together to develop innovative technologies and policies for local transport



Volpe Center. U.S. Department of Transportation. Federal Cabinet department of the U.S. government concerned with transportation

3. Action Plan

Defined actions

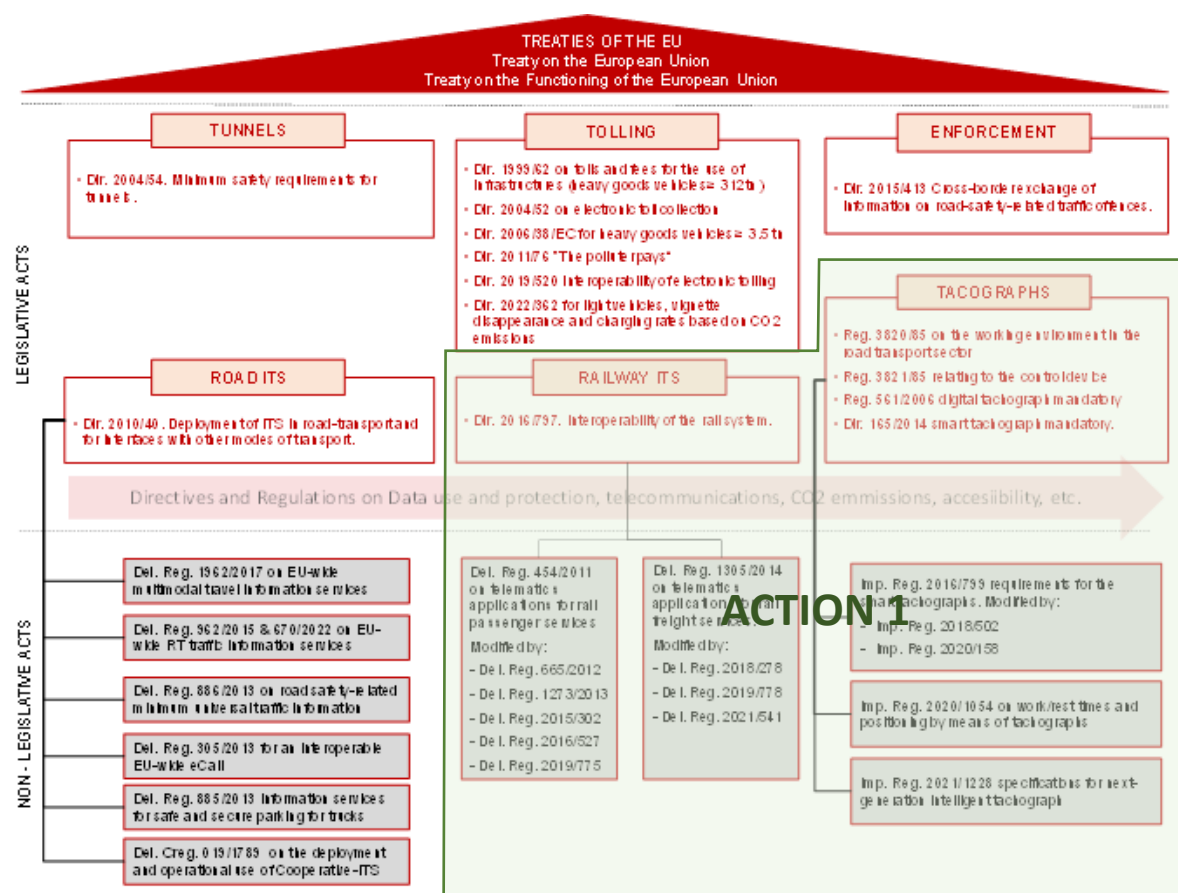
Action 1	Minimum required update in Macedonian legal framework	Action 14	ALPR technology in the national tolling system
Action 2	Adaptation of the Macedonian legal framework for ITS implementation	Action 15	Program for the development of C-ITS in North Macedonia
Action 3	Digitalization of the traffic enforcement	Action 16	Improvement of the operation in road tunnels
Action 4	Creation of the ITS leader body	Action 17	Safety improvement in railway level crossings
Action 5	Promotion of an ITS Association	Action 18	ITS solutions to facilitate people and goods movement in border crossings
Action 6	Development of a program for innovation on ITS	Action 19	Promotion of ITS implementation in cities with more than 20,000 citizens
Action 7	Establishment of an ITS Service Charter for transport and mobility	Action 20	Improvement of accessibility of travelers with special needs
Action 8	National Traffic Management Center	Action 21	Program to implement ITS solutions in highways and national roads.
Action 9	National Access Point	Action 22	Improvement of security for vulnerable travelers of transport services.
Action 10	Development of a digital platform for mobility and transport planning	Action 23	ITS solutions to improve the safety of routes to schools and kindergartens.
Action 11	Development of the Telecommunication Plan for main mobility and transport infrastructures	Action 24	Promotion of the implementation of LEZ in cities.
Action 12	National multimodal Fare Collection System	Action 25	Promotion of MaaS solutions.
Action 13	Digital information channels in railway transport	Action 26	Digitalization of traffic management in highways and national roads

3. Action Plan

Key actions

ACTION 1+2

ADAPTATION OF THE MACEDONIAN LEGAL FRAMEWORK FOR ITS IMPLEMENTATION



Adaptation of Macedonian legal framework with specific laws, equivalent to the existing European regulation, for each of the following topics:

- **Road ITS**, taking into account EU Directive 2010/40 and related delegated regulations.
- **E-Tolling**, taking into account EU Directives 1999/62, 2004/52, 2006/38, 2011/76, 2019/520, 2022/362 and related delegated regulations.
- **Tunnel safety**, taking into account EU Directive 2004/54.
- **Cross-borders data exchange**, taking into account EU Directive 2015/413.

In addition:

- Road safety: 2019/1936.
- Accessibility of public web site and application: 2016/2102.



3. Action Plan

Key actions

ACTION 3

DIGITALIZATION OF TRAFFIC ENFORCEMENT

Although European regulations do not impose the use of automatic enforcement or digitalized procedure, the Commission Recommendation on enforcement in the field of road safety (2004/345) stated as a best practice for speeding:

“the use of automated speed enforcement systems, followed up by procedures that have the necessary capacity to cope with a large number of violations”.

Digitalization of the traffic enforcement including:

1. Incorporate in the **law** the possibility of not notifying an infraction at the moment that it happens if the infraction has been detected with automatic enforcement equipment.
2. Implement a **National Traffic Infractions Management Center** where the automatically detected infractions are centralized, reviewed and processed and, if applies, notified to the offender.
3. Extent the **implementation of automatic enforcement system along road network** in order to be aligned with European rates.

3. Action Plan

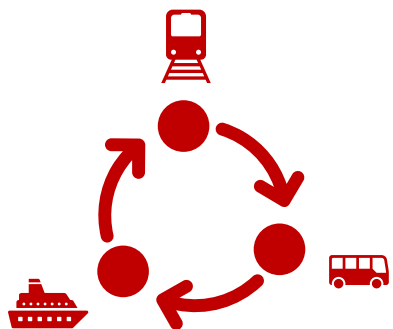
Key actions

ACTION 12

NATIONAL MULTIMODAL FARE COLLECTION SYSTEM

MACEDONIAN MULTIMODAL FARE COLLECTION SYSTEM

Offer the users a way to identify, pay and consequently be granted access to the transport services integrated into the system; and in the same way, provide mobility and transport operators with a tool to identify users, charge according to their user characteristics and collect information about the use of the transport service



- Development, implementation, configuration, installation, operation, and management of the **Ticketing Central System**. The main functionalities are the **Clearing House** actions, the management of transport cards and security issues.
- Configuration and integration of the Central System with every **Operators Central System**. This integration is based on the agreement between the different stakeholders, especially the relevant administrations of the different public transport systems.
- The supply, installation, configuration, and testing of the **ticket and/or card validation equipment**.
- The supply, installation, configuration, and testing of **equipment to buy tickets and acquire and top up transport cards**.

3. Action Plan

Key actions

ACTION 17

SAFETY IMPROVEMENT IN LEVEL CROSSINGS

248 level crossings with the following characteristics:

- Road horizontal/vertical signalization (without barriers): 142 level crossings.
- Manual barriers: 11 level crossings.
- Signal-safety equipment (automatic barriers, light/sound signals): 95 level crossings.



55% Active (safe)
45% Passive



43% Active (safe)
57% Passive

Action in 42 level crossing in order to equate North Macedonia with European average

- Diagnostic of existing level crossings.
- Categorization of level crossings based on flow, dangerousness or other criteria.
- Definition of technical alternatives (signaling, detection...).
- Implementation of the safety measures in a prioritized way.

3. Action Plan

Key actions

ACTION 18

ITS SOLUTIONS TO FACILITATE PEOPLE AND GOODS MOVEMENT IN BORDER CROSSINGS

The mobility of goods and people cross border crossings can vary depending on the period of the year or the time of the day, as well as social, political and/or economic conditions.



ITS solutions to inform and guide border crossings users are useful.

- **Border crossing,** VMS are useful in order to inform users and indicate the use of the lanes in each case.
- **Road section to the border crossing,** VMS before waiting areas or gas stations located close to the border crossing informing about the waiting time in the border crossing



3. Action Plan

Budget

- National professional services
- Contingency reserves (15%)
- Indirect cost and benefits depending on the business
- CPI

Zone	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
EU	1,3%	1,5%	1,3%	-0,3%	5,0%	8,1%	5,5%	2,3%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%
MK	2,4%	0,9%	0,4%	2,3%	4,9%	8,8%	3,0%	2,5%	2,5%	2,5%	2,5%	2,5%	2,5%	2,5%	2,5%	2,5%

Internally carried out or not needed

National professional services

International professional services



Development of National ITS Strategy for the Republic of North Macedonia

		CONSULTANCY	PROJECT DESIGN	SYSTEM SUPPLY & INSTALLATION	SW DEVELOP	PROJECT SUPERVISION	TRAINING	COMMUNICATION CAMPAIGN	TOTAL
Action 1	Minimum required update in Macedonian legal framework								
Action 2	Adaptation of the Macedonian legal framework for ITS implementation	120.000,00 €							120.000,00 €
Action 3	Digitalization of the traffic enforcement	140.000,00 €	130.000,00 €	7.990.000,00 €	920.000,00 €	380.000,00 €	50.000,00 €	60.000,00 €	9.670.000,00 €
Action 4	Creation of the ITS leader body								
Action 5	Promotion of an ITS Association								
Action 6	Development of a program for innovation on ITS	280.000,00 €							280.000,00 €
Action 7	Establishment of an ITS Service Charter for transport and mobility	230.000,00 €							230.000,00 €
Action 8	National Traffic Management Center			9.740.000,00 €		840.000,00 €	100.000,00 €	50.000,00 €	10.730.000,00 €
Action 9	National Access Point	280.000,00 €	140.000,00 €	410.000,00 €	580.000,00 €		30.000,00 €		1.440.000,00 €
Action 10	Development of a digital platform for mobility and transport planning		250.000,00 €	470.000,00 €	180.000,00 €		10.000,00 €		910.000,00 €
Action 11	Development of the Telecommunication Plan for main mobility and transport infrastructures	310.000,00 €							310.000,00 €
Action 12	National multimodal Fare Collection System	550.000,00 €	360.000,00 €	26.330.000,00 €	3.600.000,00 €	1.760.000,00 €	40.000,00 €	90.000,00 €	32.730.000,00 €
Action 13	Digital information channels in railway transport		240.000,00 €	2.650.000,00 €	90.000,00 €	50.000,00 €		30.000,00 €	3.060.000,00 €
Action 14	ALPR technology in the national tolling system		130.000,00 €	2.380.000,00 €		100.000,00 €	10.000,00 €		2.620.000,00 €
Action 15	Program for the development of C-ITS in North Macedonia	380.000,00 €							380.000,00 €
Action 16	Improvement of the operation in road tunnels		160.000,00 €	430.000,00 €		50.000,00 €	30.000,00 €		670.000,00 €
Action 17	Safety improvement in railway level crossings		290.000,00 €	14.510.000,00 €		100.000,00 €	10.000,00 €		14.910.000,00 €
Action 18	ITS solutions to facilitate people and goods movement in border crossings		290.000,00 €	3.960.000,00 €		80.000,00 €	10.000,00 €		4.340.000,00 €
Action 19	Promotion of ITS implementation in cities with more than 20,000 citizens	390.000,00 €							390.000,00 €
Action 20	Improvement of accessibility of travelers with special needs		300.000,00 €	2.340.000,00 €		100.000,00 €			2.740.000,00 €
Action 21	Program to implement ITS solutions in highways and national roads.	260.000,00 €							260.000,00 €
Action 22	Improvement of security for vulnerable users of transport services.	120.000,00 €	160.000,00 €	1.100.000,00 €	30.000,00 €	100.000,00 €	10.000,00 €		1.520.000,00 €
Action 23	ITS solutions to improve the safety of routes to schools and kindergartens.	30.000,00 €	20.000,00 €	460.000,00 €		50.000,00 €			560.000,00 €
Action 24	Promotion of the implementation of LEZ in cities.	410.000,00 €							410.000,00 €
Action 25	Promotion of MaaS solutions.	350.000,00 €							350.000,00 €
Action 26	Digitalization of traffic management in highways and national roads		800.000,00 €	20.000.000,00 €		2.000.000,00 €			22.800.000,00 €
									111.430.000,00 €

3. Action Plan

Timeline

	SHORT TIME	MEDIUM TIME	LONG TIME
	20232025	20262029	20302032
Criticality	Action to address identified challenges	Action to reach best-practices level	Action to position North Macedonia in ITS roadmap
Required investment	Low investment (less than 1 million €)	Medium investment (less than 15 millions €)	High investment (more than 15 millions €)
Political commitment	Political commitment required	Political commitment not required	Political commitment not required
Maturity	Accessibility to marketable mature technological solutions	Mature technological framework in Europe	Innovative solutions
Correlation between actions	Non conditioned action	Action conditioned by any developed in previous period	Action conditioned by any developed in previous period



		Timeline of implementation of the ITS																																								
		SHORT TERM								MEDIUM TERM								LONG TERM																								
		2023				2024				2025				2026				2027				2028				2029				2030				2031				2032				
		Q1-2023	Q2-2023	Q3-2023	Q4-2023	Q1-2024	Q2-2024	Q3-2024	Q4-2024	Q1-2025	Q2-2025	Q3-2025	Q4-2025	Q1-2026	Q2-2026	Q3-2026	Q4-2026	Q1-2027	Q2-2027	Q3-2027	Q4-2027	Q1-2028	Q2-2028	Q3-2028	Q4-2028	Q1-2029	Q2-2029	Q3-2029	Q4-2029	Q1-2030	Q2-2030	Q3-2030	Q4-2030	Q1-2031	Q2-2031	Q3-2031	Q4-2031	Q1-2032	Q2-2032	Q3-2032	Q4-2032	
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3. Action Plan

Approval from stakeholders



WORKSHOP WITH STAKEHOLDERS

- July 20th, 2022
- September 21st, 2022
- November 17th, 2022

Indicate for each of the following statements the level of agreement by your side: 0 - No concern 1 – Disagree 2 – Partially agree 3 – Agree		
1	Identified needs represent Macedonian current challenges in terms of technological solutions implementation regarding mobility and transport	
2	Stated vision is aligned with national general objectives	
3	Stated vision supports the evolution of ITS implementation in North Macedonia	
4	Defined actions are achievable tasks	
5	Defined actions support the solution of identified needs	
6	The scope of each of the actions covers expected outcomes for each of them	
7	The identification of involved stakeholders and leadership is coherent with Macedonian framework	
8	Used prioritization criteria for timeline definition is coherent with strategic framework and national challenges	
9	Defined action plan can promote the development of national qualification on ITS	
10	Defined action plan can promote the development of the national ITS market	
11	North Macedonia should make efforts to complete the development of the Action Plan according to stated strategy	



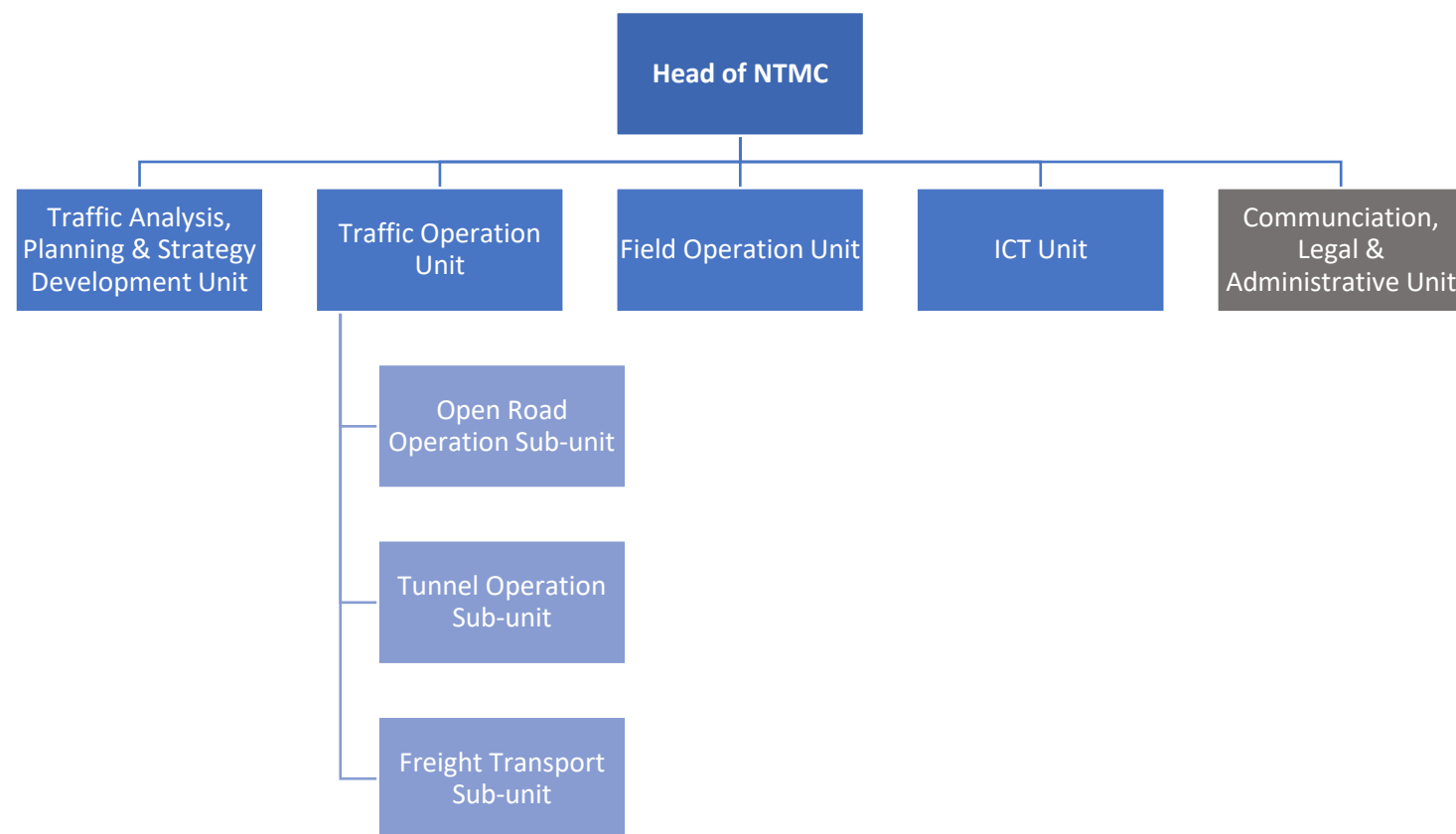
AVERAGE QUALIFICATION

2,5 – 3,0

4. ITS Applications for NTMC

Operational Concept of NTMC

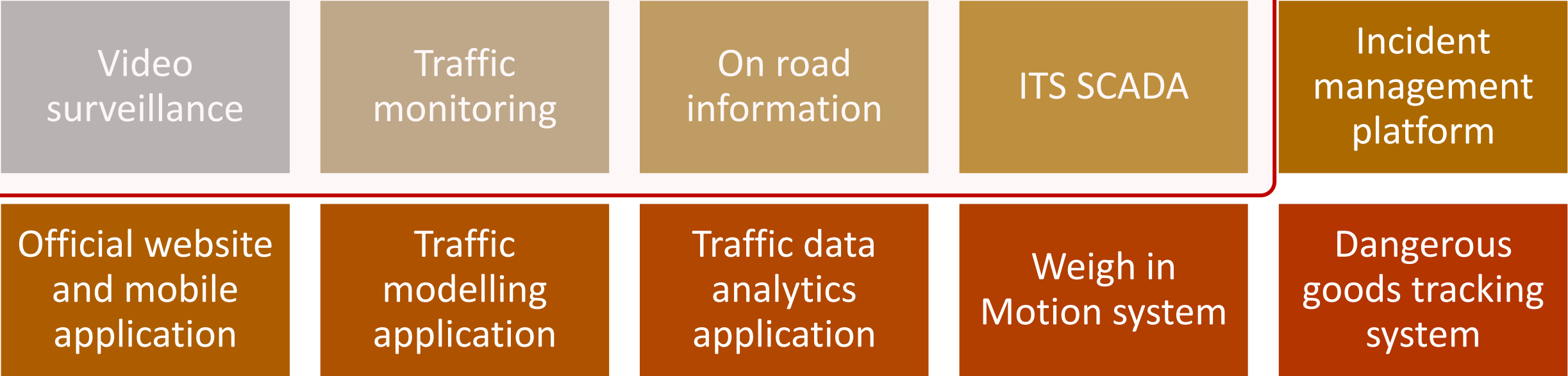
- Data integration
- Analysis and forecast of mobility and traffic
- Traffic monitoring and operation
- Road tunnel monitoring and control
- Coordination with other management centers
- Coordination of events developed in field
- Distribution of traffic-related information



4. ITS Applications for NTMC

Selecteced ITS application for the NTMC

Already considered in the Project for Corridor X



4. ITS Applications for NTMC

Incidente management platform

It corresponds with the tool of the Operation Room in order to centralize the register and management of every events and/or incidents identified by the NTMC. It helps to centralize the information, coordinating the operation of activities that, planed or not, can affect over traffic conditions.

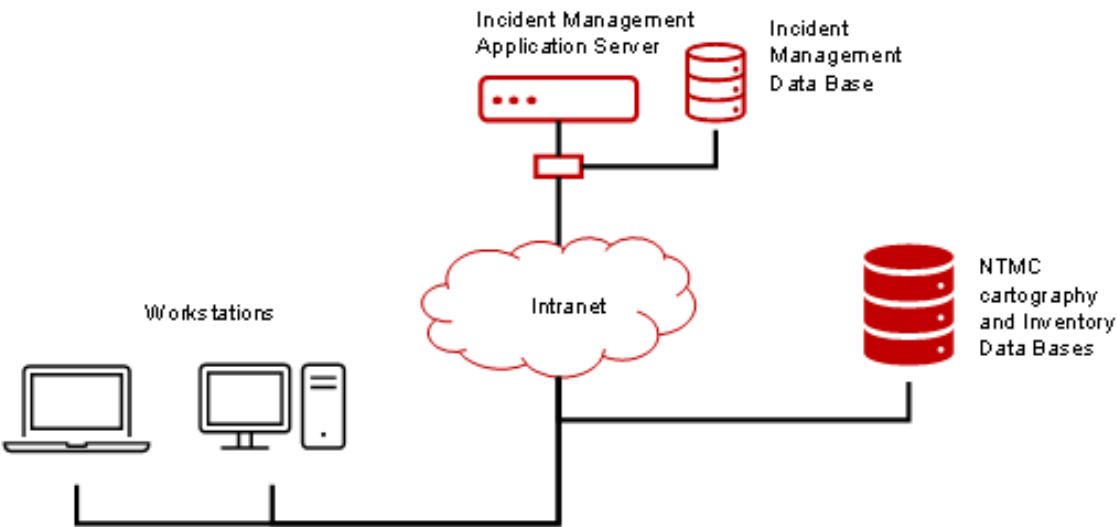




9 months



177,300.00 €



4. ITS Applications for NTMC

Official website and mobile application

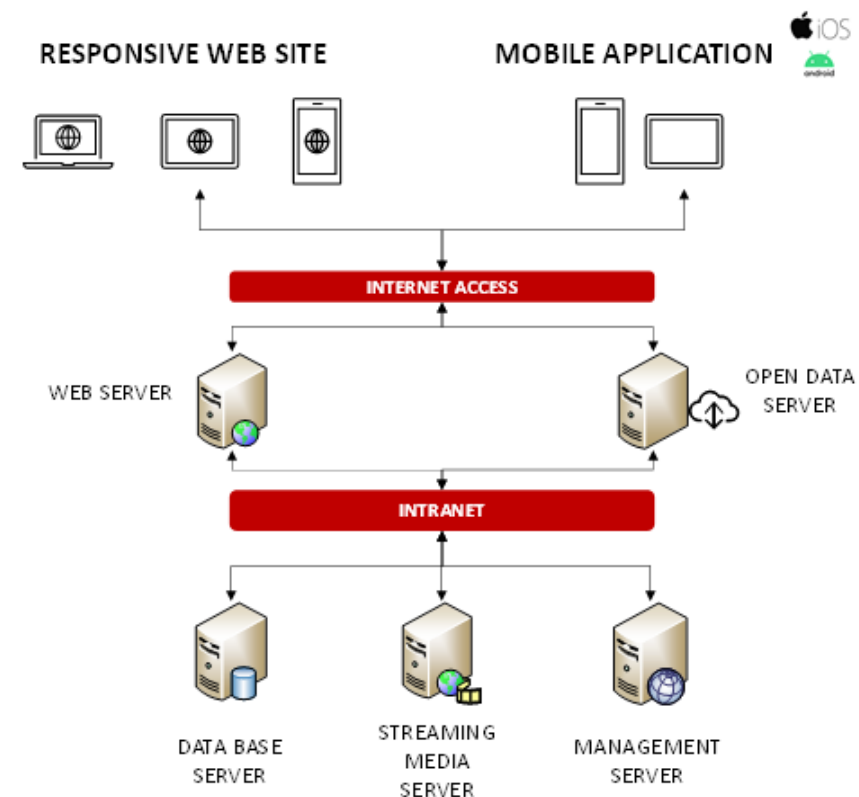
As channels to inform road users, they allow to make public the activities developed by the NTMC as key element of national roads management. Each of them should be designed taking into account the information expected by the users, as well as the boundaries of each channel.



9 months + 36 months of HaaS



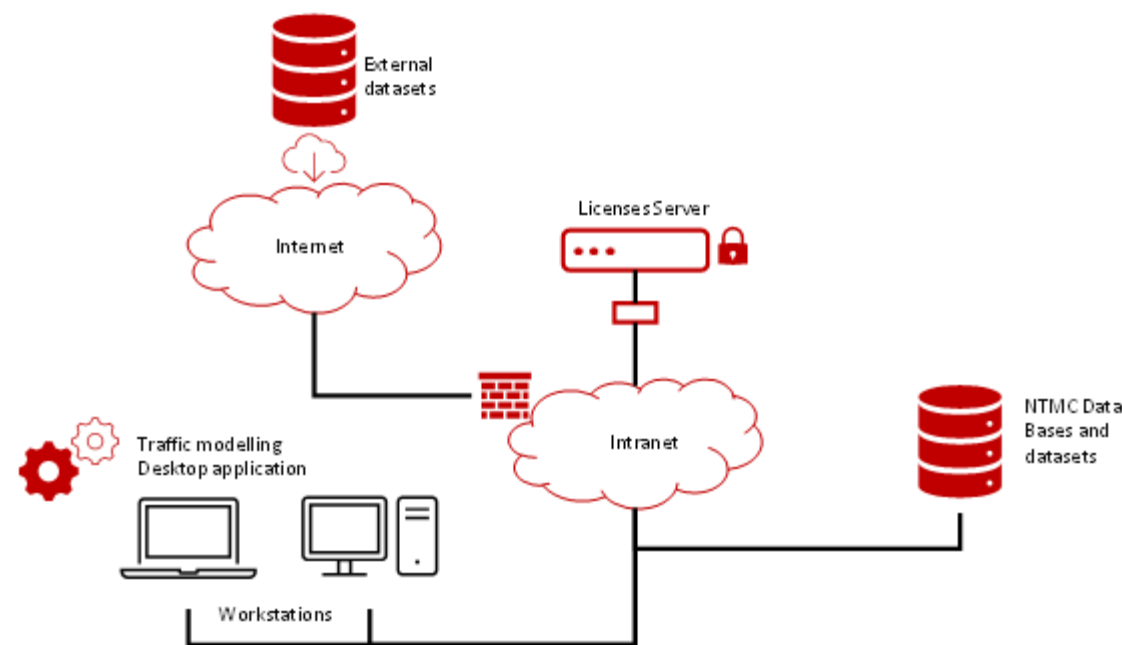
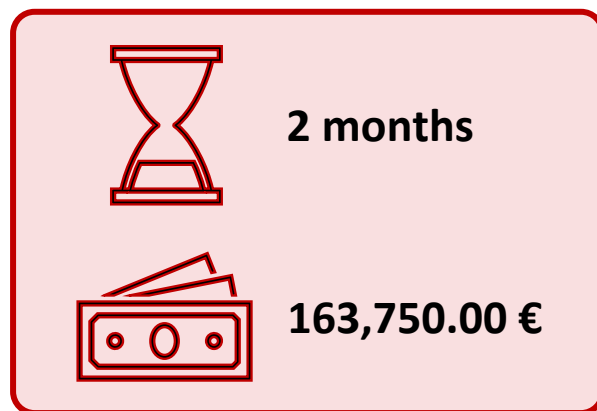
236,450.00 €



4. ITS Applications for NTMC

Traffic modeling application

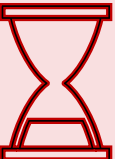
It is the main tool of the Traffic Analysis, Planning & Strategy Development Division of the NMTC. It allows to objectively analyze the effect that actions or events can have over traffic conditions not only in a local way but also in terms of metropolis, region or country.



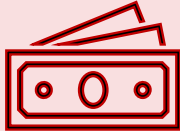
4. ITS Applications for NTMC

Traffic data analytics application

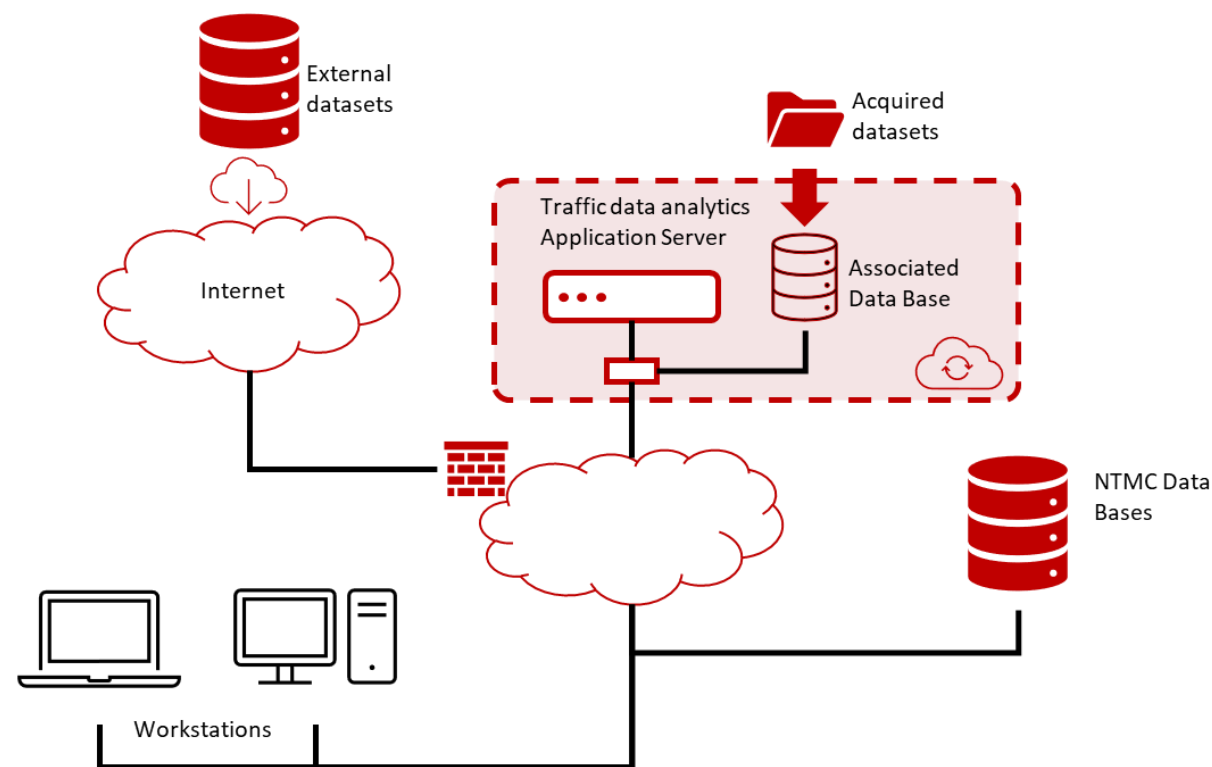
As the application to obtain numerical indicators to assess not only current and past mobility pattern, but also forecast the evolution of mobility and its effects. Generated indicators can support decision-making of different management levels.



12 months + 36 months of HaaS



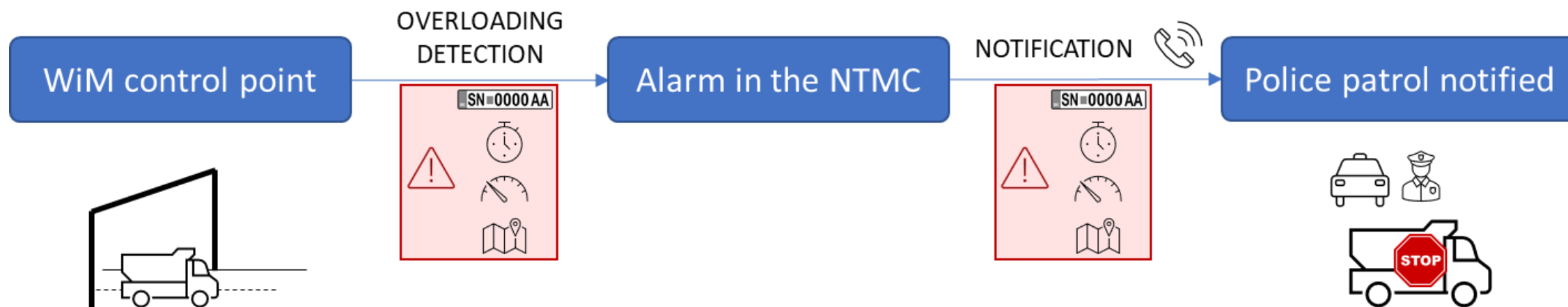
1,188,750.00 €



4. ITS Applications for NTMC

Weigh in Motion system

It corresponds with the application to detect and identify over loaded vehicles, reducing the effect of potential accidents as well as the damage of road infrastructures. It has been defined only to preselect overloaded vehicle, without enforcement.



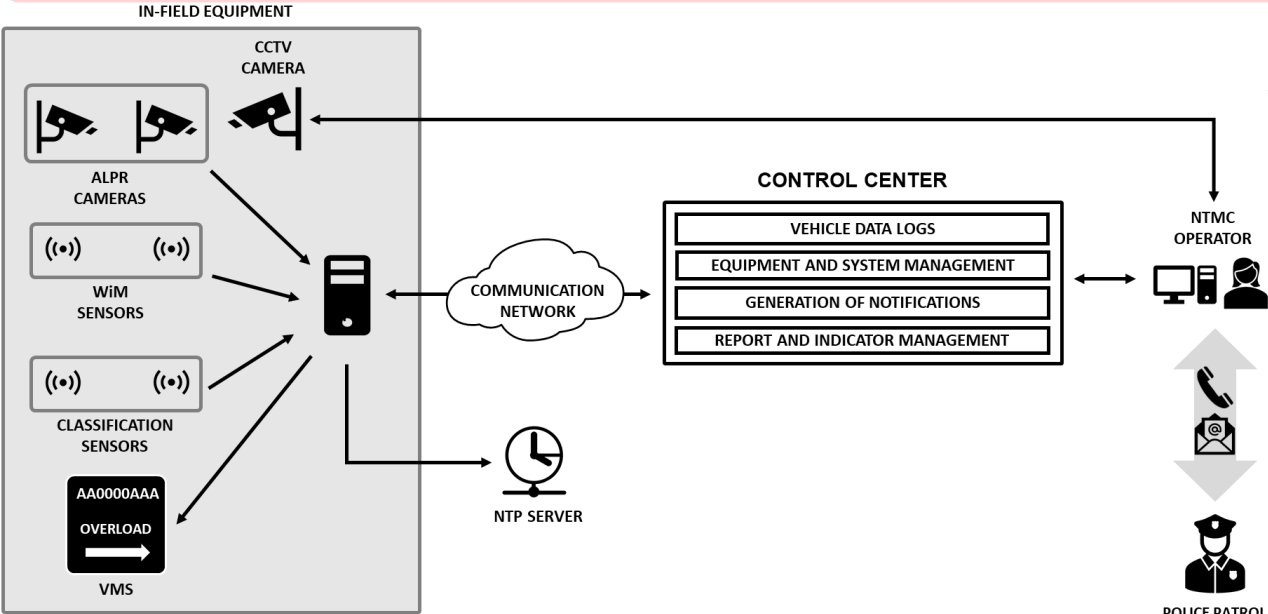
COST 323



Class B: Preselection

4. ITS Applications for NTMC

Weigh in Motion system





15 months



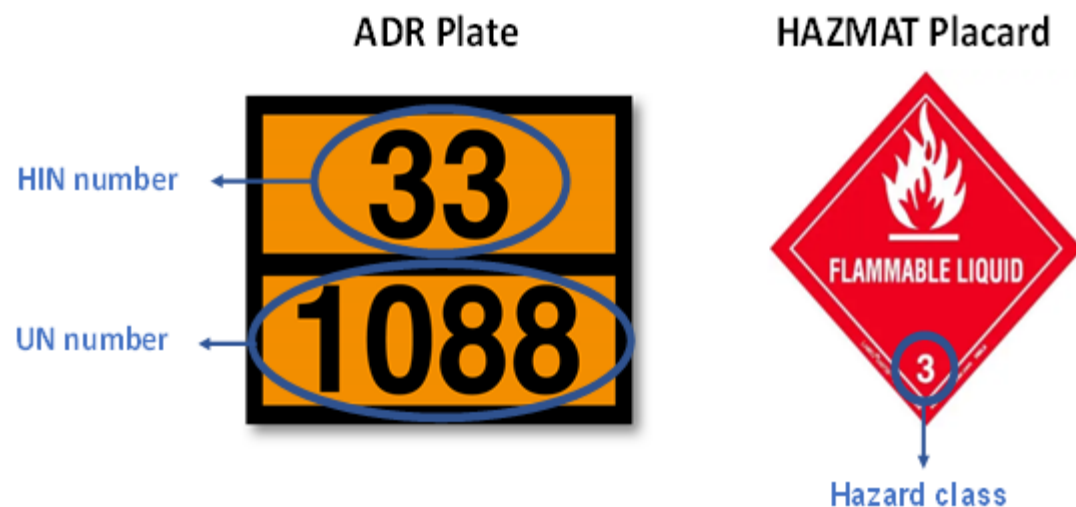
2,327,750.00 €



4. ITS Applications for NTMC

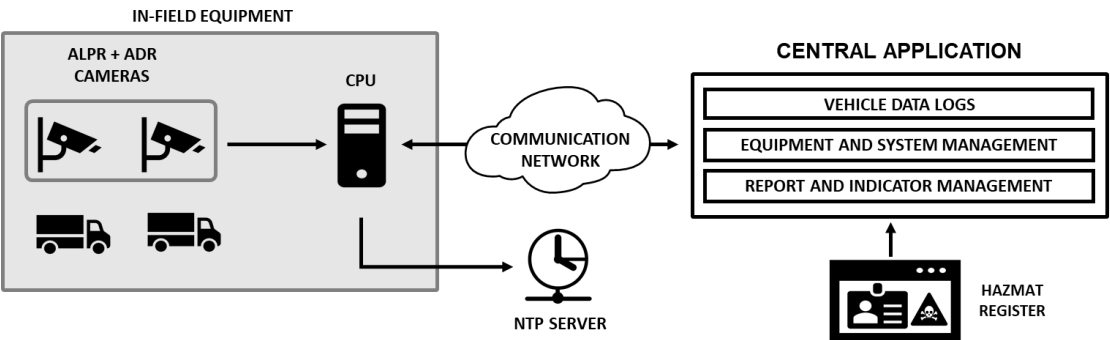
Dangerous goods tracking system

It corresponds with the application to detect and identify not only the vehicle but also transported dangerous goods, improving the enforcement over this kind of transport that presents special risks in case of accident. It has been defined to read the license plate of the vehicle and the codes indicated in the ADR plate.



4. ITS Applications for NTMC

Dangerous goods tracking system

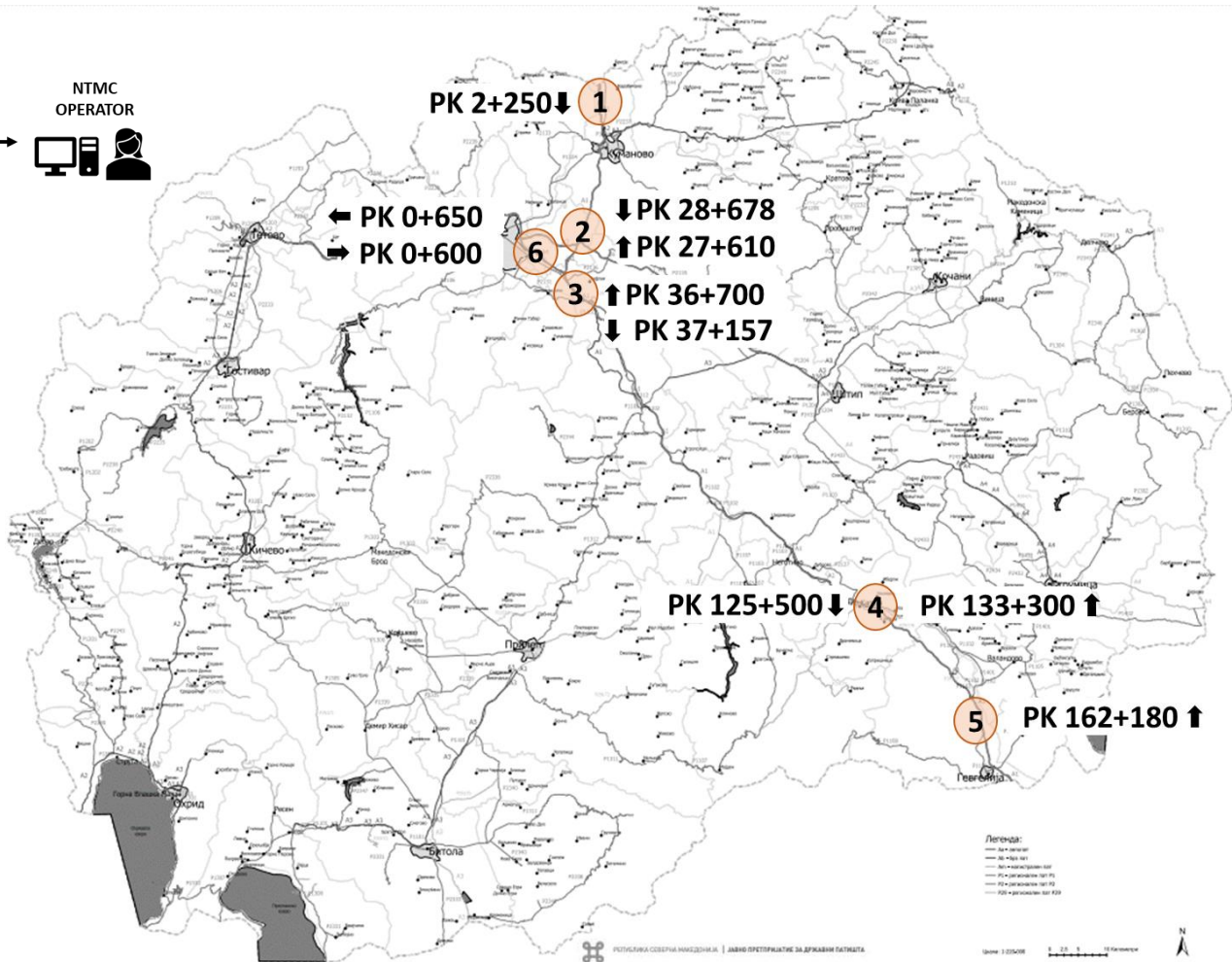




9 months



349,650.00 €



4. ITS Applications for NTMC

Recommendations for implementing ITS SCADA

PROPIETARY SOFTWARE (ONE PROVIDER)

- Lower investment
- Fast implementation
- Low level of supervision required

Specific contract for maintenance (corrective and developmental)

Use of European standards

OWN DEVELOPMENT BASED ON COMMERCIAL PLATFORM WITH MULTIPLE PROVIDERS



- Multiple providers
- Integration and competence is ensured
- Previous experiences to avoid dependency
- National expertise as to other businesses

- Higher investment
- Required time for sw development
- Required supervision for successful implementation



Thanks

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