Deliverable 6.2.2: Demonstrating and evidencing the added value of Traffic Management 2.0 featuring new services dedicated to the optimisation of transport and logistics processes.

Case study: Italian pilot site

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ABBREVIATIONS

Acronym	Description
AI	Artificial Intelligence
API	Application Programming Interface
GA	Grant Agreement
ICT	Information and Communication Technologies
ITS	Intelligent Transportation Systems
JSON	JavaScript Object Notation
LoS	Level of Service
REST	Representational State Transfer
RTTI	Real Time Traffic Information
TM	Traffic Management
TM2.0	Traffic Management 2.0
TMP	Traffic Management Plans
TMS	Traffic Management System
V2X	Vehicle To Anything
VMS	Virtual Message Signs
XML	Extended Mark-up Language

CONTRACTUAL REFERENCES

FENIX stands for “A European **FE**derated **N**etwork of **I**nformation e**X**change in Logistics”. FENIX is an action 2018-EU-TM-0077-S under the Grant Agreement number INEA/CEF/TRAN/M2018/1793401 and the project duration is 36 months, effective from 01 April 2019 until 31 March 2022. It is a contract with the Innovation and Networks Executive Agency (INEA) under the powers delegated by the European Commission.

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1. INTRODUCTION

1.1 Purpose of the document

The work performed in task A6.2 aims at implementing measures for the reduction of congestion, increase of safety and improvement of the service offered by the FENIX network. FENIX network aims at integrating logistics operations and good transportation with the objective of:

- improving information and data sharing in a cross-domain urban/interurban environment;
- improving cross-border and multimodal cooperation;
- fostering interoperability.

As stated during the FENIX GA, the A6.2 deliverable will be completed in two phases: a first one dedicated to the specification of the TM2.0 services in FENIX and a second phase dedicated to the implementation, deployment and impact validation for deployed services. The first phase (D6.2.1, D6.2.2 and D6.2.3) starts with the identification of scenarios for coordination of multimodal traffic management (TM) plans at cross-border and urban/interurban integration. This will allow the definition of measures to minimise perceived discontinuity in quality of information for traffic management services and the identification of needs for data exchange due to envisaged measures for a) tactical (short-term, travel and congestion times etc.) and b) for long-term travel information (events forecast) for each stakeholder. Based on this, in the conclusion of the first phase, the requirements for implementation will be defined and the specification of the solution will be released (D6.2.4 and D6.2.5).

The present document is the second one of the overall process for A6.2 and contains a detailed description of the business environment (in terms of stakeholders and physical/digital infrastructure) and a description of the TM2.0 concept, along with its application for the optimisation of transport and logistic processes, with a specific focus on the specification for the Trieste Pilot. Last but not least, part of the work in this document is focussed on the impact assessment of the TM2.0 services through the definition of KPIs.

The document starts by introducing the Digital and Physical Infrastructure in Chapter 3, followed by the description of TM2.0 and its relative integration in FENIX in Chapter 4 along with the proposed implementation and demonstration at Trieste Pilot in Chapter 5. Information on the expected impact of TM2.0 services is contained in Chapter 6, followed by overall conclusions.

1.2 Connection to other deliverables

The graph below shows the interconnection of deliverable A6.2 with the work contained within various deliverables. There is also an interconnection with other activities in WP6, as well as with the Pilot Activities in the Port of Trieste, to be developed in WP4. Deliverable 6.2.2, along with deliverable 6.2.1, which describes the scenarios where ITS can support the optimisation of logistics operations, forms the basis for the definition of the Data model and System requirements.

Inputs from other deliverables:

- Use case 5 description from Trieste Pilot description (D2.2.1);
- High level scenario descriptions (D6.2.1).

Outputs to other deliverables:

- Services description to be considered when defining the data model (D6.2.3);
- Services description to be considered when identifying System requirements (D6.2.4).

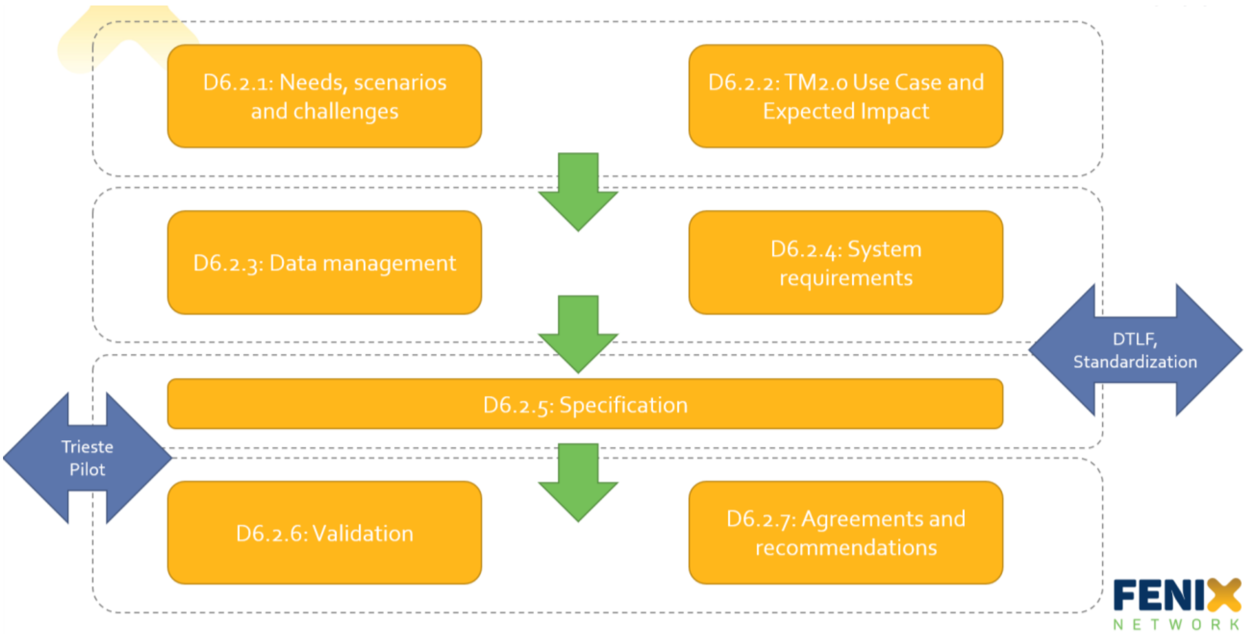

Figure 1 Interaction of subtasks in Activity A6.2

1.3 Methodology

The process shown in the graph below explains the work and process performed in this deliverable.

1. A first phase was dedicated to a brief analysis of the meaning of Smart Infrastructure and its use for stakeholders.
2. This is mainly a follow-up on previous work developed within the context of the TM2.0 environment, considering the FENIX context.
3. The second phase was dedicated to the presentation of TM2.0 and its relative integration in FENIX as an implementation of collaboration.
4. Based on the previous points, the extension of UC5 from the Trieste Pilot Site has been performed.
5. Last but not least, indications on the expected impacts and the way to measure this impact are presented.

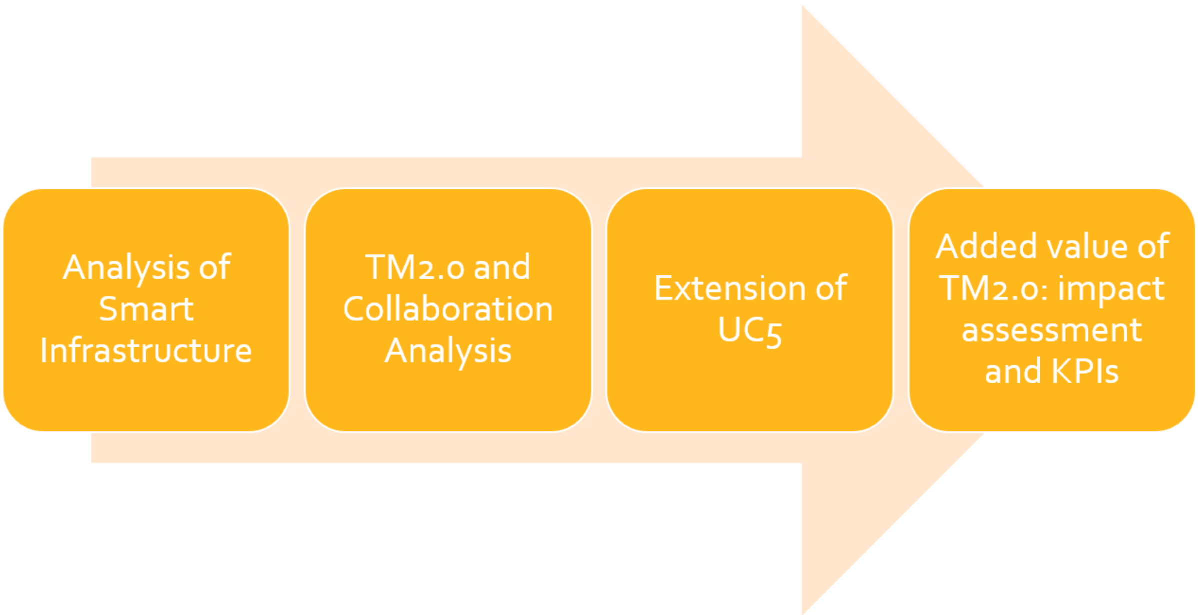

Figure 2 Methodology for D6.2.2

2. EXECUTIVE SUMMARY

Nowadays the only way truck drivers can get information on port traffic, bridge use, and parking is through the message boards posted throughout the port. Outside the port area, the truck drivers have very limited access to information, even with the advent of mobile devices. Standard traffic apps and internet searches cannot provide real-time details of what is happening inside the port. There is a lack of sharing management or optimization schemes between logistic hubs operators and road operators/users. Many trucks make multiple stops at the port and at various destination cities in Europe to load and unload. The increasing truck traffic in the vicinity of the terminal gates have an impact not only in terms of congestion in the vicinity of the terminal but also on the surrounding roadway network. This causes congestion problems and reduces not only the terminal/port performance, but also affects the shipper’s efficiency. In addition, the use of innovative, IT-based traffic information systems and an integrated port traffic control centre will facilitate improved traffic flows and optimum usage of the port routes. There is an opportunity, based on collaboration at both vertical and horizontal level, to use a port-wide traffic management system that constantly records, processes and distributes transport and traffic information to all interested parties including service and content providers and truck drivers.

The present document addresses this opportunity and contains a detailed description of the business environment (in terms of stakeholders and physical/digital infrastructure) and a description of the TM2.0 concept, along with its application for the optimisation of transport and logistic processes with focus on the specifications for the Trieste Pilot. Last but not least, the work ends focussing on the impact assessment of the TM2.0 services through the definition of KPIs.

3. DIGITAL AND PHYSICAL INFRASTRUCTURE IN FREIGHT AND LOGISTICS

3.1 Stakeholders

As identified in D6.2.1 the stakeholders involved in the transport of goods value chain are:

- shipping lines: companies that transport cargo on board of ships; nowadays, with more cooperation among shipping lines, a reduction in terms of logistics costs can be registered, as well as a significant reduction in fuel consumption and pollutant emissions (1);
- shipping agents: licensed agents in a port who transact a ship's business, such as insurance or documentation, for the owner;
- freight forwarders: companies that receive and ship goods on behalf of other companies; the freight forwarder coordinates whether to ship a consignment by road, rail or by sea;
- logistic operators: companies that manage trucks to pick up freight, and own track, rail cars and locomotives to move freight across long distances on land. They own and operate aircraft or ships to move large cargoes through the air and across the ocean, to other continents.
- custom agents: parties authorised by international customs authorities to certify and manage consignments between countries on behalf of shippers;
- airport terminal operators: companies that are responsible for the carriage or the arrangement of cargo, including the discharge of cargo from the aircraft and subsequent distribution; terminal operators undertake a wide range of activities;
- road transport operators: companies responsible for the management of road transport infrastructure and operations;
- rail/River transport operators: companies responsible for the management of rail/river infrastructure and operations;
- shippers: companies that transport or receive goods by sea, land, or air.

3.2 Physical infrastructure

All stakeholders indicated in the previous section are dependent on the infrastructure in order to perform their core function along the freight transport value chain. The physical infrastructure in freight and logistics is not only represented by the road or rail vehicles travel on and it also consists of roads, tunnels, ports, warehouses, terminals and similar asset-based facilities.

Figure 3 Port of Trieste

3.3 Digital infrastructure

Nowadays, smart systems and IT solutions support the physical infrastructure in overcoming its suboptimal use. Towards this physical smart infrastructure, smart vehicles can benefit of a two-way information flow through the ICT systems that are part of the digital infrastructure. This way the vehicle is potentially connected at all times, providing and receiving real time information as needed from the ITS application.

The digital infrastructure can be defined as the ability to store, exchange and elaborate data, exchanging information through a shared communication system.

3.4 Smart infrastructure

Smart Infrastructure is therefore the combination of two parts: digital infrastructure and physical infrastructure. It is important to distinguish between these two, as they have different characteristics. The smart digital infrastructure retrieves, manipulates, stores, processes and communicates data, as well as information from the physical infrastructure to and from the smart vehicles, using different digital technologies such as sensors, cameras, databases, and positioning technologies. The smart infrastructure enables information exchange about the goods, vehicles and infrastructure to be transmitted between participants in order to reach efficiency at all levels of the value chain.

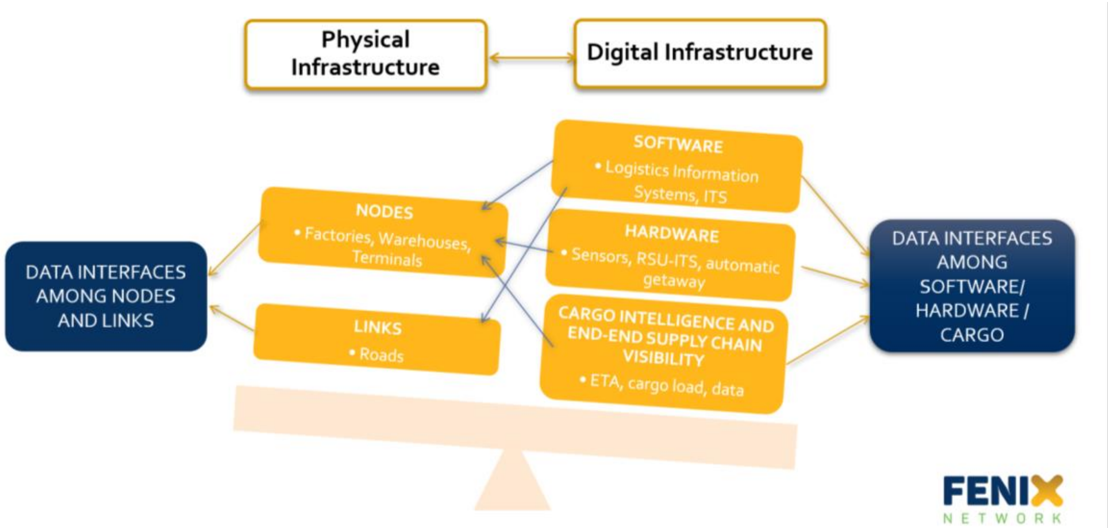

Figure 4 Interaction among Physical and Digital Infrastructure as defined in TM2.0

4. TRAFFIC MANAGEMENT 2.0 AND FREIGHT

4.1 Collaboration among stakeholders

With regards to road freight transport, the role of stakeholders along the value chain is in a continuous evolution with the era of big data and connectivity. In the following paragraphs, the evolution of the stakeholders and the interaction among them is described according to the vision of TM2.0 (1).

The TM2.0 concept is based on collaboration, an important element for increasing efficiency across the value chain. Collaboration, intended as both vertical (data sharing and collaboration schemes across the various levels of the value chain), and horizontal (standardisation of processes and of data structures supporting interoperability at all levels), is gaining importance in logistics. Companies, in fact, have to react to intense competition and public and government pressure that requires them to reduce their effect on the environment. Collaboration can be the success factor to achieve long-term competitive advantages in the market, and in order to be able to implement and manage these collaboration schemes, interoperability is a mandatory requirement.

For example, on the private entity side, several stakeholders can provide traffic management data from their services and/or can benefit from using data as provided by public entities. Below, some of the entities are explained by describing general service characteristics, their business case and the possible benefits that could be reaped by being involved in traffic management data exchange.

Content service providers are considered at the moment the most dominant private parties involved in traffic management data exchange. Content service providers (especially the ones with higher numbers of active users) have a broad and real-time data source available to monitor the status of the road infrastructure. In addition, they can even know where traffic is to be expected, given the number of trips that are pre-planned. Currently, these service providers offer their routing advice based on a combination of their own monitoring data and the use of publicly provided open data on travel times, congestions, roadwork, etc. Their business case is two folded. It can be a business-to-consumer case based on paying customers (e.g. TomTom and Garmin) expecting the best navigation advices and being willing to pay for either the navigation box, or a subscription to the service. It can also be business-to-business case based on retrieving valuable information for businesses from community data (e.g. Google Maps).

A complicating issue for **service providers** is the multitude of traffic management centres and infrastructure operators, on which road infrastructure providers rely to offer their services. Most highway agencies have several traffic management centres. This means that within one region there can be different and combined traffic management centres: from the highways agency, from the regional department or one or two from the main cities. In-car service providers have to retrieve the TMP from all these traffic management centres and incorporate the full set in their route guidance. Content service providers have to retrieve (if possible open and streaming) traffic data from all these traffic management centres. An emerging group is the roadside service providers. Road infrastructure providers can outsource their traffic management activities to these service providers. The other way around, road side service providers deliver their services to a multitude of road infrastructure providers. Last but not least, there are the service users, in this case the truck drivers.

As for the **road infrastructure providers**, a distinction is made between public entities (Traffic and Transport authorities and administrations) and private road operators. In the same region public entities and possible private road operators (e.g. a toll tunnel or toll road) are involved in several forms and on several levels (with corresponding policies). The complexity of traffic management in a region is given by the adoption of a different approach. On one hand, the entire road infrastructure provides one road network, which is used by road users to travel from origin to destination; on the other hand, however, every entity by itself has its own issues to manage. For instance, traffic management operations for a motorway operator consist in ensuring a smooth and safe traffic flow over the motorway 'pipelines'. For urban road infrastructure providers this operation consists (in addition) in balancing flows of motor cars, trucks over the same streets and intersections in the city centre. For inter-urban road infrastructure providers, this will entail the link to the hinterland transport, such as ports.

For a **port operator** the main objectives are to optimise port accessibility and to increase safety. For this purpose, for instance, efficient traffic management measure must be used to separate local traffic from truck traffic.

At the moment truck drivers receive the information on port traffic, bridge use and parking through the message boards posted throughout the port. Due to the lack of sharing schemes between the logistic hubs operators and the road users, truck drivers have very limited access to information outside the port area, even despite the advent of mobile devices. At the same time, increasing truck traffic in the vicinity of the terminal gates can have an impact not only in terms of congestion in that area, but can compromise the surrounding roadway networks. This can cause congestion, reduce the terminal/port performance and therefore affect shippers. In addition, the use of innovative, IT-based traffic information systems and an integrated port traffic control centre will ensure improved traffic flows and optimum usage of the port routes.

Incoming truck traffic has no specific time slot management, therefore “unplanned” parking is an inevitable negative side effect around the airport or port to arrive to the customs gate. For an infrastructure operator, “unplanned” parking outside the port area is a black box, providing insufficient transparency about parking situation (location, duration, peak hours) and therefore disturbing the daily operations. A truck driver makes long-distance trips, moving cargo from an origin to a logistics destination, such as the (air)port logistics hub. The fleet operator is managing the fleet in real-time and information on the access to the parking area is available on the truck route, offering the driver the best place to rest or wait before arriving to the hub. Based on adequate sample fleets, GPS data from smart phones or fleet management systems can monitor standstill, travel time and time losses related to trucks waiting for the required customs clearance. Such data can be used to set-up a dynamic park guidance and slot booking system for future developments along with improved management of rest times required for truck drivers. ICT is not available in all dry-ports. In fact, some of them use an access system based on a paper ticket given to the truck driver at the moment of entering the parking area. The same ticket is used for a manual payment at the checkout. In specific, no access monitoring and control is performed, as no related electronic payment systems are available. Dry-port managers can have interest in installing new monitoring systems, linked to ICT platforms able to provide new services such as electronic payment.

4.2 TM2.0 Overview

The TM2.0 platform (2) was launched in 2011 by SWARCO and TomTom and formally established in 2014 under the ERTICO umbrella of activities. It now comprises 40 members from all ITS sectors (from public authorities to service providers) to focus on new solutions for advanced interactive traffic management. The concept of TM2.0 is based on real time collaboration between the Traffic Management Centres (TMCs) and Mobility Service Providers (MSPs), in order to connect the public policy objectives of sustainability, cost efficiency and reduced congestion. The TM2.0 Platform intends to promote common interfaces, principles and business models that can facilitate the exchange of data and information between all road users and TMCs, developing the total value chain

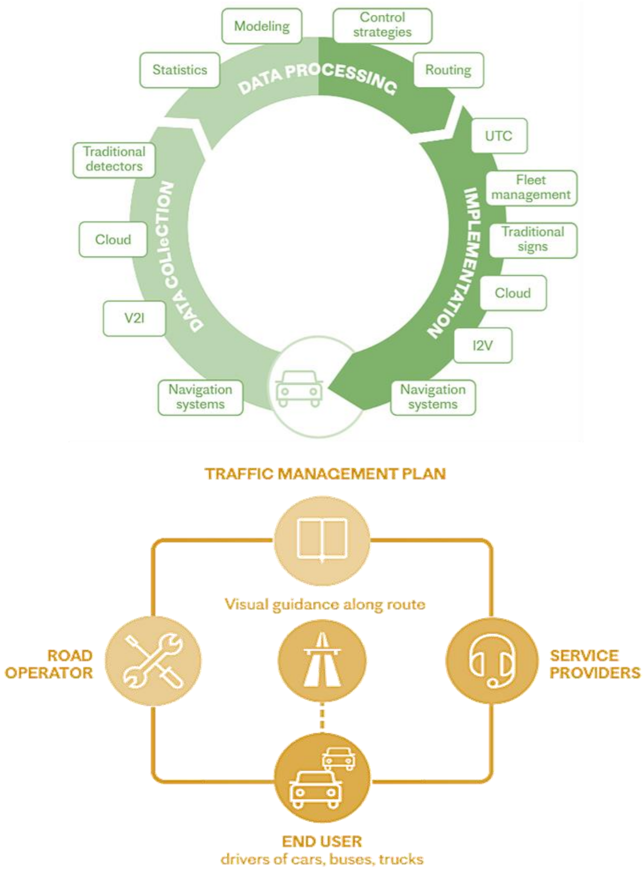

Figure 5 TM2.0 concept representation

for cohesive management and traffic services, as well as avoiding conflicting guidance information of the vehicles on the road.

TM2.0 aims to improve the interactive traffic management. TM 2.0 services are defined as the ones making use and benefiting from the interaction between the vehicle and traffic management systems, with the objective of supporting end users in their individual travel and driving choices while being aware of the collective traffic management context. These services provide a basis for the identification of involved actors, data and value exchange, which can lead to the identification of supporting business models.

4.3 Integration of TM2.0 in FENIX

The main focus of task A6.2, through the integration of TM2.0 concept in FENIX, is to build seamless traffic management services aimed at optimising multi-modal logistics operations inside and outside the port area, as well as on the connected cross-border corridor and in the interurban-urban environments, making references to the scenarios described in A6.2.1. This can be achieved through the implementation of adequate data sharing mechanisms among the involved actors (Road operators, Logistics operators, Hub operators). The deployed services have the purpose to optimise logistics operations. Traditional traffic management does not represent the object of this task.

In order to reach the above-mentioned goal, the integration of the TM2.0 concept is addressed in the FENIX project through three clusters of services to be deployed in the Trieste Pilot site: the pre-trip, on-trip and post-trip cluster.

1. Pre-trip cluster

Pre-trip cluster services are to provide forecast data to the FENIX platform. The TM2.0 Service Centre should provide forecasts and recommendations to operators. The recommendations are triggered by a scenario based on (?) forecasted conditions/incidents, on a specific path, corridor or area, and have clear objectives: reduced travel times, reduced waiting times and accurate ETA prediction. The traffic parameters used (for example, speed on path or incident in an area) and the parameter threshold values used for the scenario both result from the decision of the TM2.0 Services Centre.

This cluster of services has an impact on the delivery planning. The scenario and strategies definition are also part of this cluster service.

2. On-trip cluster

The On-trip cluster will provide real-time services to the FENIX platform. The TM2.0 Services Centre should provide traffic information, V2X services and traffic management strategies to operators; the recommendations are triggered by a scenario based on real time conditions/incidents data this time, on a specific path, corridor or area.

Collaborative traffic management schemes are part of this cluster: TM2.0 integrates the user (e.g. the truck driver) in the traffic management loop, making it therefore mandatory to have a two way communication implemented.

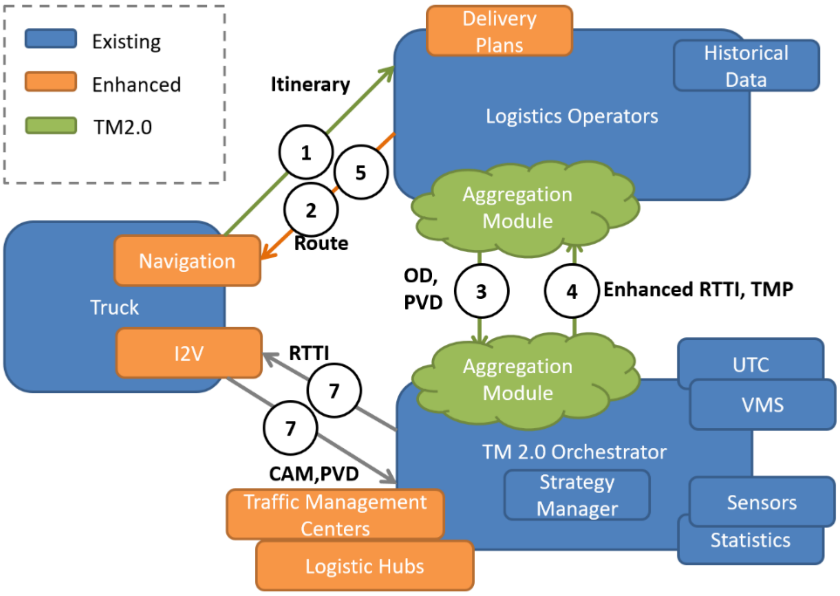

Figure 6 Example of TM2.0 on-trip use-case

3. Post-trip cluster

The Post-trip cluster will provide assessment and monitoring tools to the FENIX platform to be able to track impact-KPIs and perform the analysis of the benefits of TM2.0 services. It will provide also analysis on the degree of collaboration among the actors and perform other types of analysis, such as the analysis of driving patterns/eco-behaviour of drivers.

5. DEMONSTRATION OF TM2.0

5.1 Trieste Pilot

As described in D2.1.1, the Trieste Pilot Site will operate as a Living Lab, with all the Implementing Bodies collaborating in a systematic co-creation approach and integrated innovation and research process. These concepts are organically integrated in real use cases that involve all relevant stakeholders and their needs. The Living Lab covers all the phases of the FENIX project, from the research and development to its implementation and validation.

Specifically, Trieste is a cosmopolitan city of 207,800 inhabitants and is the capital of the autonomous region Friuli-Venezia Giulia, a north-eastern Italian region of about 1.2 million inhabitants.

Trieste is one of the main Italian Ports, positioned into two TEN-T EU corridors:

- the Mediterranean corridor;
- the Baltic-Adriatic corridor.

The following important logistics assets are located in this area: the Motorway of the Sea of south-east Europe and the Port of the Silk Road. It is important to underline the strategic cross border issues: Slovenia 10 km, Croatia 50 km, Austria 100 km.

5.2 Use case description

The reference use-case for the implementation of TM2.0 services is the UC5(b), as described in deliverable D2.1.1.

Use case	**UC5b – SWARCO**
Title	**TM2.0 for multimodality across the TEN-T corridors**

Description	Collaborative TM services for integrated port-road traffic management for the optimization of freight transport.
Contributors	AUTOVIE, DBALab.
Partner role	The role of SWARCO is to provide a C-ITS-S (Central ITS Station) integrated with the legacy systems and integrated in the FENIX Federated platform for the provision of collaborative services, through implementing the TM2.0 concept based on V2X technologies, including a Strategy Manager component for traffic management optimization, online Dashboard that constantly monitors the system performances.
Goal of the use case	To implement collaborative schemes among the infrastructure operators, service providers and freight fleet managers to optimize operations and traffic conditions around port area.
Actors	Road Authority (AUTOVIE, DBAlab).
Phase (optional)	Approaching to the port area on the targeted corridor.
Preconditions (optional)	The truck driver shall be qualified. The truck driver shall use a mobile app integrating the V2X services (optionally the app can be provided by SWARCO), or an OBU (On Board Unit ?).
Main Flow	1. The truck enters the ITS-equipped area; 2. The driver starts the mobile app; 3. The C-ITS-S periodically receives localisation information from the truck side; 4. C-ITS-S connects to the legacy systems and constantly receives infrastructure data (static and dynamic); 5. The Strategy Manager (i.e. a tool for Strategic Traffic Management) elaborates the optimal traffic management strategies in the controlled area (to be defined); 6. C-ITS-S broadcasts, through V2X channel, (cellular) information about events, Level of Service, driving advices, parking information, traffic

	management strategies; 7. The Road Authority receives constantly traffic information (data) derived from the elaboration of aggregated data originating from the vehicles; 8. All information related to monitored systems and performance of the services is available through an on-line dashboard.

5.3 TM2.0 services

TM2.0 services will be deployed through the implementation of a TM2.0 Services Centre within the context of UC5(b) of the Trieste Pilot. The TM2.0 Services Centre will be API based and is a component of the OMNIA Platform.

According to the previous description in section 4.3, the TM2.0 services will support operations in three phases: Pre-trip, On-trip and Post-trip.

Below, TM2.0 services are indicated for all these three clusters.

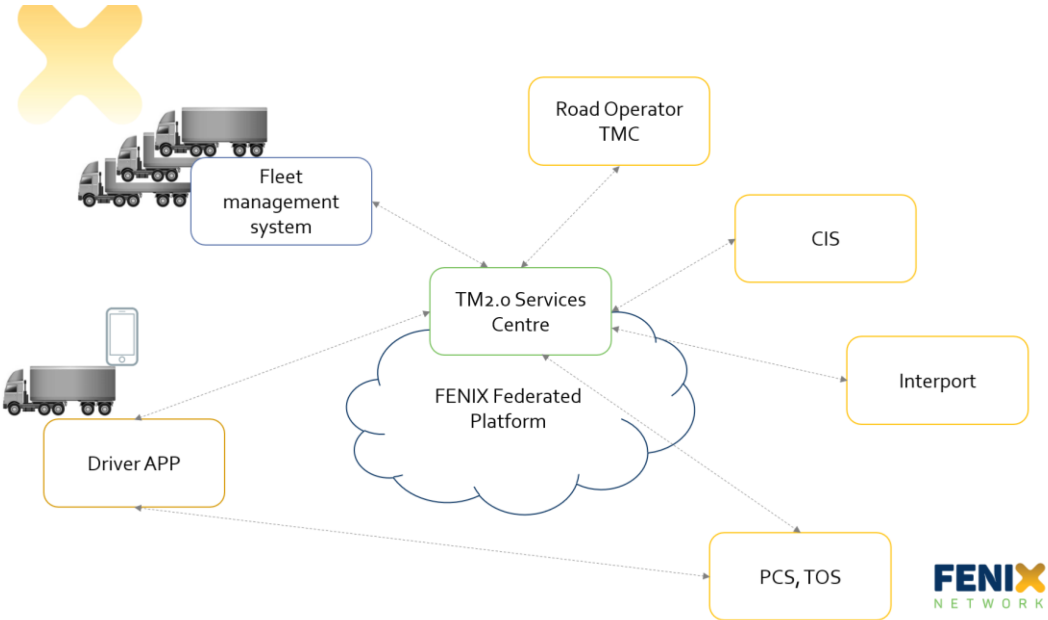

Figure 7 High level functional architecture for the deployment of TM2.0 in Trieste

5.3.1 Pre-trip cluster

Service ID	Name	Description
5b.1.1	Traffic Information Forecast	This use case is about forecasting the traffic state, by using data fusion techniques and machine learning models for real time traffic volume estimation and traffic volume prediction on highways and urban areas. The goal is to go towards data driven traffic management and reduce infrastructure costs.
5b.1.2	Traffic Management Plans	Traffic management plans triggered by traffic operators are not automatically shared with the other mobility stakeholders, leading to uncoordinated and conflicting decision making. The goal is to establish a scheme for sharing traffic management plans as supporting the planning of trips.

5.3.2 On-trip cluster

Service ID	Name	Description
5b.2.1	Travel Time Information	This use case is about having real time information available for the traffic state, by using data fusion techniques. The goal is to go towards data driven traffic management and reduce road infrastructure costs.
5b.2.2	Traffic Events Information	This use case is about having real time information available for the traffic events, by using data fusion techniques. The goal is to go towards data driven traffic management and reduce infrastructure costs.
5b.2.3	Traffic Management	Traffic management strategies (i.e. traffic

	Strategies (Virtual VMS Positions)	management measures determined by predefined scenarios, that are being actuated through all available channels, in a harmonised way) triggered by traffic operators are not automatically shared to the other mobility stakeholders, leading to uncoordinated actions. The goal is to establish and share those points on the network that are critical for decision making.
5b.2.4	Traffic Management Strategies (Virtual VMS Information)	Traffic management strategies triggered by traffic operators are not automatically shared to the other mobility stakeholders, leading to uncoordinated actions. The goal is to share traffic management strategies between stakeholders.
5b.2.5	V2X services	Services need to be available coherently through all available channels. The goal here is to share all traffic information by using the V2X infrastructure developed following the C-Roads specification.
5b.2.6	FCD Aggregation (from the mobile app)	Probe Vehicle Data coming from the logistics fleets can be integrated as new data sources for a more precise estimation. The goal is to integrate Probe Vehicle Data (i.e.) for enhancing the traffic information services.
5b.2.7	Multi-modal Route Advice (through a mobile app)	Goods transported by trucks and vessels in the port area need to benefit from a smooth and efficient intermodal exchange. The goal is to provide guidance and enable data exchange within the port area for smooth operations management.
5b2.8	Buffer zone management	Based on accurate forecasts, multi-modal information and V2X technologies, parking/buffering spaces can be managed in the most efficient way. The goal is to reduce queues and waiting times at the entrance of the port terminal.

5.3.3 Post-trip cluster

Service ID	Name	Description
5b.3.1	Services Availability Dashboard	It is important to be able to monitor the availability and faults of the systems in real-time. The goal is to reduce the mean time to failure.
5b.3.2	Services Performance Dashboard	KPIs for the level of the readiness of management systems, in terms of collaborative multimodal network optimisation are needed to quantify the impact of the services. The goal is to have a real-time dashboard monitoring all provided services.

6. EVIDENCE OF TM2.0 ADDED VALUE

6.1 Expected impact

The challenge of this deliverable is to demonstrate, through the implementation of specific use cases, how the development of the TM2.0 concept in the FENIX platform will generate benefits and how the TM2.0 concept can progress from the restrictions of the car owner to multimodal operators.

6.2 Key Performance Indicators

6.2.1 Pre-trip cluster

Service ID	Name	Proposed KPIs
5b.1.1	Traffic Information Forecast	Availability of information, coverage of information.
5b.1.2	Traffic Management Plans	Availability of information, coverage of information.

6.2.2 *On-trip cluster*

Service ID	Name	Description
5b.2.1	Travel Time Information	Availability of information, Coverage of information.
5b.2.2	Traffic Events Information	Availability of information, coverage of information.
5b.2.3	Traffic Management Strategies (Virtual VMS Positions)	Availability of information, coverage of information, travel times.
5b.2.4	Traffic Management Strategies (Virtual VMS Information)	Availability of information, coverage of information, travel times.
5b.2.5	V2X services	Availability of information, coverage of information, travel times.
5b.2.6	FCD Aggregation (from the mobile app)	Availability of information, coverage of information (in terms of users), travel times.
5b.2.7	Route Advice (through the mobile app)	Collaboration index.
5b2.8	Parking Buffer zone management	Availability of information, coverage of information, waiting times.

6.2.3 *Post-trip cluster*

Service ID	Name	Description
5b.3.1	Services Availability Dashboard	Tool availability, mean time to failure.
5b.3.2	Services Performance Dashboard	Number and availability of KPIs.

7. CONCLUSION AND NEXT STEPS

The present work contains a detailed description of the business environment (in terms of stakeholders and physical/digital infrastructure) and a description of the TM2.0 concept, its application for the optimisation of transport and logistic processes, with focus on the specification for the Trieste Pilot. Last but not least, a part of the work is focussed on the impact assessment of the TM2.0 services through the definition of KPIs.

This document intends to provide a high-level description of TM2.0 services aimed at tackling the lack in sharing available interoperable and interconnected data in the supply chain (?) and logistics – this represents the main challenge of the FENIX project.

This is why a basic high level architecture has been provided (modelling the interaction among actors) as well as the basic description of the TM2.0 services, as a basis for the requirements definition that will follow in further activities in Task A6.2 (i.e. with regards to the data model in D6.2.3 and the overall system requirements in D6.2.4).

8. REFERENCES

1. The effect of cooperation among shipping lines on transport costs and pollutant emissions, E. Irannezhad, Elsevier, 2018.
2. Online reference: www.tm20.org.