

# Multidisciplinary approach and solutions to development of intermodal transport in region



## Transport Performance Strategy

WPT3	Transport performance model and Quality Management	Activity	<b>T3</b>
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## 1. Introduction

The European Commission has launched a Freight Transport Logistic Action Plan (COM(2007) 607) that is proposing a series of measures to promote the freight transport logistics, to make intermodal transportation more competitive, to create a framework which will allow European ports to attract investment for their modernization, to put maritime freight transport on an equal footing with other transport modes and to review progress made in development of sustainable mobility. Based on that plan, project MultiAPPRO combines different approaches to reach most of the goals highlighted by the EC towards the successful development of a transnational intermodal transport system in Adriatic – Ionian Region. One of MultiAPPRO approach is the development of Transport Performance Strategy to eliminate irrational and uncoordinated transport infrastructure investments, enable a simple and objective comparative analysis of the impact of planned investments at the level of the entire region and develop quality indicators in ports to satisfy the MoS concept standards.

This document presents the output T3.1 “Transport Performance Strategy” which main goal is to identify and present the developed strategy for defining the effect of any investment (infrastructure, administration, organisation) very precisely, and defining therefore the strategy and action plan for future investments in the region in the field of environment-friendly, intermodal transport. The developed Strategy within Multiappro project has a clear mission:

Transport Performance Strategy aims to promote sustainable growth of intermodal transport through defining very precisely the effects of any potential investment on any intermodal transport component with respect on intermodality, operational, financial, safety, environmental and ITS issues. The main advantage of the Strategy is that although it has been assessed only on Adriatic Ionian ports, it has been developed on entire European intermodal transport network reality.

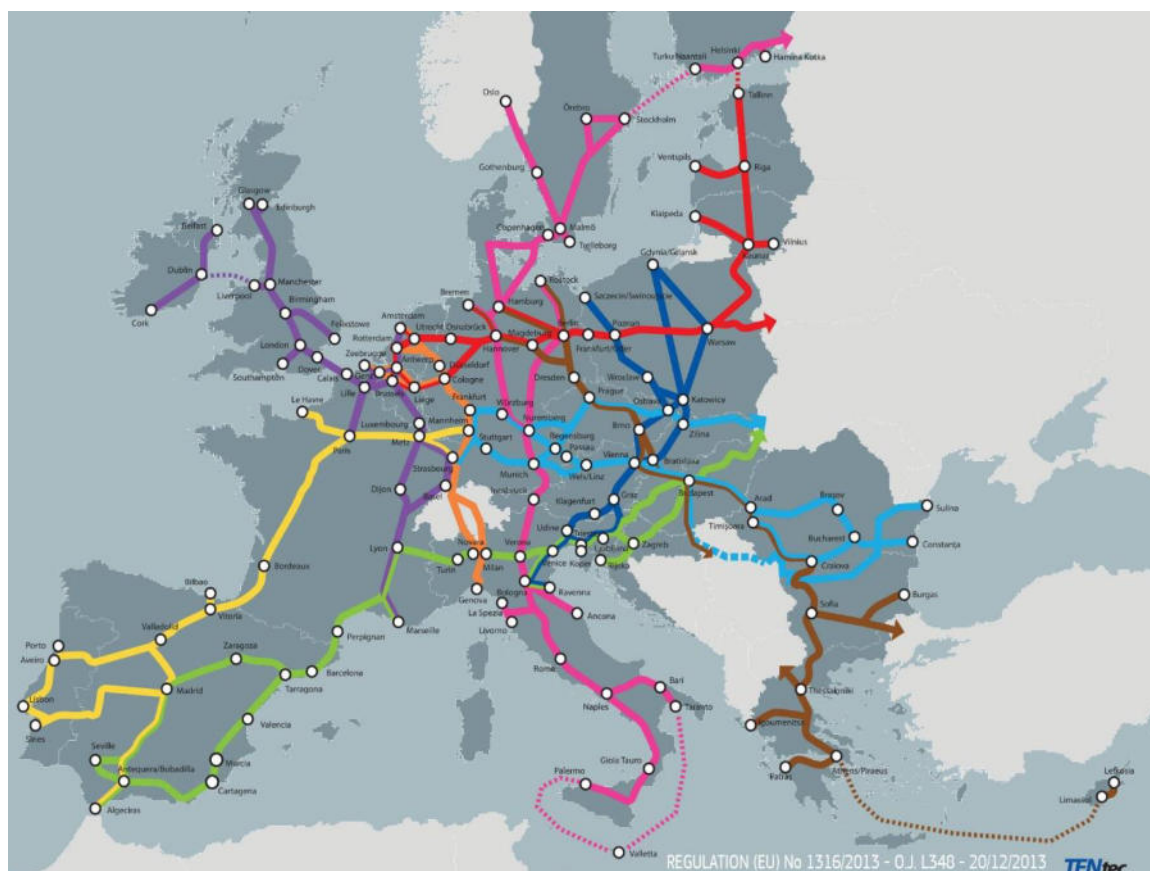
## 2. EU Intermodal Transport Network

The creation of a completed and high level European intermodal transport network is a high-priority objective of the European Union and one to which it has dedicated studies, specific legislation and considerable funds. EU has analysed and identified the significance of intermodality, interconnection and interoperability in transport sector targeting at improving the quality life of EU countries. Based on this EU priority, the Trans-European Transport Network (TEN-T) was developed and firstly adopted by EU in 1990. Since then, several changes and revisions have taken place with the last one in 2019. The Trans-European Transport Network (TEN-T) policy addresses the implementation and development of a Europe-wide network of railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad terminals. The ultimate objective is to close gaps, remove bottlenecks and technical barriers, as well as to strengthen social, economic and territorial cohesion in the EU. Besides the construction of new physical infrastructure, the TEN-T policy supports the application of innovation, new technologies and digital solutions to all modes of transport. The objective is improved use of infrastructure, reduced environmental impact of transport, enhanced energy efficiency and increased safety.

TEN-T comprises two network 'layers':

- The Core Network includes the most important connections, linking the most important nodes, and is to be completed by 2030.
- The Comprehensive Network covers all European regions and is to be completed by 2050.

The backbone of the Core Network is represented by nine Core Network Corridors (Atlantic, Baltic Adriatic, Mediterranean, North Sea – Baltic, North Sea – Mediterranean, Orient East Med, Rhine – Alpine, Rhine -Danube and Scandinavian – Mediterranean), which were identified to streamline and facilitate the coordinated development of the Core Network. Two horizontal priorities, the European Rail Traffic Management System (ERTMS) and Motorways of the Sea complement these.



Picture 2.1: Trans-European Transport Network

Numerous studies in transport geography and economics are completed every year on waterway, road, rail and air transport on national and European level for defining and analysing the bottlenecks of intermodal transport and recommend potential solutions. According to this analysis, infrastructure projects are developed towards the completion of the European transport network which will support and promote intermodality, interoperability, safety and security, innovative systems and green solutions.

Focusing on European ports and its significant role in EU supply chain, their general goal is to improve their role, through restoring/modernising existing and developing suitable port infrastructure to cater for both passenger and freight transport demand and improving services towards efficient intermodal transport system.

With supply chains becoming increasingly long and international, efficient supply chain management and logistics are prerequisites for the competitiveness of a port in the international transport and trade arena. Consequently, another key challenge lies to a significant extent in the quality and effectiveness of the port's logistic services and

transshipment capabilities. In addition, focus should be placed on the need for efficient logistic services, and investments in the creation of intermodal “interfaces”, such as logistic centres, dry ports, inland container terminals and freight villages. Intermodal transport and services have significant positive influence on two levels:

1. Effects on logistic costs for shippers
2. Effects on costs for transport operators

Therefore, ports must team up with their respective “natural” hinterlands to serve the logistics and entrepreneurial fabric of their individual countries. Technological evolution and development of ITS is also mandatory and present opportunities for significant growth advantages.

In addition to the above, Adriatic ports need to gain recognition as the key multi-port cluster of Europe, particularly along selected corridors (MoS of the Eastern Mediterranean, links with the Black Sea, Middle East, etc), in order to encourage the ships that enter the Mediterranean through the Suez Canal to sail up the Adriatic. To this end, the active participation of the countries of the Adriatic region in the development of the Trans-European, Trans-Mediterranean, and Euro-Asian transport links ought to be sought, and efforts should be directed towards integrating their national transport networks with each programme’s identified routes and corridors.

Finally, the realisation of an efficient Adriatic port transport network requires foremost political will and commitment, since transport is a strategic responsibility of Governments, which can play a major role through the implementation of transport infrastructure together with a regulatory framework within which transport services can be developed. Rules and regulations must be brought up to date for ports to benefit of conditions that will enable them to rise above their European competitors. The stakes are each country’s share of Mediterranean transshipment and a share of the European destination markets. To this end, coordinated action is required at the national level to address these significant opportunities and challenges.

### 3. European Macro-Regional Strategies

A Macroregional strategy is an integrated framework endorsed by the European Council to address common challenges faced by a defined geographical area relating countries located in the same geographical area which thereby benefit from strengthened cooperation contributing to achievement of economic, social and territorial cohesion.

EU has developed four EU macro-regional strategies which act as “umbrella” over several policies and put specific priorities and goals. The macro-regional strategies which have been adopted so far are:

1. The EU Strategy for the Baltic Sea Region
2. The EU Strategy for the Danube Region
3. The EU Strategy for the Adriatic and Ionian Region
4. The EU Strategy for the Alpine Region

All adopted macro-regional strategies are also accompanied by a rolling action plan to be regularly updated in light of new, emerging needs and changing contexts. The four macro-regional strategies concern 19 EU member-states and 8 non EU countries.

#### 3.4 Adriatic & Ionian Region Strategy

From the above Strategic Instruments, the Adriatic and Ionian Region Strategy is one of great importance to the development of the MULTIAPPRO Strategy. Focusing on transport sector, EUSAIR firstly targets at strengthening maritime safety and security and develop a competitive regional intermodal port system. Specifically, EUSAIR has put the following target until the end of 2020:

- Double the current Adriatic-Ionian market share in container traffic reaching EU
- Establish a single system for maritime traffic surveillance through a unique window and common data exchange
- Increase the traffic of clean Ro-Ro, ferries, short-sea shipping and cruise ships and yachts by 20%

Secondly, EUSAIR targets at developing reliable transport networks and intermodal connections with the hinterland, both for freight and passengers. Specifically, EUSAIR has put the following target until the end of 2020:

- Agree on a master plan for coastal road traffic

- Double cross-region regular container train connections
- Reduce the time spent at regional border crossings by 50%

On a horizontal level, EUSAIR promotes environmental sustainability in transport sector (both land and maritime transport) putting as priority the introduction of alternative fuels with the aim to reduce the transport emissions.

MULTIAPPRO has been designed and developed within the principles of EUSAIR Strategy in order to enhance connectivity in the Region with the increase of service level of intermodal transport system and contributes into the reduction of transport emissions with supporting “green” future investments.



## 4. MultiAppro Transport Performance Strategy

### 4.1 The vision and the goals of the Strategy

The MULTIAPPRO transnational Strategy is developed focusing on the future investment of intermodal transport network. The main goal of the Strategy is to deal with current bottlenecks of transport networks, analyse future needs and identify future technologies towards the designation and development of the most suitable and low risk projects (mainly infrastructure projects.) that can optimize transport flows and intermodality as a concept and as a practice. MULTIAPPRO Strategy aims to be transformed into a powerful tool for transport stakeholders for assessing future investments with more accuracy and with respect to policies and regulations in force. MULTIAPPRO Strategy has been designed to act as the first step evaluating current transport systems and potential infrastructural and operational transport investments towards optimized solutions ensuring seamless transport of goods and passengers.

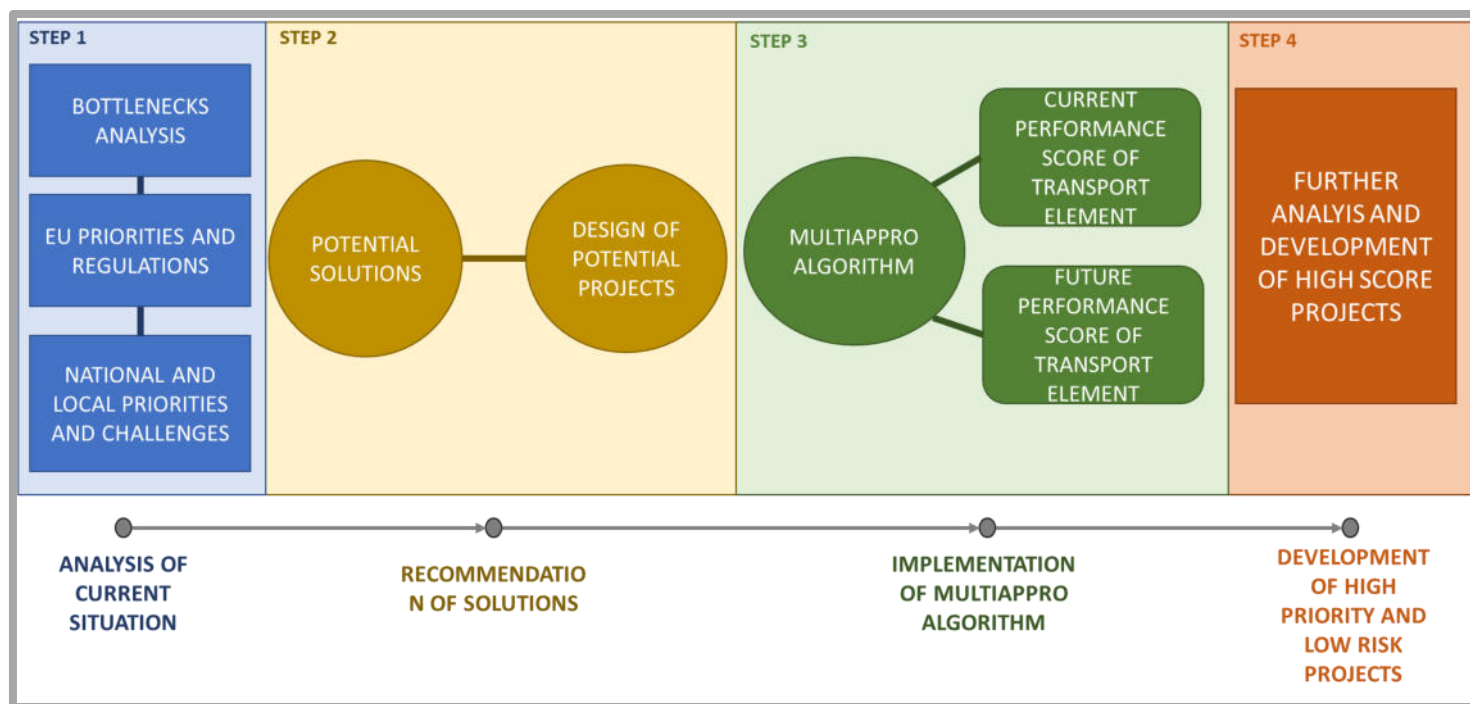
The vision of MULTIAPPRO Strategy is to contribute to the elimination of pointless high-risk development projects of the transport network which lead to waste of money and time often failing to achieve the final goal. The implementation of MULTIAPPRO Strategy will allow the designation of short term and long-term actions of transport stakeholders.

### 4.2 Methodology

The development of MULTIAPPRO Transnational Strategy is based on the key fundamental pillar of “Transport Sustainability”. This term includes various aspects which should be fulfilled for achieving sustainable transport conditions with respect on environment and human. The developed strategy follows a specific and common methodology evaluating numerous elements of transport intermodal transport network mainly focusing on:

- Current situation
- Future needs
- Policies and Regulations
- Available and future technologies
- Future Investments

The methodology of the MULTIAPPRO Strategy is divided into four (4) steps beginning from time=0 and ending on time=T (further assessment of potential investment). Below, the picture presents the methodology of MULTIAPPRO Strategy.



Picture 4.1: Methodology of MULTIAPPRO Transport Performance Strategy

#### 4.2.1 Analysis of current situation

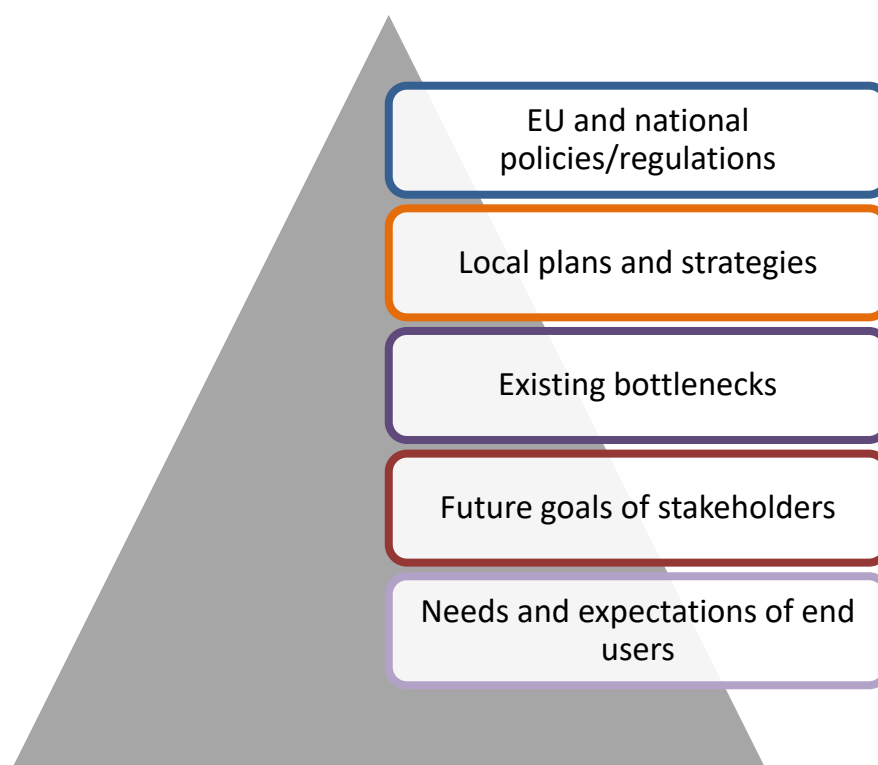
The first step of the Strategy’s methodology includes the analysis of current situation of transport system. It is clear that the transport system is complex as it serves various needs and priorities and consists of more than one component. The four core components are:

- **Modes.** They represent the conveyances, mostly taking the form of vehicles that are used to support the mobility of passengers or freight. Some modes are designed to carry only passengers or freight, while others can carry both. Regarding, maritime transport, ships are the most preferable mode for huge number of freight and passengers due to their big capacity.
- **Infrastructures.** The physical support of transport modes, where routes (e.g. rail tracks, canals or highways) and terminals (e.g. ports or airports) are the

most significant components. Infrastructures also include superstructures which are movable assets that usually have a shorter lifespan.

- Networks. A system of linked locations that are used to represent the functional and spatial organization of transportation. This system indicates which locations are connected and how they are serviced. Within a network some locations are more accessible (more connections) than others (less connections).
- Flows. Movements of people, freight and information over their respective networks. Flows have origins, intermediary locations and destinations. An intermediary location is often required to go from an origin to a destination.

The above-mentioned components, directly interdependent and vulnerable to any variation inter alia, should be treated as an entity and developed/transformed based on common strategic aspects:



Picture 4.2: Main pillars of current situation's analysis

- EU and national policies and regulations  
EU regulations put the framework and priorities for the development of EU intermodal transport network so that it will fulfill the needs and expectation of end users with respect on environment and human. National policies of European countries adopt EU regulations and put in force the national framework for transport system's development and operation.
- Local plans and strategies  
Local plans and strategies are developed for serving the needs of local communities. They are developed in line with the goals of EU and national policies and regulations, but they include more detailed actions towards the local sustainable development.
- Existing bottlenecks  
The identification of existing bottlenecks is a very important action towards the development of any sector as it describes in detail the day to day operation of a system taking into consideration all existed problems and obstacles which influence its successful operation. The detailed identification and analysis of existing bottlenecks could be a very important tool for the development of any Action Plan and Strategy.
- Future goals of stakeholders  
Stakeholders are important part of transport system as they are responsible for the development and operation of it. Stakeholders have specific goals and expectation of the transport system's operation and they develop relevant action plan for achieving them. The identification of their future goals should be taken seriously into consideration as they have the daily experience and the knowledge of how a transport system works and which are its requirements. To this category, scientific experts could play also important role into the identification of future needs and goals of transport system.
- Future needs and expectations of end users  
The identification of needs and expectation of end users complete the analysis of current conditions of transport system. End users of transport system, either they use it every day or at regular times, have specific needs and expectations mainly linked with level of service and environmental impacts. The expectations of end users are taken into consideration in any strategy of any

sector in case that the developing strategy wants to have a more social profile and be competitive.

#### **4.2.2 Recommendation of solutions**

The results of the first step of MULTIAPPRO Strategy's methodology leads to the implementation of the second step which reflects the first identification and designation of potential investments which can fulfill the needs and gaps concluded from the analysis and assessment of the current conditions of transport system. For this step of the methodology, it is crucial the existence of good knowledge or the already conduction of research about existing best practices and available tools and technologies for the designation of necessary future investments. People, who are responsible for the implementation of the Strategy, should combine the results of the analysis and the assessment of current situation of transport system with potential solutions towards the selection and the designation of potential investments. The selected investments should be described in detail according to a specific set of KPIs, which has been identified within MULTIAPPRO algorithm and will be described in the next step of the methodology.

#### **4.2.3 Implementation of MULTIAPPRO algorithm**

In this step of Strategy, an algorithm has been developed within MULTIAPPRO project for supporting the implementation of the Strategy vision through quantifying the outcomes of the potential investments towards the selection of the investments with the higher score. For the development of the algorithm, a set of KPIs has been identified by MULTIAPPRO consortium after an extensive literature review on previous applications of indicators on transport sector. The selected KPIs detect all elements of transport sector such technological, operational, environmental and financial which influence the performance of the logistic chains. The picture below shows the categories of the selected KPIs.



*Picture 4.3: The categories of the selected KPIs*

The selected KPIs were the basic input for the proposed algorithm, imported as numerical & logical variables depending on their characteristics. The algorithm is developed to identify the performance level of the system at present and evaluates the feasibility and viability of future transport investments using the KPIs to validate the outputs. In order to achieve that, the algorithm calculates the Total Transport Performance Score. The calculation is based on two scenarios clearly defined in sections, with the first focusing on the identification of system's overall performance at present whereas the second evaluates the investment and its impact on the overall system performance and the entire transport chain. The Total Transport Performance Score calculations include all identified KPIs, categorized in sectoral groups. The developed Algorithm is programmed to be adaptive to all transport investment projects and the quality/quantity of information provided for the selected KPIs. Algorithm structure is set to ask the user for the input value or the exclusion of each KPI individually. The transport system under consideration and the possible investment are evaluated based on the same KPIs with the exception of the financial part where investment particular variables have to be considered. The weight of each KPI remains constant between calculations.

#### **4.2.4 Development of high priority and low risk projects**

The final step of the MULTIAPPRO Performance Strategy is the assessment of the algorithm's results and the designation of the next actions towards the development of the potential. After the implementation of Strategy's algorithm, the received scores for the performance of the potential investment are compared with the performance scores of another investment or/and with the performance scores of the current

situation for concluding if the under-investigation investment is of high priority and low risk.

The investments with high scores are selected for further assessment with more analytical methods such as feasibility study, etc. towards the development of the infrastructure project. The implementation of MULTIAPPRO Performance Strategy allows the overall assessment of any transport system operation identifying the weakest elements in it while allows the selection of more positive investments which should be taken in more consideration and analysis.

### 4.3 Monitoring Actions

The MULTIAPPRO Performance Strategy is expected to be used by transport stakeholders as an assessment tool assisting in the selection, evaluation and development of future transport investments. The implementation of the Strategy should be monitored at regular intervals and adapt accordingly to forthcoming transport prospects. Below, the table shows the monitoring actions for the successful implementation and operation of the MULTIAPPRO Strategy.

*Picture 4.1: Monitoring Actions for the implementation of the MULTIAPPRO Strategy*

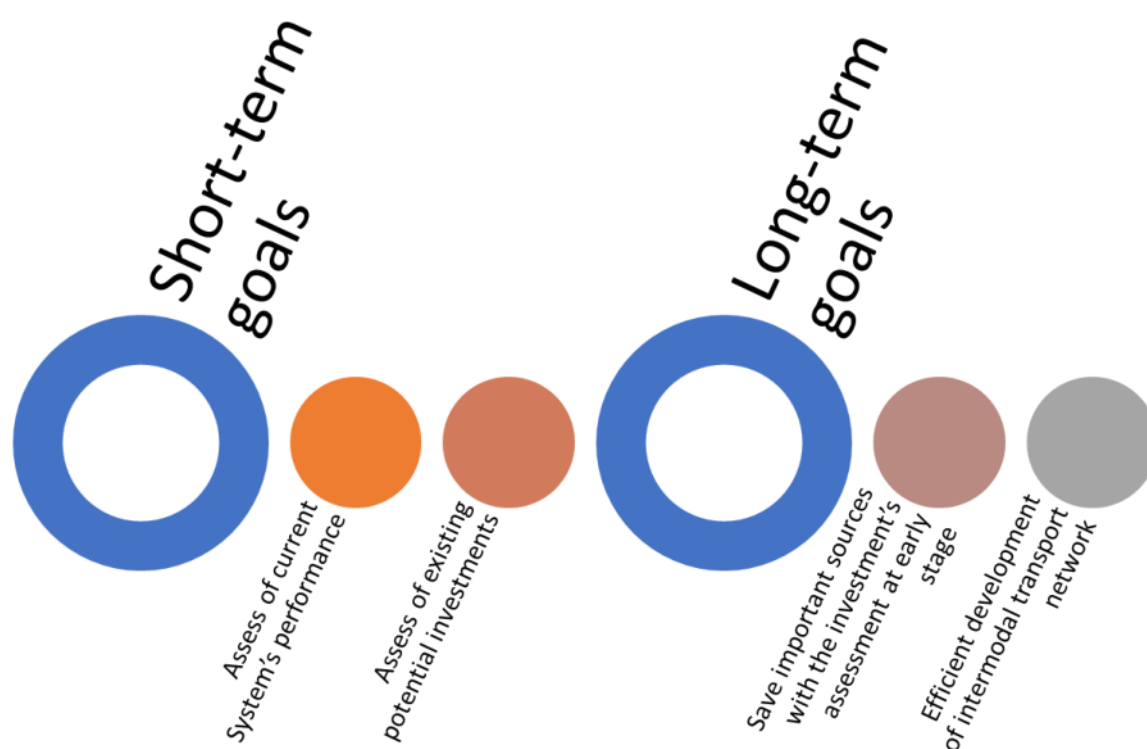
MONITORING ACTIONS	WAY OF MONITORING	MONITORING PERIOD	MONITORING GOAL
<b>Identification of current needs of transport system</b>	Prioritization of needs with scores after focus groups with involved stakeholders	every year	Update list of real needs for avoiding deviation from the reality
<b>Identification of key bottlenecks</b>	Put scores of influencing the operation of transport system	every year	Identification of needs through the everyday problems
<b>Identification of EU and national policies</b>	Making a list of EU and national goals	every year	Putting the framework for the development of future investments
<b>Identification of end users' needs</b>	Implementation of questionnaires for the end users	every two years	Development of future investments

			fulfilling the needs of end users
<b>Identification of transport system footprint</b>	Implementation of air quality stations and energy management system	every 3 months	Development of future investments improving the transport system footprint
<b>Identification of advanced technologies</b>	Survey about the current and under development technologies	every six months	Development of future investments using the benefits from advanced technologies
<b>Identification of similar strategies</b>	Survey about developed or under development similar strategies	every six months	Creation of synergies among relevant strategies in transport sector



## 5. Short and Long-term goals of the Transport Performance Strategy

The Transport Performance Strategy has been developed on the present reality of European intermodal transport network taking into consideration future needs of a global intermodal transport network and EU goals. However, the Transport Performance Strategy should be regularly updated in order to assess precisely each potential investment and conclude to realistic results. The revision of the Strategy is suggested on a three-year interval mainly to include newly introduced technologies and innovations and new transport policies and regulatory frameworks.



Picture 5.1: Short and Long-term goals of Transport Performance Strategy

The key aim of the Strategy is the formation of a model that will perform in a transparent manner the analysis of the benefits of any investment in comparison to other investments related to different elements of a transport system, using several pre-identified scenarios of the current state/performance and the related values of each element. The expected effect for the relevant EU Member States, organisations

and other stakeholders, constitutes the capability to objectively review any proposal for investment and to rationally and efficiently reach a decision on financing and implementing new transport infrastructures. A tangible example for the methodology application is the current CEF programme at European level. The evaluation will be performed on the basis of the received applications and the relatively subjective description of the real investment benefits without a unique, transparent and objective model for comparing benefits, costs and risks among the received proposals. At institutional level -regional, national or European - the developed tool can also assist in improving the operations and maintenance planning of the transport networks by examining different investment scenarios ranging from short-term maintenance works to long-term rehabilitation interventions. The project’s model can moreover be equally beneficial to private users and financiers who will be able to promptly simulate potential investment cases and rationally decide which scenario will yield the broadest benefits at the lowest possible risk.

*Table 5.1: Main goals of the Transport Performance Strategy based on SMART approach*

	Specific	Measurable	Achievable	Realistic	Time-based
System Performance before the investment	Total score of the performance	Specific number	Available information – evaluation of the investment at early stage	Take into consideration the real situation	Time=0 (take into consideration current situation)
System Performance after the investment	Total score of the performance	Specific number	Available information – evaluation of the investment at early stage	Take into consideration the real situation	At early stage of the investment
Selection of investment	Comparison of total scores/ investments	Comparison of total scores	Comparison of total scores	Comparison of numbers	At early stage of the investment
Save important sources such	Minimise of human attempt to evaluate	Use of Strategy lead to specific scores	Transport Performance Strategy requires less	Transport Performance Strategy leads	At early stage of the investment

as time and work	each investment		time for assessing an investment in contrast to traditional methods	to precise results	
Efficient Development of Intermodal Transport Network	Implementation of investments with positive and important effects	Implementation of investments whose effects can be measured	The implementation of investments with high score of performance will lead to the development of the Intermodal Transport Network with great respect on key issues such as operational, environmental, financial, safety and ITS	The successful assess of potential investments at early stage will lead to the implementation of the more efficient investments	After the implementation of the required investments to deal with EU goals

## 6. Conclusion

We are facing the quest for better transport investment optimisation techniques that can efficiently combine the governance, management and finance elements of a single “transport infrastructure investment project system”. Traditional Cost–benefit Analyses (CBA) and Feasibility Studies are often questioned on the grounds whose results depend on uncertain assumptions about the future and on subjective decisions between different types of benefits. Resulting, two key questions arise about innovation concepts to better design future investments of a single “transport infrastructure investment project system” towards minimising risks and about the impacts and benefits arising from various different investments across modes, links and nodes of an integrated transport system. The answers of the above questions are the main target of the developed Transport Performance Strategy which takes into consideration various aspects of transport sectors such as the economic efficiency, social acceptance and environmental sustainability, innovation potential and economic activity generation for evaluating the feasibility of future investments.

The purpose of MULTIAPPRO Strategy is to identify the performance level of a system and evaluate the impacts of a possible investment using a set of KPIs to validate its outputs. To achieve that, MULTIAPPRO Strategy’s methodology identifies and analyses current transport operations in combination with available best practices and technologies towards the designation of potential viable future investments. The developed algorithm, constituting the product of the Strategy, is programmed to be adaptive to all transport investment projects and the quality/quantity of information provided for the selected KPIs.

The main advantage of the Strategy is that it mainly evaluates investments and their impact on a system at an early stage with respect on the current and future needs of the single transport system. In addition, all outputs and results, either these are produced by the bottlenecks analysis or the developed algorithm are based on the role of each transport system in the entire transport network. The estimation of the impact of the investment on a node level but also on the entire intermodal transport level, ensures reliability, environmental sustainability and regularity of flow movements, respecting the profile of the European intermodal transport sector and serving the needs of the macro-regional European priorities.

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## Letter of support for MultiAPPRO output Transport performance strategy

Dear Madam/Sir

Hereby I am writing in my capacity as legal representative of my institution to express our support to document **Transport performance strategy** written as a part of MultiAPPRO project funded under Interreg ADRION programme.

We, as project partner, support the creation of the strategy that can assess current port performance and the potential future investments in all elements of intermodal transport system. We see it as a tool that can assist as a unique, transparent and objective model for comparing benefits, costs and risks of all future investments.