

## **HORIZON 2020**

### **WORK PROGRAMME 2016 – 2017**

#### *11. Smart, green and integrated transport*

## **OUTLINE**

**(DRAFT 27/01/2015)**

### **DISCLAIMER**

**THIS OUTLINE IS AN INTERNAL EVOLVING WORKING DOCUMENT FOR PREPARING THE FIRST DRAFT OF WORK PROGRAMME 2016-2017 OF SOCIETAL CHALLENGE 4 – SMART, GREEN AND INTEGRATED TRANSPORT. ITS CONTENTS WILL UNDERGO CONTINUOUS REVISION, INCLUDING ADDITIONS AND REMOVALS AS NEEDED. THIS DOCUMENT DOES NOT PREEMPT ISSUES CURRENTLY UNDER DISCUSSION AND FUTURE DECISIONS TO IMPLEMENT WORK PROGRAMMES.**

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## INTRODUCTION

The specific objective of the Transport Challenge ‘Smart, green and integrated transport’ is “to achieve a European transport system that is resource-efficient, climate- and environmentally-friendly, safe and seamless for the benefit of all citizens, the economy and society”.

"Funding priorities will be geared towards the present and future needs of citizens and businesses, and strive to maximise value for the transport sector, the wider economy and ultimately, the people."

The Specific Programme is structured in four broad lines of activities aiming at:

- a) **Resource efficient transport that respects the environment.** The aim is to minimise transport's systems' impact on climate and the environment (including noise and air pollution) by improving its efficiency in the use of natural resources, and by reducing its dependence on fossil fuels.
- b) **Better mobility, less congestion, more safety and security.** The aim is to reconcile the growing mobility needs with improved transport fluidity, through innovative solutions for seamless, inclusive, affordable, safe, secure and robust transport systems.
- c) **Global leadership for the European transport industry.** The aim is to reinforce the competitiveness and performance of European transport manufacturing industries and related services including logistic processes and retain areas of European leadership (e.g. such as aeronautics).
- d) **Socio-economic and behavioural research and forward looking activities for policy making.** The aim is to support improved policy making which is necessary to promote innovation and meet the challenges raised by transport and the societal needs related to it.

These activities are addressed in this Work Programme by three Calls for proposals:

1. **Mobility for Growth**
2. **European Green Vehicles Initiative**
3. **Automated Road Transport**

Each Call for proposals contains a scene setter and the description of proposed themes or topics.

In addition to the three Calls for proposals, Transport Challenge contributes to the following Calls on cross-cutting focus areas: **Blue Growth**, **Smart Cities and Communities with Nature-based Solutions**, and **Energy Efficiency**. Also, it contributes to the **SME instrument** and the **Fast Track to Innovation Pilot** Calls. Other actions will be implemented by calls for tenders or by other instruments (see section ‘**Other actions**’). These actions are part of the Transport Challenge envelope and complement the content of the Calls.

A thorough and mature research and innovation agendas for the three Calls have been defined taking into account the ‘Clean Sky 2’, ‘SESAR’, ‘Shift2Rail’<sup>1</sup> and ‘Fuel Cells and Hydrogen 2’ Joint Undertakings. In addition, European GNSS will provide new opportunities for the localisation and the guidance of vehicles. It is intended to create synergies with all these initiatives as well as with other parts of Horizon 2020, namely 'Information and Communication Technologies' (ICT), 'Nanotechnologies, advanced materials, biotechnology and advanced manufacturing and processing' (NMBP), 'Space', 'Secure, clean and efficient energy', 'Climate action, environment, resource efficiency and raw materials' and 'Secure societies'.

Particular attention will be paid in this Work Programme to the following major transport research challenges:

- Improving energy/resource efficiency, reducing transport’s dependence on fossil fuels, take-up of alternative fuels, and achieving the required level of mitigation of climate change, pollution, noise and adverse health effects in the transport sector.
- Supporting the development and take-up of automation in road transport, in view of optimising its contribution to the ambitious EU policy goals in terms of road safety, reduced congestion, energy efficiency and air quality as well as ensuring the leading role of European industry in the global market to boost growth and create jobs.
- Paving the way for the deployment of innovative mobility solutions, including through the use of ICT and satellite navigation technologies, for example in connected and automated vehicles, personalised/smart services, overcoming fragmentation through the bundling of existing services via single interfaces, and optimising the role of data and connectivity (e.g. internet of things) as driving factors.
- Modernising infrastructure for Europe-wide mobility demands and for reducing social and territorial inequalities in access to mobility, introducing new materials and processes, smart transport systems and new charging and refuelling options, and making infrastructure more safe, adaptable, resilient and responsive to evolving weather conditions and disruptive events.
- Assessing the impacts and cost-effectiveness of new solutions to address the mobility challenges in urban areas, exploring new opportunities to support take-up of innovative solutions, including through procurement.
- Optimising the use of the infrastructure and redistributing passenger and freight traffic between transport modes, as a way to mitigate environmental problems and ease traffic congestion.
- Optimising the efficiency and interoperability of transport systems and operations through new approaches to target setting and performance review.

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<sup>1</sup> 'Shift2Rail' will encompass all H2020 research and innovation activities in the Rail sector, and thus these activities are not part of this Work Programme.

- Making quantum improvements in safety levels across the transport system, reducing the associated costs for both the users and the public sector.
- Anticipating technological developments that have the potential to be transformational, both internal to transport and in other activities that are likely to impact on transport and the competitiveness of the European transport industry, while promoting the use of common standards and procedures across transport modes.
- Understanding and managing the impact of demographic trends.
- Assessing future requirements for skills and jobs across transport sectors and systems.

All these priorities are related to one or more of the above-mentioned four broad lines of activities defined in the Specific Programme. They have a two-fold aim: addressing key challenges that Europe faces, and making our industry more competitive and cooperative through transferring these solutions and standards worldwide, as other regions are confronted with similar challenges.

In addition, the societal trend towards service-orientation is also visible in the transport sector. Resources are scarce and decreasing while needs and expectations are growing. Hence, there is a need to design, organise and manage transport and mobility in a smarter way. Horizon 2020 is the right tool to explore how these challenges can be addressed in an integrated way.

Outputs from actions meeting these priorities will have tangible impacts in the form of new implementable technologies, information systems, and business practices. Some of these impacts will be evolutionary, representing refinements to existing technologies, systems and practices, while others will be more revolutionary, in offering a step-change in performance or innovative solutions. Outputs will also have impacts on the demand-side of European transport, including people's behaviour and company logistics. Overall, they will make the European transport system more efficient, sustainable, safe and competitive, and they will place it on a trajectory to meet the 2030 and 2050 targets set out in the Transport White Paper as well as those of other policy initiatives.

International cooperation will have a key role to play. Global challenges such as CO<sub>2</sub> and polluting emissions, oil dependency, transport safety and security, and standardisation of many services, products and procedures will benefit from global solutions. Other aspects that are more local in nature such as traffic congestion, land use planning, behavioural issues could profit from the exchange of best practice identified in effective international collaborations. Activities at the international level are important to enhance the competitiveness of world leading European industries by promoting the take-up and trade of novel technologies, in particular where the applicable regulatory regime is international and can thus result in barriers to the market introduction of innovative solutions coming from EU actors. Demand for high-end European produced vehicles as well as for European know-how is very strong in the emerging markets. With most of future transport growth occurring outside Europe, access to knowledge and to new markets will become increasingly important. Potential areas for mutually beneficial cooperation with the US may include road transport automation, logistics, infrastructure, and climate change mitigation. Cooperation with China, Brazil and possibly other countries could focus on fuel efficiency, clean vehicles and/or urban mobility. Collaboration on freight transport and logistics could represent a useful complement to the priority areas for Euro-Mediterranean cooperation. Transport safety could be a possible priority for a Euro-African science diplomacy partnership. Cooperation on aviation safety,

noise and adverse health effects may be engaged with some of the main international partners. Multilateral exchanges on transport R&I strategies and investment priorities could be pursued with the major international partner countries.

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## **CALL ‘MOBILITY FOR GROWTH’**

*H2020-MG-2016/2017*

Transport is on the brink of a new era of "smart mobility" where infrastructure, transport means, travellers and goods will be increasingly interconnected to achieve optimised door-to-door mobility, higher safety, less environmental impact and lower operations costs. In order to achieve efficiency at system-level, targeted efforts are needed to develop and validate new solutions that can be rapidly deployed, notably on corridors and in urban areas. They will address transport means and infrastructure and integrate them into a user friendly European transport system of smart connected mobility and logistics. Research and innovation on equipment and systems for vehicles, aircraft and vessels will make them smarter, more automated, cleaner and quieter, while reducing the use of fossil fuels. Research and innovation on smart infrastructure solutions is necessary to deploy innovative traffic management and information systems, advanced traveller services, efficient logistics, construction and maintenance technologies.

As indicated in the Specific Programme, the “activities will be organised in such a way as to allow for an integrated and mode-specific approach as appropriate”. Therefore, the contents of the ‘Mobility for Growth’ call has been structured as follows:

Areas addressing mode-specific challenges (technical and socio-economic)

1. Aviation
2. Road transport
3. Waterborne

Areas addressing cross-modal and/or transport integration specific challenges (technical and socio-economic)

4. Safety
5. Urban
6. Logistics
7. Intelligent Transport Systems
8. Infrastructure

Areas addressing cross-cutting issues

9. Socio-economic and behavioural research and forward looking activities for policy making

## **1. AVIATION**

Aviation is vital for our society and economy. It provides mobility to passengers and freight, establishing links between citizens and regions of Europe and beyond. It is a high-tech sector where Europe has gained worldwide leadership. However, aviation is constantly facing major challenges. Its leadership position is increasingly challenged by international competitors. Aviation has also an impact on the environment and the citizens due to its emissions and noise. The world air transport is expected to continue growing by 4 to 5% every year. We should seize all opportunities associated with this growth while mitigating the negative impacts. Therefore, it is important and urgent to act at EU level through research and innovation actions, in particular contributing to the ambitious goals set out for European aviation in its new vision ‘Flightpath 2050’.

The EU level response includes contributions from public-private partnerships such as Clean Sky 2 and SESAR 2020 complemented by Research and Innovation Actions and other actions, which are the subject of this Work Programme. The Clean Sky 2 programme targets primarily the reduction of the environmental impact through integration and validation of existing technologies up to Technology Readiness Level 6. The SESAR Joint Undertaking develops solutions for a seamless, efficient and cost effective management of air traffic, including services of European GNSS and covers the full range of TRL from 1 to 6.

This Work Programme addresses therefore mainly medium to long term research and innovation actions with a bottom-up approach for innovative technologies not covered by Clean Sky 2 and outside the scope of SESAR, and calls for their maturation in the TRL range 1-6.

The proposed areas are in line with the Horizon 2020 Specific Programme and the Strategic Research and Innovation Agenda (SRIA) of the Advisory Council for Aviation Research and Innovation in Europe (ACARE):

- Improving the resource efficiency of aviation
- Reducing aviation noise
- Enhancing safe and seamless mobility
- Maintaining the industrial leadership
- Providing breakthrough solutions for more revolutionary approach to face the current challenges

A number of actions related to the production of alternative fuels for aviation will be found under the ‘Secure, clean and efficient energy’ challenge.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Improving resource efficiency**

The reduction of energy consumption in aviation leads to high social, environmental and economic benefits and will be important to ensure its sustainability against air traffic growth.



Actions in this area will provide new technologies and solutions that will enable reducing the energy consumption and related CO<sub>2</sub> and NO<sub>x</sub> emissions.

### **Reducing aviation noise**

Exposure to aircraft noise has an adverse effect on population and the noise perception has also an important impact on future extensions of airports which are reaching their capacity limits. Actions in this area will address development of new technologies and methodologies to enable 24/7 operations including new methods for assessing, monitoring and managing the impact of aviation noise. They will also support the coordination of national and EU research activities related to aviation noise and consider possibilities for international cooperation.

### **Enhancing safe and seamless mobility**

Increase in air transport demand brings challenges for whole air traffic and airport management. The actions in this area will address products and services that optimise travel time, deal with disruptions, simplify interconnections, provide on-trip information as well as optimise accessibility to airports and aircrafts. It will also address lower life-cycle cost solutions for improving the safety of the air transport systems and reducing the risk of incidents and accidents.

### **Maintaining industrial leadership**

The EU aeronautics sector is one of the world leaders in terms of production, employment and exports. Despite this leadership, the industry, and especially the supply chain, is increasingly confronted with strong traditional or emerging international competitors. Actions in this area will address the key capabilities to retain the leadership, in particular by decreased costs and increased time efficiency of production, services or certification.

### **Breakthrough innovation**

The existing technologies and processes are not sufficient to achieve the ambitious goals set for the EU aviation sector. Therefore, actions in this area will provide highly innovative breakthrough solutions that will be able to push existing or create new products or services contributing to decrease the environmental impact, enhance the competitiveness, the mobility and the levels of safety.

### **Coordination and support actions**

Limited number of studies and coordination and support actions to address specific aviation research and innovation policy areas such as:

- Broadening participation in aviation research.
- Identification of aviation research infrastructure needs.

- Identification of gaps and barriers in the ACARE Strategic Research and Innovation Agenda research domains (mobility, competitiveness, environment and energy, safety and security).

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## **2. ROAD TRANSPORT**

This section of the work programme addresses research and innovation for road transport which is complementary to the “European Green Vehicles Initiative (EGVI)” call. It includes activities in the field of Internal Combustion Engines based on conventional fuels (not included in the scope of the Green Vehicle call), in support of the air quality policy, and stimulating research on future road transport technologies. The EGVI topics address the application of new types of energies to road transport and the improvement of the energy efficiency of road vehicles and their power trains. Whilst EGVI looks primarily at breakthrough research that will lead to a step change in road transport energy use, topics in this section will also address the necessary incremental improvements in road transport that will support the attainment of short to medium term EU policy targets.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Towards readiness to market. Steps for more efficient and cleaner internal combustion engines in the market**

A new generation of engines components and subsystem has reached the level of maturity necessary for their introduction in the market. They need to be combined in an optimal way in order to maximise energy efficiency and decrease emissions. The action will aim at incorporating new engines' technologies for their shorter term introduction in the market.

### **Technologies for the next generation of combustion engines with cutting edge efficiency**

Research and development on radically new concepts for further internal combustion engines are needed to push the efficiency towards its physical limits. Besides the technical challenges, Europe is also confronted with similar research programmes in other regions around the globe and, thus, the challenge of maintaining its global competitiveness. The action will address new combustion processes, control systems and develop advanced modelling technologies, to allow these engines to meet future energy and emissions targets and objectives.

### **3. WATERBORNE**

Sustainability in all of its three dimensions (economic, environmental and social) remains a key challenge for waterborne transport. Equally important is a continued focus on improving maritime safety.

Bringing it to full bearing as Europe's commercial link to the rest of the world is as important as making it an efficient and essential part of exchange and transport processes in the European internal market in all of its dimensions from goods to people to energy. Therefore, attention must be given to enabling a modern, resource efficient, safe, secure and resilient waterborne transport system, encompassing deep sea shipping, coastal shipping around Europe, domestic and international ferry connections, and the use of the internal waterways.

Significant efficiency gains, a much improved use of energy sources (including alternative fuels) and the minimisation of environmental impacts, in particular with regard to pollutant and greenhouse gas emissions, are still possible and desirable. The waterborne sector continues to lag behind in these respects as compared with other transport modes.

Europe remains a world leader in the design, production and operation of waterborne assets, but its industry is facing ever fiercer global competition, also in the production of smaller and specialised vessels that require advanced engineering, new materials and adapted production methods. To stay ahead, the entire value chain needs an accelerated creation and deployment of research and innovation solutions whilst at the same time there is a need to explore new frontiers in terms of vessel concepts, operational paradigms and the industrial use of the oceans.

For all of this the social dimension in terms of new skills required and human-centred operational approaches needs to be taken into account.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

#### **Innovations for energy efficiency and emission control in waterborne transport**

Waterborne transport still has huge potential in terms of energy use reduction and emission control. The specific challenges are to defend the lead in world markets and introduce a step change in energy efficiency and emission reductions; to explore alternative fuels through real world demonstrators; and to prepare the ground for vessel electrification where sailing distances and infrastructures are suited for a zero-emissions approach.

#### **High performance and lightweight materials for ships and equipment**

New lightweight materials and construction principles can provide a step change in vessel efficiency, both in terms of energy use and maintenance. European technology leadership needs to be translated into market demand in current and future markets, also beyond the maritime transport sector. The specific challenges are to research the functional characteristics of new lightweight and high performance materials for waterborne usages (vessels and components); to develop the most appropriate construction and production principles for

medium sized and large vessels and for components (also by learning from applications in other transport modes); and to influence the regulatory environment in order to eliminate existing barriers and facilitate market take-up.

### **New and improved transport concepts in waterborne transport, including automation, short sea shipping, gas transport, smart ports, transport security**

Bringing waterborne much deeper into multi-modal transport concepts, in particular to the benefit of domestic shipping and inland navigation, is a necessity. The specific challenges are to overcome the traditional barriers between transport modes, also by re-thinking the role of ports; to work on the greening and the optimisation of the entire transport chain; to contribute to the EU's energy union through new energy transportation concepts for natural gas; and to increase the resilience of the transport chain in terms of threats and climate change effects. River and canal transport can offer particular opportunities for automation that can improve safety and address current employment challenges.

### **High-value and value-added specialised vessels: next generation passenger ships, standardised workboats, entirely new vessel concepts, and novel ice-breaking technologies**

European yards and their suppliers, often consisting of SMEs, are world leaders in passenger ship construction, in small and medium-sized, value-added vessels and in highly specialised ships. In addition to making the production and use of existing vessel concepts more efficient, new business cases require more specialised and customised ships. The specific challenge is to explore the best design concepts and construction and production principles for small series and one off vessels, also in terms of marketability (technology push).

## **4. SAFETY**

Safety is of primary concern for any transport system. In the last ten years, safety has increased across all modes. The EU set ambitious targets in its 2011 Transport White Paper, e.g. moving close to zero fatalities in road transport by 2050, halving road casualties by 2020 and ensuring that the EU remains a world leader in the safety of all modes of transport, while optimising modal split for sustainability.

Research and innovation can play a major role to optimise the safety and efficiency of the transport system. Acting on transport safety means saving thousands of lives. In order to help achieve the policy objectives, Transport safety research aims at ‘reducing accident rates, fatalities and casualties’ in each mode and in the whole transport system by furthering knowledge and awareness, and by developing technologies, products, services and solutions that reconcile safety with efficiency and user-friendliness.

This chapter will address research priorities for all transport modes, covering actions in the field of transport infrastructure and vehicle/vessel design, traffic management and crash safety.

Another focus will be on research related to human behaviour aspects as a major cause for accidents including the assessment of changes of user behaviour following the introduction of new transport technologies and advanced driver assistance systems which could have unintended impacts, such as an over-reliance on automated devices, distraction and cognitive overload.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Protection of all road users in crashes**

Several accident types may decrease due to active safety systems and, in the long run, automated road transportation. Nevertheless, a residual of crashes is foreseen to remain and will require improved and/or modified crash safety. Societal trends add to the challenge: increased ageing of the population, growing urbanization with expected increases in the number of two-wheelers (powered, non-powered) and green, sub-compact cars. The action will develop vehicle based protection systems and improved infrastructure safety by means of design and maintenance.

### **Safer waterborne transport and maritime operations, including offshore operations in extreme environments and safer vessels designs**

More intense and more diverse waterborne traffic, also in areas so far underused, needs specific operational knowledge and technology support as well as advanced vessel and equipment designs that are intrinsically safer and address safety issues holistically and based on goals. The specific challenge is to build the enabling knowledge, develop designs and technologies and test them in a real world environment with the aim to guarantee safer and environmentally sound maritime operations, also taking into account the increasing use of low flash point fuels.

## **Transport infrastructure to increase the safety level of the transport system at modal and intermodal level (including their nodes)**

The action will address infrastructure based systems that support safety systems in vessels, vehicles and aircraft; early warning capabilities in the infrastructure; development of new monitoring systems; improved worker safety; and information sharing.

Integrated cross-modal safety management systems will be required, e.g. to conduct Infrastructure Safety Impact Assessment and corridor level safety evaluations. It includes, e.g. harmonisation of cost effectiveness procedures for the evaluation of the potential safety effectiveness of solutions and technologies; tools for the safety assessment of multimodal corridors and hubs; multimodal safety management criteria for emergency management in case of critical events; and multi-modal safety governance, competences, regulatory bodies, accountabilities and oversight.

## **Behavioural aspects for safer transport**

A pre-requisite to make the use of all transport modes safer is an increased understanding of the behaviour of individual users (including drivers, riders and all types of vulnerable users), but also understanding the interaction between them and all types of systems and services (i.e. new on-board technologies, mobile devices or infrastructure).

The specific challenge is to study key influencing factors of the behaviour of users of all transport modes, both on the individual level and across the population, taking also into account demographic factors (gender, age, etc.). Examples are the influences of fatigue, drowsiness, stress, the use of medicines, drugs, alcohol, trip goal and motivation, and also prevalent behaviour that causes unsafe situations. The aim is to identify and implement countermeasures to the most relevant human behaviour aspects and the interaction with the systems that represent the major causes of unsafe user behaviour in transport.

## **5. URBAN MOBILITY**

Urban mobility figures prominently in the 2011 Transport White Paper which calls for achieving essentially CO<sub>2</sub>-free city logistics in major urban centres by 2030, and for phasing out the use of conventionally-fuelled cars in cities by 2050. CIVITAS 2020 as part of Horizon 2020 addresses innovation in resource-efficient and competitive urban mobility and transport.

Reflecting citizen, business and city needs to reduce energy consumption, increase use of alternative fuels, become more resilient and create more liveable urban areas, a number of topics could integrate solutions from other sectors, notably energy, ICT and 'smart city' concepts.

Improving the efficiency of urban transport and mitigating the negative effects of transport effectively, while taking into account technological, socio-economic and urban development trends, is crucial for the performance and attractiveness of Europe's urban centres. This requires a transformation in the use of vehicles, more efficient and lower impact city logistics, and a reduction in urban road congestion, combined with a broad take up of cleaner vehicles powered by alternative fuels and drive trains.

The 2016-2017 topics will expand the CIVITAS initiative, by aiming at 2-3 challenge based topics per year, developing research and innovation and linking it with deployment (Connecting Europe Facility) of sustainable urban mobility solutions and technical advice and capacity building through the ELENA facility.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Increasing the take up of innovative solutions to achieve sustainable mobility in urban areas**

Many innovative solutions (supported by CIVITAS and other initiatives) are locally developed for sustainable urban mobility, but lacking replication and wider up scaling. The action could focus on innovative, high potential technological and non-technological solutions/approaches that have been tested and evaluated in a small number of locations in Europe.

### **Supporting 'smart mobility and power' in cities**

The development of new business/value models and integrated approaches for the testing for the deployment of private and public recharging and refuelling stations would enable cities and policy makers, citizens and businesses to invest in market take-up of alternatively fuelled vehicles in urban and sub-urban areas.

### **Innovative approaches for integrating urban nodes in the TEN-T core network corridors**



The efficient and effective integration of urban nodes into TEN-T corridors requires further research and innovation efforts including the development and validation of new concepts and related recommendations for deployment of innovative solutions.

### **Facilitating public procurement of innovative sustainable transport and mobility solutions in urban areas**

Urban areas concentrate demand for sustainable transport and mobility solutions (such as alternatively fuelled vehicles and supporting (refuelling) infrastructure) by public procurers. The procurement of innovation can support the broad market up take of innovative solutions through the demand created by public procurers. Support could be provided for the establishment of cross-border PPI initiatives.

### **New ways of supporting development and implementation of neighbourhood-level transport innovations**

People oriented transport and mobility encompasses both new ways of translating people's needs into mobility solutions and new ways of delivering (co-creating) these solution. Neighbourhoods could be the right scale to pilot innovations that address for example safety, inclusion, social innovation, job creation, health, etc. This action could also create scale and visibility to innovations in Europe and beyond.

### **ELENA contribution: Deployment of transport innovations that lead to greater energy efficiency in urban areas**

The ELENA (European Local Energy Assistance) Facility could provide technical assistance grants to the final beneficiary (mostly local administrations, public transport companies, etc.) for feasibility and market studies, project structuring, business plans, energy audits, preparation of tendering procedures and contractual arrangements, and include any other assistance necessary to develop investment programmes, excluding subsidies for investment (hardware) costs. Actions funded under this facility could address for example alternative fuels vehicles and infrastructure, and other subjects to achieve energy efficiency in transport. The ELENA facility will not fund the actual investments to deploy these innovations.

## **6. LOGISTICS**

Freight transport logistics is an industry sector responsible for managing the flows of goods and information between a point of production and a point of destination in order to meet the requirements of clients and consumers. As regards the supply chain, logistics focuses on the planning, organisation, management, control and execution of freight transport operations.

In 2010, EU-27 freight transport was close to 3.9 trillion tonne-kilometres (tkm), of which about 45% was on the road and 40% by sea. Currently, only 5% of internal EU freight traffic flows through intermodal routes. Eurostat surveys estimate that 24% of good vehicles in the EU are running empty and that the average loading of the rest is 57% giving an overall efficiency of 43%. Flow imbalance can only explain half of this loss.

The total volume of logistics expenditures in the EU was estimated at EUR 930 billion in 2010. A 10% to 30% improvement in efficiency in the EU logistics sector has been estimated to give savings of between EUR 100 billion and EUR 300 billion per year.

The aim of the topics in this section is to increase efficiency and hence sustainability in the logistics supply chain, removing the communication bottlenecks in the interaction between the different stakeholders and thereby improve the potential for collaboration, the effective utilisation of equipment and seamless connectivity across the transport modes. The topics complement relevant topics in the sections on Urban Mobility and Intelligent Transport Systems.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Networked and efficient logistics clusters**

To meet the objective on a shift towards emission-low transport and consolidate freight for more efficiency we need to better integrate transport subsystems and modes. An action could study the position, size and required number of hubs needed for efficiently linking the core network corridors and providing sufficient access points to last mile delivery services. It could also improve their efficiency in transshipment relying on automated cargo handling of Modular Load Units. Finally, it could extend the role of these hubs and have them serve as seeds for smart specialisation and the formation of logistics clusters, integrating manufacturing and advanced logistics services.

### **Innovative ICT solutions for future logistics operations**

In a logistics sector with highly increased collaboration, synchro-modality and dynamic re-routing of freight, there is a need to match ICT advances such as Internet-of-Things, big data and Intelligent Transport Systems with business needs, rethinking the way we plan, book and execute freight flows. An action could address booking and planning systems to find the best (combinations of) modes and optimal route, optimisation algorithms for increased load factors, event management systems that create visibility and transparency and allow real-time exception management for faster traffic reconfiguration and simple and cost-effective network connection tools and sensors or smart devices.

## **Promoting the deployment of green transport, towards Eco-labels for logistics**

In Europe, but also in other parts of the world, actions to reduce the carbon footprint of transport services are gaining momentum. This could be a win-win for the environment and industry provided there is a level playing field as regards transparency and comparability of methodologies and data used. An action could address the establishment of a co-ordinated network, gathering regional, national and international activities and fostering communication, collaboration and consensus-building on harmonised methodologies for carbon footprint calculation along the transport supply chain. It could also explore conditions for the introduction of carbon footprinting certification schemes or eco-labelling for logistics.

## **Potential of the Physical Internet**

Translation of the working principles of the Internet to the routing of freight, thus creating the Physical Internet (PI), has the potential to be a real game-changer. An action could address the development of a detailed operational vision shared by all relevant stakeholders. It could include development of simulation and modelling tools, roadmaps for implementation and create support and consensus between research and industry stakeholders. Furthermore, it could identify needs for common standards and rules and assess the socio-economic impact.

## **7. INTELLIGENT TRANSPORT SYSTEMS**

Intelligent Transport Systems (ITS) provide the key to achieving the vision of seamless transport both in passenger and in goods transport markets. For passengers, seamless transport across modes and across countries will better meet their mobility needs by ensuring a wider choice of transport services. Seamless transport, provided through mobility as a service, should also allow European citizens to make better use of the existing infrastructure when travelling and could lead to a shift to more environmentally friendly modes of transport. To reach the goal a number of issues have to be tackled, including the development on a European-wide basis of a transport information system that provides real-time data to enable cross-border trips throughout Europe and beyond, combining up-to-date information from each relevant transport mode source. The customer should have easy (one-stop-shop) access to online booking, payment and ticketing services.

The availability of open and high quality transport data will provide substantial improvements for the performance of transport networks by raising their efficiency, visibility, resilience and facilitate collaboration.

The time has come to consolidate the work performed to date to make substantial advancements and demonstrate current and future opportunities arising from the deployment of ITS.

In addition to the topics of this section, other topics of this call address to some extent ITS-related issues.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Innovative concepts, systems and service towards "mobility as a service"**

A major challenge for the widespread use of ITS is the realisation of advanced capabilities across national boundaries and transport modes, to cater multiple users and enable improved travel performance. An action could address coherent concept development encompassing all relevant elements, systems and services to bring Europe's transport system towards mobility as a service and make advanced travel planning a reality. It could include multi-modal cross-border traffic management, information and planning systems to serve freight and/or passengers and inducement of socially-responsible travel behaviour, integrated ticketing and advanced planning

### **Large-scale demonstration(s) of cooperative ITS**

The cooperative dimension of ITS and the applicability in different settings (e.g. urban, highway, long-distance, etc.) has so far not been sufficiently addressed. An action could address large-scale, real-life demonstrations in specific environments (for example highly dense population) or combinations of environments that would not only showcase the current status of development and the large potential of C-ITS, but also reveal key areas for future research, innovation and any deployment-related issues. It should include partnerships of

multiple stakeholders, namely private companies, public and other stakeholder groups and users), be supported by thorough post-demonstration impact and cost-benefit assessments and evaluations of C-ITS concepts and technologies. This will also offer an opportunity for stakeholders and partners to address issues and identify relevant technologies to prepare towards automated road transport.

### **New business models, awareness raising, support and incentives for the roll-out of ITS**

ITS business models have not evolved sufficiently to take into account new technologies, systems, services, as well as user needs. A key challenge for ITS remains the "last-mover advantage", where many parties await others to deploy first, to maximise their own immediate benefits at lowest possible implementing cost. An action could address market sizing, customer demand vs. production, project feasibility and financial returns of relevant mobility services and development of Key Performance Indicators (KPIs) building on on-going activities for the assessment and measurement of ITS take-up and/or deployment. Furthermore, building upon the EU strategy for the deployment of C-ITS, it would develop tools and guidance to support public and private stakeholders, in particular Member States, with the development of efficient policies for C-ITS deployment based on consolidated knowledge across the EU.

## **8. INFRASTRUCTURE**

Efficient and high quality transport infrastructure is fundamental for the mobility of people and goods and for Europe's economic growth, competitiveness and territorial cohesion.

The whole of Europe is faced with a growing need to make infrastructure more resilient, including to climate change, to keep pace with the growing mobility needs and aspirations of people and businesses and to reduce the impact of infrastructure on the environment (air pollution, fragmentation of ecosystems, health and noise). At the same time the resources available to maintain and upgrade transport infrastructure have been declining. As a result, many elements of the surface transport infrastructure are in a deteriorating condition. Remediating to this problem will ensure an adequate safety level that, in many modes and reflecting also vehicle and ITS developments, needs to be enhanced via new design and maintenance methods.

Set against these multifaceted challenges, key in the future will be to find innovative solutions to increase the performance, robustness and efficiency of infrastructure for all modes of transport, finding solutions to ensure the resilience of the whole transport system in case of extreme events, to guarantee the maximum infrastructure contribution to the best safety level, and to allow an optimal use and management of multimodal transport infrastructure.

Proposals addressing rail in a multimodal approach (rail-only proposals are not eligible) and proposals addressing aviation infrastructure must ensure complementarity with 'Shift to Rail' and 'SESAR' activities, respectively.

Projects aiming at fast implementation of results, should demonstrate their readiness for timely deployment. They could then be considered for funding under the TEN-T/CEF Programme, in particular under its Innovation and New Technology heading (TEN-T Guidelines, Reg (EU) 1315/2013, Art. 33).

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Resilience to extreme (natural and man-made) events**

Research is needed to identify the climate risk 'hot spots' in the European transport network, identify the appropriate adaptation measures, and to develop cross-modal implementation strategies that optimise cost-performance-risk. This includes the integration of terrestrial and satellite systems for the structural health monitoring of key infrastructures located in a natural risk (earthquakes, landslides, floods) prone area. Adaptation measures and strategies need to be developed that enable minimising the impact of both natural and man-made extreme events on seamless transport operation as well as provide optimal information to the users of the transport infrastructure. These measures could include the strategic application of new materials, techniques and systems for construction, operations and maintenance in order to ensure reliable network availability during unfavourable conditions.

### **Optimisation of transport infrastructure, including multi-modal corridors and terminals, retrofitting, adaptation and upgrading of existing infrastructure, and relevant operations**

Seamless integrated transport of freight and passengers over the European transport infrastructure network requires optimal inter-connectivity between the modes. This requires optimised layout of, and vastly improved processes and systems at hubs and gateways as points of interchange (within the same mode) or transfer (between the modes) for the movement of freight and passengers over the European transport infrastructure network. Airports of all sizes and operations are included and deserve specific attention. The action will address in particular optimal location, operation and accessibility to and within terminals, hubs and gateways; seamless interchange of freight and passengers; synchro-modality over key transport corridors, where inland waterways represent a major challenge. Attention is to be paid to the design and operation of corridors, terminals, hubs and gateways.

### **The Port of the future**

Ports are a major example of hubs' need for modernisation. Ports are a main catalyst for regional development and their inclusion in the territory is fundamental to ensure that a smooth operation will not affect negatively the surrounding areas. Specific issues (like dredging, energy management and emissions) are combined with other challenges common to all multi-modal terminals. Research is needed to implement innovative design, engineering, construction and operation technologies ensuring low environmental impact, optimised operation inside the terminal, advanced and efficient link and connections with the cities and hinterland network, and aiming at full customers' satisfaction. Inland waterways ports deserve particular attention. Solutions should consider the possible transferability to other multimodal hubs such as rail-freight terminals, inter-ports, airports and dry ports.

## **9. SOCIO-ECONOMIC AND BEHAVIOURAL RESEARCH AND FORWARD LOOKING ACTIVITIES FOR POLICY MAKING**

The social sciences and humanities are integrated in the Transport work programme at several layers, in order to achieve the required degree of incorporation while maintaining sufficient visibility. In this context, the 'social sciences and humanities' dimension is embedded both as an essential component of several topics and research questions as well as distinct topics of socio-economic relevance in other parts of the work programme.

In addition, the present section addresses issues which are intended to complement and underpin the activities covered in the other sections of this work programme. It includes in particular topics aimed at exploring new user preferences and attitudes with respect to ownership and sharing, potential changing values of travel time, analysing the research and innovation capacities of the European transport manufacturing industries, examining new research opportunities and limitations offered by the use and exploitation of big data, looking at how new tools and business models may improve accessibility and equity in remote and rural areas and assessing future skills requirements in transport. Finally, it includes a topic which would lead to the establishment of a transport research and innovation monitoring and information system that would underpin further research and policy making in the transport sector.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Research, technology development and market trends for the European transport manufacturing industries**

European transport manufacturing industries across different sectors are well positioned in the global market. However, they are faced with new challenges stemming from the need to move to smart, green and sustainable transport technologies and systems within a relatively short period of time as well as from increasing international competition and the changing mobility demand. The challenge is to provide an overview of research, technology development and innovation capacities and strategies of the European transport manufacturing industries, identify present and emerging market trends and regulatory contexts at a global scale, making use of diverse data and information sources.

### **Big Data in Transport: Research opportunities, challenges and limitations**

Technological developments, particularly related to the extended and expanding use of ICT in the transport sector, allow the collection of unprecedented volumes of data across all modes and transport systems, including those related to accidents and incidents. These volumes of data, known also as "big data", have generated a strong interest in the transport research community as well as in the relevant industries and policy makers and have created a wide spectrum of challenges and opportunities in the field of transport research. At the same time, the collection and possible exploitation of "big data" pose a number of questions both in methodological terms as well as in legal, institutional and social ones, which need to be addressed. The main challenge is therefore to investigate the potential that "big data" offer for research in the transport field as well as the implications of their utilisation.



## **Assessing future requirements for skills and jobs across transport sectors and systems**

Transport is a rapidly developing and changing sector which faces problems to develop, attract and retain appropriate staff. As the overall trend is to increase automation, the sector will depend more and more on specialised equipment and products. Future jobs will therefore require new and advanced skills in engineering as well as in back office operations, but at the same time, the growing interdisciplinary elements of transport activities will also require transport professionals with developed skills in safety, security, logistics, IT, behavioural sciences, marketing and economics. The specific challenge of this topic will be to identify and assess future requirements for skills and training tools across transport sectors and systems.

## **Improving accessibility and mobility: new tools and business models for public transport in rural and remote areas**

The majority of efforts in re-designing public transport have primarily focused in urban areas. Rural areas at the same time are faced with continuous challenges linked to demographic, socio-economic and mobility factors such as: a) declining populations characterized by more pronounced ageing (compared to the urban ones); b) income factors; c) reduced number of services and economic viability of public transport schemes; and d) longer distances and different mobility needs related to public transport. In this context, the main challenge of this topic is to examine whether organisational and technological innovations and the use of ICT in public transport can lead to improved accessibility and mobility in rural and remote areas, by responding better to their specific needs and demographic/socio-economic characteristics.

## **Switching from ownership to sharing: An assessment of social, economic and environmental impacts**

Over the past two decades a trend to move towards car sharing practices is gradually taking place in many European countries, particularly in the younger generations. Various related business models have been developed so far and new ones are likely to emerge in the forthcoming years. Switching from car ownership to sharing may have significant impacts in environmental, social and economic terms. The specific challenge of this topic is therefore to provide a comprehensive analysis of the observed trend from car ownership to sharing, identify the main factors that influence this trend and assess its potential environmental, social and economic impacts.

## **Changing value of travel time**

Slow steaming has so far been applied in maritime transportation (primarily in container ships) since 2010, as a response to increased fuel costs and the economic crisis with considerable effects on travel costs as well as on CO<sub>2</sub> emissions. Passenger transport on the other hand, seems to attach higher values to travel time across all transport modes. However, as technology evolves (particularly ICT) people can use their time during travel for business or leisure thus "reducing" the cost of travel in economic and social terms. The specific challenge of this topic is to explore whether 'slow steaming' is a practice that can be

transferred from maritime freight to passenger transport across all transport modes given the differences in these two transport areas, and provide an initial assessment of potential environmental and economic implications.

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## **CALL ‘EUROPEAN GREEN VEHICLES INITIATIVE’**

*H2020-GV-2016/2017*

The European Green Vehicles Initiative (EGVI) represents an essential component of road transport research and innovation. It includes research, technological developments, innovation and demonstration in support of improvements in energy efficiency of road transport vehicles and the use of new types of non-conventional energies in road transport such as electricity, CNG and LNG, renewable and tailored fuels.

The scope of the EGVI activities include both advanced power-train technologies and new vehicle architectures, weight reduction, improved aerodynamics and rolling resistance and component development for alternative fuel vehicles. Concerning new forms of energy, the interfaces between the vehicles and the recharging infrastructure will also need to be taken into account with particular attention to standardisation issues. Demonstration activities will play an essential role in ensuring a proper and timely deployment of the new technologies. In this respect, innovation activities linked with other EU funding mechanisms such as cohesion and regional funds should be considered.

This call has been defined taking into account the other calls and initiatives where the Transport Challenge is concerned, particularly the calls on ‘Mobility for Growth’ and ‘Smart Cities and Communities’, and the ‘Fuel Cells and Hydrogen 2’ joint undertakings. Multi-sectorial research involving other research and innovation areas such as Energy and Environment coupled with research on new materials, advanced production and Information and Communication Technologies will be encouraged, particularly in fields such as advanced energy storage systems and interfaces between vehicles and energy recharging infrastructures.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **Optimisation of heavy duty vehicles for alternative fuels use**

The EU has a strong dependence on diesel. The use of alternative fuels in internal combustion engines could reduce this dependence in the short and medium term as well as achieve a significant level of GHG and pollutants emission reduction.

The overall objective of the action is to optimise and develop new powertrains (engine / exhaust after treatment systems) for heavy duty vehicles running on alternative fuels with the perspective of achieving higher efficiency and lower pollutant emissions compliant with Euro VI standards and meeting CO<sub>2</sub> emission targets under discussion. Activities will also include recommendations for future standards.

### **System and cost optimised hybridisation and range extenders for road vehicles**

Hybridised road vehicles and range extenders combining internal combustion and electric engines are already available in the market and contribute to the uptake of electrified vehicles. However, a major challenge for this type of vehicle is their cost in relation to the benefit for

end users. The topic will focus on technologies to reduce cost and complexity of hybrid vehicles and range extenders.

### **Next generation electric drivetrains focusing on high efficiency and cost**

Developments have already been undertaken in recent years to optimise electric drive trains to the needs of electric vehicles. However, the next generation of electric drive trains must be conceived to also take into account manufacturing, design, subcomponents and material cost. The action will develop technologies for low cost and modular electric powertrains.

### **Electric vehicle interior redesign specific for optimised efficiency**

Increasing the range of electric vehicles requires a tight optimisation of energy consumption while maintaining certain passenger requirements regarding noise, vibration and harshness (due to the use of light materials) and heating and cooling capacities due to intense energy consumption by these functions. The action will develop new technologies to accommodate passenger requirements and low energy consumption through interior architecture including seats, the use of new materials and new ergonomic designs.

### **Physical integration of hybrid and electric vehicle batteries at pack level aiming at increased energy density and efficiency**

In order to render hybrid and fully electric vehicles fit for the mass market, energy density of battery packs has to increase. Besides research on advanced electrochemistry, the integration of battery primary cells into battery packs has a major role to play. To increase battery pack energy density, safety and modularity aspects must be taken into account. The action will look at advanced technologies for high energy density battery packs in order to maintain the strength of the European automotive supply industry in this area.

### **Multi-level modelling and testing of xEVs and their components**

Simulation models and testing procedures of electrical components for electrified vehicles are often derived from solutions for ICE vehicles, thus lacking appropriateness and accuracy. Novel tools are required in particular for covering the entire chain of integration into vehicles and subsystems. This topic will develop common standardised codes, methods and tools for testing of electric vehicles and their components.

### **Super-fast and smart charging of electric vehicles**

The duration of the charging process is a major hurdle for the broad market introduction of electric vehicles, particularly for those deployed in fleets with higher energy consumption like trucks and buses. Technologies for ultra-fast, bi-directional and wireless charging would enable a higher market share of such vehicles and enable wider benefits such as intermediate storage and provide spinning capacity for the electricity grid.

### **Electrified heavy duty vehicles**

Emissions and fuel consumption of a range of commercial vehicles used for transportation and delivery (buses, vans, medium-duty goods vehicles, and specialist vehicles such as trucks for refuse collection) can be reduced through the electrification of the vehicle and its constituent systems, and through a combination of advanced solutions and technologies. This action will address electrified medium-duty trucks and electrified high capacity buses whilst taking into account on-going research.

### **Aerodynamic and flexible trucks**

There is a need to find adaptable and configurable truck concepts, fulfilling future logistics and co-modality needs for different segments and markets, thereby contributing to the improvement of overall transport efficiency. The complete trucks must also be significantly more aerodynamic and energy efficient than today. This action will develop a new generation of reconfigurable and low energy trucks.

### **Affordable weight reduction of high-volume vehicles and components taking into account the entire life-cycle**

One of the principal levers to improve vehicle consumption performance and consequently foster the reduction of CO<sub>2</sub> emission is to decrease their weight. Previously-conducted EU research projects have already demonstrated that the adoption of advanced grades of steel, metal alloys, novel plastics and composites can lead to a drastic reduction in the weight of all vehicle components. However the additional cost for each kilogram saved is still too high. The action will develop a holistic approach to reduce the cost due to the use of lightweight materials.

### **Demonstration (pilots) for integration in urban transport system of electrified L-category vehicles**

Growing urbanisation in Europe is generating increased traffic congestion, greenhouse gas emissions, and air pollution. L-category vehicles, for individual passenger transport and for small logistics, are an effective solution to address the growing problems of traffic congestion in towns and cities across the EU. Electrified three and four wheels L-category vehicles (EL-Vs) are a further step towards a more sustainable urban mobility. The action will deploy ICT tools for driver support and services such as booking and route scheduling and for integrating the electrified three and four wheels L-category vehicles into the urban transport and local energy systems. The goal is to increase the potential market penetration of these vehicles in different EU cities. The scope also includes analysis of customer characteristics and needs, operating conditions, cost efficiency analysis, business models and energy efficiency and environmental performance indicators.

### **Stimulating European research and development for the implementation and deployment of future road transport technologies**

To improve the efficiency of road transport research in Europe, close cooperation between all stakeholders involved is needed, in particular by supporting coordination, monitoring activities and updating of the R&I roadmaps within all areas of road transport technologies (also those which are outside the scope of EGVI). The scope of the action includes research at EU, national, regional and private level. It also addresses links with on-going PPPs relevant to road transport research. Activities will include: roadmaps updating, monitoring of on-going projects, analysis of uptake of results, dissemination activities and education and training initiatives.

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## **CALL ‘AUTOMATED ROAD TRANSPORT’**

*H2020-ART-2016/2017*

Road transport automation holds the promise to help addressing many of the major challenges of today's transport system, such as user safety, energy efficiency, air quality and congestion, and at the same time, it represents a critical testing ground for the ability of the European automotive industry to preserve and consolidate its global leadership.

Automation technology is rapidly evolving. Building on Cooperative ITS and advances in ICT, such as connectivity, cloud computing and big data, as well as on satellite navigation technologies, automated road transport will enable driving strategies which are safe, sustainable and efficient on the level of the whole transport system. It will also facilitate the deployment of novel transport services and applications, and innovative infrastructure solutions. Current technology will evolve further towards semi-automation and eventually towards full automation in normal moving traffic. This evolution is very promising and may help to drastically reduce fatal traffic casualties to near zero, as more than 90% of road accidents are due to human errors.

The trend towards automation will however present numerous challenges in terms of technology and component development, human-machine interactions, testing of automatic vehicles in real life conditions, transition scenarios including impact on traffic volumes and transport management, legislative/regulatory implications, integration with infrastructure, and aspects of user behaviour and public acceptance.

Proposed specific themes or topics to be addressed in this Work Programme are the following:

### **ICT enabled transition towards road transport automation**

Building on Cooperative ITS and breakthroughs in ICT, automation in road transport can significantly contribute in advancing the levels of safety, sustainability and efficiency of the transport system in a holistic way.

There are still many challenges to overcome in various areas. The action will address the necessary improvements in the areas of product liability, data and access security, tamper-proof in-vehicle platforms, cloud-based digital infrastructure and the capability of big data processing, vehicle dynamics, human machine interaction and monitoring strategies.

### **Automation pilots for personal and commercial vehicles**

Technologies enabling vehicle driving automation can significantly improve energy efficiency, safety and the usage of limited road capacity. In the past years, there have been significant efforts in RTD to develop the required technologies for vehicles and infrastructure. The action will integrate and test enabling technologies in real traffic conditions and evaluate the benefits in pilots and field operational tests taking into account connectivity, human factor and automated transport big data.

### **Support action for Field Operational Tests of Automation**

Large scale automation pilots shall be supported by a common Field Operational Test (FOT) methodology that will enable the efficient sharing and re-use of data. The action will develop a platform of knowledge exchange in order to let individual tests benefit from each other's' learning experiences as well as giving the European Commission an overview of the activities involved.

### **Safety and end-user acceptance aspects of road automation in the transition period**

The introduction of automated vehicles into the existing traffic poses specific issues regarding safety and end-user acceptance especially during the transition phase where mixed traffic will co-exist. Addressing safety of automated driving will lead to acceptability of automated road traffic since there would be no situations where vehicles driving automatically behave unpredictably. The action will investigate safety aspects specific to autonomous driving including in the transition phase and the way these impact on human-machine interface and end-user acceptance.

### **Impact of automation in densely used areas and networks (automation in transport systems)**

In some transport locations (e.g. ports, multi-modal hubs, traffic interchanges), different modes and users come together in a very dense area or network crossing. This poses specific challenges on vehicle-human and vehicle-system interactions, as well as the transition from conventional transport users/policies to (semi-)automated transport. This action will assess automation in densely used networks and locations, including a wide range of applications on a systems' level in shared transport (public, private cooperative) and for various modes and vehicles.

### **Road Infrastructure to support the transition to automation and the coexistence of conventional and automated vehicles on the same network.**

The foreseen step-wise introduction of automated vehicles in traffic will face a transition period where the coexistence of conventional and high automated vehicles will have to be managed in order to ensure an uninterrupted level of safety and efficiency. Road infrastructure will play a major role in managing this transition period. The action will address new methods of traffic flow modelling depending from the introduction of automated vehicles; infrastructure design, upgrading, and adaptation; new forms of visual and electronic signalling; new safety performance criteria for road infrastructure, and public acceptance of automation technology with the goal to set the basis for a timely deployment of automation-appropriate infrastructure network.

### **Coordination of activities in support of road automation and impact study**



Continuously increasing levels of transport automation require an in-depth analysis of all relevant issues related to socio economic and human factors such as driver behavioural aspects and end-user acceptance, economic implementation developing the business case, infrastructural aspects, standardisation, regulation and legal aspects. The topic will address the coordination of such activities at EU and international levels. A study on the impact of road automation in the integrated transport system will also be included.

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## **OTHER ACTIONS**

### **External expertise for evaluation and monitoring**

This action will support the use of appointed independent experts for the evaluation of project proposals and, where appropriate, for the monitoring of running projects.

### **External expertise to advise on EU research and innovation policy**

This action will support the provision of independent expertise in support of the design and implementation of EU research policy. Experts will work on the analysis, design and implementation of strategic transport technology options and actions, as well as on international cooperation in Transport research and innovation.

### **An inducement prize for the cleanest engine**

The objective of this action is the reduction of polluting emissions originated from internal combustion engines used on passenger cars and light freight vans, which are presently leading to poor air quality, and therefore health and environmental issues in many European cities. The prize aims at spurring the development of engine and powertrain technologies leading to vehicles with the lowest attainable noxious emissions in real life driving conditions, excluding however technologies in which the emission reduction targets are achieved by using main propulsive energy coming from other forms of energy storage than the main fuel (e.g. plug-in electricity with large batteries, compressed air, etc.).

### **ELTIS: supporting exchange of knowledge, information and experiences in the field of urban mobility**

The ELTIS urban mobility observatory is the Europe's leading information portal on urban mobility and transport. With its large database with details on innovative and best practice solutions/approaches, it facilitates the exchange of knowledge, information and experiences. ELTIS aims to bridge the gap between scientific knowledge and research and innovation on one side and the needs of European practitioners and policy-makers working in the urban mobility and transport field as well as in related disciplines, including urban and regional development, health, energy and the environment [procurement – tender].

### **Establishment of a Transport Research and Innovation Monitoring and Information System**

Regular and reliable information provision to policy-makers and private-sector stakeholders is necessary for evidence-based policy and decision making. In addition, the provision of comprehensive information on transport research and innovation can facilitate the monitoring and steering of the development and deployment of innovative solutions, as well as the assessment of the effects of the research funds and projects in the field of transport. In order to meet these challenges, the Commission intends to establish a Transport Research and Innovation Monitoring and Information System. Building on and taking account of other on-

going initiatives and platforms, this system will become the Commission’s instrument for mapping technology trends and research and innovation capacities in this sector.

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