

ECTP-reFINE Position Paper

Position paper on Infrastructure topics within next H2020 Calls

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ECTP-reFINE promotes boosting up the support to innovation development and deployment in the Transport Infrastructures domain (and particularly in the fixed facilities domain).

Infrastructure networks transport people and goods and are fundamental lifelines of today's society. Their operation condition and the quality of the service which they provide affect the competitiveness of European industry and the quality of life of European citizens: they support the development of smart and sustainable cities; they ensure efficient flows for all trading activities. At the same time, demographic changes, the necessary adaptation to climate change, increasing fossil energy costs, and the need to reduce impact of human activities on the environment create new and urgent requirements for our lifelines and human behaviour. In this context, the maintenance and rehabilitation of ageing networks, as well as the development of new low-carbon infrastructure networks, are essential in order to meet the needs of European society, but it is clear that the associated costs will substantially exceed available public funding. A structured and well-planned R&I effort is therefore necessary to deliver better and stronger infrastructure networks for a sustainable mobility at affordable cost.

It is often considered that transport infrastructure comprises the basic physical elements as well as the associated organisational structures, systems, processes and services needed for enabling the flow of passengers and freight from origin to destination, by road, rail, water and air. Transport infrastructure therefore includes **fixed facilities** (such as roadway segments, railway tracks, public transportation terminals, harbours, and airports), the infrastructure facing **control and information systems**, and the **governance and management systems**, structures and processes that link the functioning of the infrastructure with the framework of policies, regulations and legislations.

ECTP supports an integrated approach on infrastructure, but advocates that **a specific interest should be given to the fixed facilities**. As a matter of fact, if sufficient attention is not given to this type of infrastructure beyond available technologies and tools:

- Requirements for resource efficient and environmentally friendly construction will increase construction and maintenance costs, with growing difficulties to maintain the quality of services.
- Traffic jams (congestion) will continue to develop, with associated societal and economical costs.
- Inefficient transport corridors will penalise the efficiency of industrial companies. Deficient and deteriorating infrastructure will cost EU companies billions of Euros in lost growth potential.

- The new transport technologies will fail to develop because of inadequate or insufficient infrastructure.
- Failing infrastructure will not support the new conditions created by climate change. Disruption will become more and more severe and frequent, with ever deepening consequences on quality of life and efficiency of economy.
- The environmental impact of infrastructure during its whole life-cycle will remain high, ranging from energy and raw materials consumption during construction (including upgrade) and maintenance, nuisance (e.g. noise, vibrations, pollution of air and groundwater) and land occupation during service life, to waste generation during maintenance and demolition.
- The vital investments which are needed to upgrade a large majority of all infrastructures that reach the end of their design life will be hard to bear.

Building infrastructure (construction and maintenance) as usual is not an option. Whole sets of new construction concepts, design methods, materials, and components must be developed, tested, implemented to satisfy the new requirements. A huge effort of research and innovation, coordinated at European level, is necessary to create and implement these concepts rapidly at the scale of the European continent, across the frontiers of Member States.

As a support to the Single European Transport Area (SETA) for European-scale mobility of people and goods, ECTP-reFINE advocates the need for developing High-Level Service Infrastructure (HLSI), to be considered the core element of a future fully functional and EU-wide multimodal integrated transport by 2030.

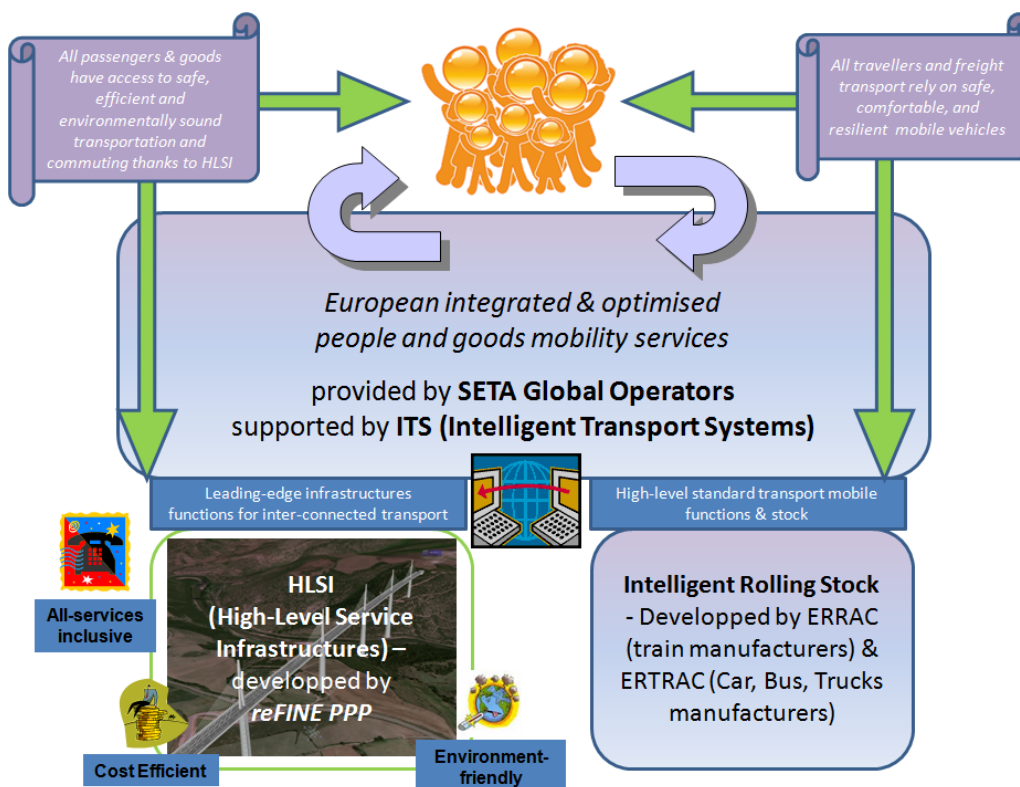


Figure: the reFINE vision of a future integrated SETA

The High-Level Service Infrastructure (HLSI) has the following features:

- delivering infrastructure for high quality mobility services for people and goods while using resources more efficiently;
- ensuring overall better service and performance, including multimodal integration and intermodal continuity for the end-user, less congestion, optimised transport time, etc.;
- guarantying a higher degree of convergence and enforcement of social, health, safety, security and environmental rules for infrastructure, with adequate service standards (including adequate service obligations) at all time;
- enabling interconnected solutions for the next generation of multimodal transport management, including information services and systems for all infrastructures.

Recommendations for 2016-2017 H2020 Calls

ECTP-reFINE would like to introduce the following recommendations:

- From the experience gained on the first calls of H2020, particularly on the **large number of introduced proposals** resulting to a low success rate and a refusal of good proposals, which may be highly discouraging for industry and therefore unfavourable for stimulating innovation, it is suggested by ECTP-reFINE to consider **narrowing the scope of the challenge descriptions** in the future calls for 2016-2107.
- Considering the requirements introduced in the first part of this position paper, ECTP-reFINE strongly recommends giving a **particular attention to the fixed facilities domain** in these future calls as it makes up the backbone of all other types of infrastructure.
- Taking account of the topics already covered in the first 2 Calls of H2020 and the priorities suggested in its Roadmap, ECTP-reFINE would like to highlight the three following major challenges as regards the two next H2020 Calls (2016-2017). These challenges deal with both long distance mobility and urban mobility.

➤ Optimised Infrastructure

- Optimising infrastructure means firstly to extend its life duration. To do so, it is needed to develop new methods and tools for monitoring and assessing (the status of) existing structures (e.g. relatively to structural loading and deterioration potential). This includes for example to get a better understanding of damage and deterioration mechanisms and their effects on asset performance and residual life, to develop new (non-destructive) testing methods (radar, ultrasound, optical fibre, wireless smart sensors...) for diagnostic, early damage detection and maintenance of the infrastructures (fatigue assessment of steel bridges...), to integrate terrestrial and satellite systems for the structural health monitoring of key infrastructures located in natural risk areas (earthquakes, landslides, floods, etc.), to develop **monitoring systems for measuring loads and structural response** that allow for taking measures in time avoiding conservative (and costly) design, to develop **advanced systems for survey, inspection and testing of infrastructure**, likewise Structural Health Monitoring (SHM) of bridges, to develop **innovative non-intrusive solutions to**

extend the life time of components (e.g. new reinforcing techniques, composite materials, accelerated rehabilitation of bridges...)

- Optimising infrastructure means also developing tools for asset and transport management. ECTP-reFINE acknowledges the value of ICT and ITS technologies although this position document highlights the need of ensuring the fixed part of infrastructure must be prepared for future user demands regardless the added value supplied by intelligent technologies sitting on top of the afore mentioned hard part of the infrastructure.
- Optimising infrastructure at last includes also greening them by minimizing its impacts on environment.

➤ **Resilient Infrastructure**

Solutions to **increase the resilience and decrease the level of risk** linked to infrastructure have to be developed, such as solutions to preserve the functional use of networks and guarantee the continuity of services in emergency episodes related to natural and man-made hazards and climate change impacts; early warning systems related to natural and climate change hazards (flooding, landslides...) that integrate real-time monitoring data and prediction tools; new non-intrusive construction methods as well as new materials (e.g. pavements) that make infrastructure safer during extreme weather conditions; new road designs; methods for characterization and assessment of the safety of existing structures; models, methods and tools for assessing and reducing impact of seismic events and improving assessment and protection; risk management tools and decision-support systems for assessing flood risks; innovative solutions and techniques reducing climate change related risks, allowing for flexible measures related to river engineering and heavy rainfall, new technologies for optimizing earth structures, like new retaining systems to build steep slopes with environmental benefit; mitigation of unstable slopes in existing and new infrastructures, minimizing slide hazards by identification, prevention, corrective measures, monitoring and emergency response systems; adaptation of infrastructures to sea level rise (e.g. roads as flood defences)...

➤ **Adaptable infrastructure**

Going further than business as usual is needed to modernize the construction of infrastructure and make them greener, smarter, safer, more resilient, and more cost-effective. Developing such adaptable infrastructure needs to introduce **new construction process concepts** (prefabrication, automation...) as well as **new high performance materials and components**.

It may include envisaging new adaption methods for existing infrastructure to meet current and future user demands (e.g. capacity enhancement in tunnel or bridges, etc.), developing a comprehensive and consistent design and reassessment approach of the durability of reinforced concrete, prestressed concrete and steel fibre reinforced concrete as well as for steel structures; favouring cost-efficient optimised solutions (concrete quality and quantity, use of resources) through reliability-based methods, physic-chemical and thermo-mechanical couplings; developing high quality versatile beams, plates and construction components solutions while applying the best materials

for an easy and safe assembly; developing reliable and durable advanced on-site assembly solutions of light components for an easy and safe implementation; developing a Life-Cycle Approach (LCA) enabling the introduction and use of new materials in transport infrastructures; fostering the introduction of new technologies, new methodologies and new approaches in the design, construction, operation and maintenance of transport multi-modal infrastructure...

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