

## **MOVING FROM THE SCOPING PAPER TO THE WORK PROGRAMME: Structure and first elements for topics for WP 2018-2020**

### **Introduction.**

This working document seeks to contribute to the transition from the Horizon 2020 Strategic Programming exercise to the elaboration of the Transport part of the work programme 2018-2020. The Strategic Programming exercise was finalized at the end of November 2016 and consists of an overarching document describing the overall objectives of the whole Horizon 2020 programme for its final 3 years of implementation as well as individual scoping papers for each specific part of Horizon 2020<sup>1</sup>. In the case of Societal Challenge 4 'Smart, green and integrated transport' the scoping paper has been endorsed by the Transport configuration of the Programme Committee during its meeting of 27 September 2016.

The document is structured into two parts. The first one presents: **a)** the main new elements for the whole Horizon 2020 work programme 2018-2020 which affect the structure and content of the Transport part as well, **b)** the main research orientations as defined in the Transport scoping paper and **c)** the proposed structure for the Transport work programme 2018-2020 which seeks to address in a coherent way the elements presented in the two previous sections. The second part presents preliminary ideas for research topics in each of the calls of the Transport work programme 2018-2020.

### **PART 1. FROM THE SCOPING PAPER TO THE WORK PROGRAMME**

#### **1.1 Horizon 2020 work programme 2018-2020 - New elements: Focus areas and reinforced international cooperation**

Parallel to the elaboration of the main research orientations in the various parts of Horizon 2020 (including Societal Challenge 4 'Smart, green and integrated transport') work has also been carried out regarding the whole Horizon 2020 Programme, with a view to aligning it further to the EU's current agenda and priorities, contributing to promoting the policy goals of open innovation, open science and open to the world (three O's) and reinforcing its impact potential during the final years of its implementation. This part of the work has been summarized in the 'Strategic Programme Overarching Document' which has been discussed with the Strategic configuration of the Horizon 2020 Programme Committee and was endorsed in November 2016.

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<sup>1</sup> <https://ec.europa.eu/programmes/horizon2020/en/what-work-programme>

As presented in the Overarching Document, a small number of missions cutting across the programme boundaries are implemented as focus areas. Each of these aligns with major political or policy drivers, and will be endowed with a substantial budget to allow for work of sufficient scale, depth and breadth. Focus areas are expected to create an exceptional impact, addressing big challenges. This focus area approach has been developed in the light of experience from previous Horizon 2020 work programmes, is simpler and has the potential for achieving greater impact.

Focus areas in the next Horizon 2020 work programme are in effect 'virtual calls', which constitute the linking of topics from respective parts of Horizon 2020 through a new rationale, and thereby unlocking new types of impact and added value. This will be achieved through aligning aspects of the implementation such as proposal submission deadlines and evaluation procedures, and also putting in place measures to share information and create synergies between ongoing projects throughout the life-cycle (e.g. publicity, project monitoring). At the same time, the 'contributing' calls and topics will remain within the structure and logic of their respective work programme parts in Horizon 2020. Overall the aim is to get more from the same investment and build critical mass where it is needed. There will be four focus areas in the 2018-2020 work programme:

- Building a low-carbon, climate resilient future
- Digitising and transforming European industry and services
- Connecting economic and environmental gains – the Circular Economy
- Boosting the effectiveness of the Security Union

As mentioned in the scoping paper, the Transport part of the work programme will, in principle, contribute to the first two focus areas, which are the more relevant ones for transport, with two dedicated calls. This however, does not mean at all that research areas which will not be part of these two calls will not bear relevance to the objectives of fighting climate change and promoting digitization, or indeed to the objectives of the other two focus areas (circular economy and security). On the contrary, several topics will be addressing relevant research issues, but for reasons of coherence and visibility it is proposed at this stage that they will form part of the main Mobility for Growth call.

Another important aspect addressed in the 'Strategic Programme Overarching Document' is International cooperation. International cooperation is necessary to ensure the EU's scientific leadership and industrial competitiveness. It is indispensable to access research excellence and all types of know-how wherever it is located, and to tap into global innovation networks and value chains. However, the participation of 3rd countries in Horizon 2020 has dropped compared to the previous Framework Programme, and the opportunity to use Horizon 2020 to establish international leadership is underexploited. There is therefore a need to reinforce international cooperation also by setting up new

international cooperation flagship initiatives in areas of mutual interest. The Transport part of the work programme will contribute to this objective both by making international cooperation more explicit in all relevant topics as well as by elaborating a limited number of topics in a way in which they can serve as international cooperation flagships.

## **1.2 Transport scoping paper - Research orientations in Transport**

The scoping paper for the Transport Part of Horizon 2020 was finalised in September 2016. Several elements and inputs have been taken into account for its elaboration: 1) the Horizon 2020 Specific Programme, as the reference for defining the content of the work programmes; 2) the main EU policy priorities; 3) the analysis of the coverage of the previous work programmes; 4) the consultation with the Transport Advisory Group and the broader group of stakeholders; 5) the discussions with and contributions of the members of the Transport configuration of the Horizon 2020 Programme Committee.

The scoping paper summarised the main priorities in the transport area linked to major EU policy initiatives and took into account the complementarities with other parts of Horizon 2020. It proposed a structure of calls, indicating participation in possible focus areas and cross-cutting activities and serves as the basis for the elaboration of the Work Programme 2018-2020. It has identified four strategic orientations, each of which includes a number of research priorities. These are:

### ***I. Towards an integrated, sustainable and robust transport system***

- Integrated door to door mobility for passengers and freight, including new mobility concepts and services.
- More efficient and effective deployment and maintenance of assets, infrastructure and traffic management.
- Enhancing safety for users in all transport modes.
- Improving health and the environment moving towards pollution and emission-free, low-noise transport and mobility solutions, with a particular emphasis on clean urban public transport.
- Increasing the transport system's resilience and security.

### ***II. Technologies transforming the transport system***

- Accelerate decarbonisation of the transport system through energy efficiency and better alternative fuels in all transport modes and support the shift of transport towards environmentally friendly solutions pursuing a “zero-emission” vision.
- Advance electromobility, including vehicle safety, charging, energy harvesting, linking in with the electricity grid, storage and improved battery/supercapacitors performance for clean and competitive transport.

- Advance technologies for automation, connectivity and digitisation for more efficient and safer transport in all application domains, making use of the European Global Navigation Satellite Systems (Galileo and EGNOS) where relevant, and paying particular attention to security and cybersecurity concerns and technical vulnerability.
- Development of radical new transport technologies

### **III. *Global leadership, competitiveness, business models and markets***

- Increasing the competitiveness and leadership of the EU transport products, production systems and services on EU and global markets.
- Creating framework conditions that allow for new business and operating models, mobility patterns and technologies.
- Availability, protection/privacy and use of big data, also as a platform for new mobility business and operating models.

### **IV. *Accounting for the people: demand, needs and behaviours; inclusion and access***

- Better understanding and anticipating the dynamics of mobility and transport demand, accounting for all citizens, industry and commerce.
- Updating and enhancing the knowledge toolbox (datasets, models, foresight, indicators, new tools, etc) for the impact assessment of mobility solutions and policies.

## **1.3 Proposed Structure of the Transport work programme 2018-2020**

As mentioned in section 1.2 above, the scoping paper identifies **four strategic orientations**

- 1. Towards an integrated, sustainable and robust transport system*
- 2. Technologies transforming the transport system*
- 3. Global leadership, competitiveness, business models and markets*
- 4. Accounting for the people: demand, needs and behaviours; inclusion and access*

which will be implemented through **three calls** for the 2018-2020 work programme:

**I) Call Mobility for Growth**

**II) Call Green vehicles – FA 'Building a low-carbon, climate resilient future' and**

**III) Call Automated Road Transport –FA 'Digitising and transforming European industry and services'**

This means that the four strategic orientations will be addressed by three distinct calls and consequently the structure of the work programme will need to be adapted accordingly. The two main research priorities under "*Technologies transforming the transport system*" (electromobility and technologies for automation, connectivity and digitisation) will be

primarily addressed through the 2 dedicated calls for Green Vehicles and Automated Road Transport which are also linked to the 2 Focus Areas as shown above.

The structure of the Mobility for Growth call will reflect to a great extent the structure of the scoping paper, of course taking into account the existence of the other two calls.

In concrete terms, the Mobility for Growth will address the remaining priorities of the scoping paper in a similar approach with that of the scoping paper. The main difference is that, as the main parts of the "**Technologies transforming the transport system**" section will be addressed by the two calls linked to the focus areas, the remaining parts do not justify a separate section in the Mobility for Growth call. The first part on 'decarbonisation of transport' will therefore be attributed to the first section "**Towards an integrated, sustainable and robust transport system**" and the last one on "radical new technologies" to the section "**Global leadership, competitiveness, business models and markets**". With these changes, section 1. "**Towards an integrated, sustainable and robust transport system**" becomes rather heterogeneous and is therefore proposed to be split at the level of the call into two more homogeneous sections: 1.1 "Low carbon and sustainable transport" and 1.2 "Safe, integrated and resilient transport systems".

### **1.3.1 Structure of the calls**

With these changes, the proposed structure of the Mobility for Growth call will be along four sections, as follows:

#### **I. Call Mobility for Growth**

##### 1. Low carbon and sustainable transport

This section will include topics addressing:

- Accelerate decarbonisation of the transport system through energy efficiency and better alternative fuels in all transport modes and support the shift of transport towards environmentally friendly solutions pursuing a "zero-emission" vision.
- Improving health and the environment moving towards pollution and emission-free, low-noise transport and mobility solutions, with a particular emphasis on clean urban public transport.

##### 2. Safe, integrated and resilient transport systems

This section will include topics addressing:

- Integrated door to door mobility for passengers and freight, including new mobility concepts and services.
- More efficient and effective deployment and maintenance of assets, infrastructure and traffic management.
- Enhancing safety for users in all transport modes
- Increasing the transport system's resilience and security.

### 3. Global leadership and competitiveness

This section will include topics addressing:

- Development of radical new transport technologies
- Increasing the competitiveness and leadership of the EU transport products, production systems and services on EU and global markets.
- Creating framework conditions that allow for new business and operating models, mobility patterns and technologies.
- Availability, protection/privacy and use of big data, also as a platform for new mobility business and operating models.

### 4. Accounting for the people

This section will include topics addressing:

- Better understanding and anticipating the dynamics of mobility and transport demand, accounting for all citizens, industry and commerce.
- Updating and enhancing the knowledge toolbox (datasets, models, foresight, indicators, new tools, etc) for the impact assessment of mobility solutions and policies.

The other two calls will have a simpler structure each covering one of the main research priorities identified in the scoping paper, under section II "Technologies transforming the transport system":

#### **II. Call Green Vehicles – linked to the Focus Area "Building a low-carbon, climate resilient future"**

This call will include topics addressing:

- Advance electromobility, including vehicle safety, charging, energy harvesting, linking in with the electricity grid, storage and improved battery/supercapacitors performance for clean and competitive transport.

#### **III. Call Automated Road Transport – linked to the Focus Area "Digitising and transforming European industry and services"**

This call will include topics addressing:

- Advance technologies for automation, connectivity and digitisation for more efficient and safer transport in all application domains, making use of the European Global Navigation Satellite Systems (Galileo and EGNOS) where relevant, and paying particular attention to security and cybersecurity concerns and technical vulnerability.

The relationship between the structure of the scoping paper and the proposed work programme structure is shown in the following table:

**Table 1 – Scoping paper and work programme structures**

SCOPING PAPER	WORK PROGRAMME 2018-2020		
	CALL MOBILITY FOR GROWTH	GV CALL – FOCUS AREA "LOW-CARBON, CLIMATE RESILIENT FUTURE"	ART CALL – FOCUS AREA "DIGITISING EUROPEAN INDUSTRY AND SERVICES"
<p><b>1. Towards an integrated, sustainable and robust transport system</b></p> <ul style="list-style-type: none"> <li>- Integrated door to door mobility for passengers and freight,</li> <li>- Deployment and maintenance of assets, infrastructure and traffic management.</li> <li>- Safety</li> <li>- Health, environment, emissions, low-noise</li> <li>- Resilience and security.</li> </ul>	<p><b>1. Low-carbon and sustainable transport</b></p> <ul style="list-style-type: none"> <li>- Accelerate decarbonisation of the transport system.</li> <li>- Health, environment, emissions, low-noise</li> </ul> <p><b>2. Safe, integrated and resilient transport systems</b></p> <ul style="list-style-type: none"> <li>- Integrated door to door mobility for passengers and freight</li> <li>- Deployment and maintenance of assets, infrastructure and traffic management</li> <li>- Safety</li> <li>- Resilience and security</li> </ul>		

<p><b>2. Technologies transforming the transport system</b></p> <ul style="list-style-type: none"> <li>- Accelerate decarbonisation of the transport system.</li> <li>- Advance electromobility.</li> <li>- Advance automation, connectivity and digitisation.</li> <li>- Development of radical new transport technologies</li> </ul>		<p><b>2. Technologies transforming the transport system</b></p> <ul style="list-style-type: none"> <li>- Advance electromobility (Green Vehicles).</li> </ul>	<p><b>2. Technologies transforming the transport system</b></p> <ul style="list-style-type: none"> <li>- Advance automation connectivity and digitisation.</li> </ul>
<p><b>3. Global leadership, competitiveness, business models and markets</b></p> <ul style="list-style-type: none"> <li>- Competitiveness and leadership of the EU transport products, production systems and services.</li> <li>- New mobility concepts, business and operating models, mobility patterns and technologies.</li> <li>- Availability, protection/privacy and use of big data.</li> </ul>	<p><b>3. Global leadership and competitiveness</b></p> <ul style="list-style-type: none"> <li>- Development of Radical new transport technologies</li> <li>- Competitiveness and leadership of the EU transport products, production systems and services</li> <li>- New mobility concepts, business and operating models, mobility patterns and technologies</li> <li>- Availability, protection/privacy and use of big data</li> </ul>		
<p><b>4. Accounting for the people: demand, needs and behaviours; inclusion and</b></p>	<p><b>4. Accounting for the people</b></p>		



<p><b>access</b></p> <ul style="list-style-type: none"> <li>- Understanding and anticipating the dynamics of mobility and transport demand.</li> <li>- Updating and enhancing the knowledge toolbox.</li> </ul>	<ul style="list-style-type: none"> <li>- Understanding and anticipating the dynamics of mobility and transport demand.</li> <li>- Updating and enhancing the knowledge toolbox</li> </ul>		
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## **PART 2. FIRST INDICATION OF THEMES/TOPICS**

The proposed new structure for the next work programme 2018-2020 and in particular of the Mobility for Growth call is radically different from previous calls moving away from sections following a modal approach towards thematic, cross-modal sections where several mode-specific topics will be integrated together with cross-modal ones aiming to maximize the impact of research topics. This part will present, in a very preliminary form, initial ideas for research topics in each of the three calls of the next Work Programme 2018-2020. In order to make clearer the transition from the previous work programme to the new one, the presentation will show the incorporation of the parts of the previous sections (e.g aviation, waterborne, cross-modal, etc.) to the new ones, indicating the foreseen specific focus in each case.

### **I. CALL MOBILITY FOR GROWTH**

#### **1. LOW-CARBON AND SUSTAINABLE TRANSPORT**

##### *1.1 Contribution from ex-modal sections:*

- **Aviation** (possible number of topics: 1-2)

Research on aviation related issues would focus on: **a) advancements in aerodynamics in order to decrease the noise and the environmental impact of aviation** (for example, better understanding, modelling and measurement techniques on laminar-turbulent transition as well as innovative technologies on the control which could allow the design of future wings with extensive laminar boundary layer flow reducing fuel burn, emissions and noise); **b) energy harvesting aircraft technologies** (focusing on identifying, capturing, storing and re-using energy in-flight and/or during aircraft landing and taxiing which is currently lost)

- **Waterborne** (possible number of topics: 1-2)

Research related to waterborne would address: **a) aspects of next generation propulsion systems** aimed at achieving large gains in energy efficiency (focusing on radical new designs of on board energy management and the integration next generation power systems (batteries, Fuel cell CHP, alternate fuels etc) into the ship design); **b) retrofitting clean shipping technology to existing vessels**, which has a much faster impact concerning the reduction of NOX, SOX and PM pollution from shipping than measures that can only be introduced within new ships.

##### *1.2 Contribution from cross-modal sections (previous and new):*

- **Urban mobility/logistics/infrastructure/ITS** (possible number of topics: 3-4)

Research related to the above cross-modal issues could address in an integrated way: **a) Clean and connected transport/mobility for the final 25 km** addressing all transport modes,

long-distance/regional dimension and urban logistics and the possible combination of passenger and freight transport, planning aspects and demonstration activities; **b) Clean and connected/automated buses**; vehicles and infrastructure/operations; **c) Logistics solutions** that deal with requirements of the 'on demand economy' and for shared-connected and low-emission logistics operations (including metropolitan and peri-urban areas; synergies with passenger transport; drones; connected services for horizontal cooperation in the logistic supply chain: secure data exchange and access) **d) Mobility in 'megaregions' – reducing the environmental impact of commuting and inter-urban transport.**

- **SSH** (possible number of topics: 1)

Socio-economic relevant activities under this section can support the cooperation and synergies with the International Transport Forum of OECD on research related to the decarbonisation of transport;

- **New cross-modal: Reduction of transport impact on air quality** (possible number of topics: 1)

Complementing topics in previous calls on understanding and reducing emissions by road vehicles at the source (engines, brakes), a complementary, wider approach is proposed to improve emissions from road and other modes, not only from a technical but also from a social point of view. This can include improvement and demonstration of technology for sensing of pollutants for road and aviation, consumer information through green ratings, validation of definitions and boundaries of real driving, avoidance of tampering, improved understanding of health impacts of extremely fine nanoparticles for road, waterborne and aviation.

## **2. SAFE, INTEGRATED AND RESILIENT TRANSPORT SYSTEMS**

*2.1 Contribution from ex-modal sections (mode-specific safety related topics appear under "safety" below):*

- **Waterborne** (possible number of topics:1)

Research will seek to contribute to the optimization of vessels for multi modal transport in order to alleviate several existing barriers in intra-EU freight transport, such as inland waterway bottlenecks, the capability of small ports and the efficiency of transferring cargo between modes. Research will target highly innovative clean vessel concepts that will have the greatest impact on the Ten-T which can operate more effectively within intermodal logistic chains with minimal need to adapt existing infrastructure.

*2.2 Contribution from cross-modal sections:*

- **Safety** (possible number of topics: 4-5)

Safety relevant research topics could address several issues linked to: **a) Safety in an evolving road and mobility environment** (including for example the repercussions of the evolving mix

of vehicle types and road users, the need to adapt active and passive safety systems, define road safety characteristics and properties as conditions and constraints in a traffic system which is undergoing increasing automation and is highly dependent on software and connectivity, etc.); **b) Human factors in transport safety** (research will aim for example at achieving a greater understanding of safety-related human performance and behavior, particularly in the context of connected and automated vehicles, and at improving human machine interaction, address issues of HMI driver training, upgraded methods to assess and quantify human behavior, develop standardized guidelines to assess human factors within accidents, etc); **c) Innovative applications of drones for safety in transport** in order to develop and test technologies for the application of drones to increase safety, security and overall efficiency surface transport (explore and develop innovative technologies for pilot services such as transport network monitoring, (inter-) urban cargo using drones including small-scale demonstration which should underpin and expedite regulatory adaptation, standards validation and follow-on deployment in Europe); **d) Reducing safety costs in aviation and rail transport** (examining novel holistic concepts and solutions to deliver the current safety of aviation and rail transport at significantly lower costs than nowadays - including a blending of technologies, due processes and training that match prevailing societal and operational diversity, e.g. human behavior, cultural aspects, business and regulatory practices); **e) Marine Accident Response**: linked to a forthcoming revision of IMO safety rules, research would address probabilistic damage and consequence assessment, actions to maintain stability and a radical rethink of evacuation systems. With an emphasis on passenger, ro-ro and container ships research would address risk, design, detection, firefighting and regulatory issues so as to greatly enhance the management of fires at sea without recourse to external intervention.

- **Logistics/infrastructure/ITS** (possible number of topics: 2-3)

Research under this section, following up and consolidating previous calls (e.g. the Port of the Future) could examine: **a) the integration of inland waterways in the transport and logistics system**, aiming at innovative solutions which would support the modernization of inland waterways; **b) an integrated multimodal freight transport system** with a focus on clean and connected systems for distributing maritime cargo from/to ports (examine also synergies with passenger transport); **c) Towards full automated infrastructure construction and maintenance** (addressing in particular: automated transport infrastructure construction and maintenance; multidisciplinary approaches aimed at delivering step-changes in the reduction of time and cost and in the heightening of the safety, quality and flexibility of infrastructure maintenance processes – e.g. use of new materials, increased automation, improved planning under uncertainty, better training and staff protection, - possible use of robots in order to reduce road workers exposure to live traffic, automate and reduce the cost of repeatable tasks, etc.)

### **3. GLOBAL LEADERSHIP AND COMPETITIVENESS**

### 3.1 Contribution from ex-modal sections

- **Aviation** (possible number of topics: 4-5)

Research on aviation related issues would address: **a) Multi-disciplinary design tools for a new aircraft and engine design paradigm**, focusing on advanced robust multidisciplinary design capabilities for structures, systems, engines and the whole aircraft, aiming at new highly efficient commercial aircraft with minimal environmental impact. The challenge is to build the proper pyramid of multidisciplinary models at each stage of the design, in a virtual enterprise context, in order to produce the best overall product design view; **b) Digitally disruptive avionics** using the full benefit of connectivity and on-board “information platform” with a better design assurance level (DAL). The introduction of high throughput connectivity on board, mainly driven by passenger demand, can also enable unprecedented amounts of ground and flight data for leaner and safer operations; **c) Innovative manufacturing, assembly and maintenance concepts, tools, technologies and processes for new aircrafts** aiming to offer cost-competitive and environmental friendly aviation products and services (minimization of production, assembly/de-assembly and maintenance costs, advancement of damage tolerance performance trade-offs and joining technologies, efficient structural optimisation using dynamic loads, innovative composites in primary and secondary aircraft structures, etc); **d) Aircraft systems integration for non-fossil fuel based propulsion** addressing advancement in hybrid energy management and storage, and systems integration; **e) Safer and Greener aviation in a Smaller world** with particular emphasis on international cooperation and covering: innovative technologies for improving aviation safety and certification in icing conditions, advanced structural health monitoring for aircraft maintenance and retrofit, electric & hybrid-electric aircraft – future propulsion & integration and high-speed global air transportation demonstration.

- **Waterborne** (possible number of topics: 2)

Research related to waterborne would cover activities exploring: **a) The autonomous ship** (with a view to exploiting digitisation and autonomy technologies which can bring disruptive changes to waterborne transport and provide competitive advantages to European business better integrating logistics, changing business models, improving safety and raising societal issues concerning crewing, research would address technological barriers, including interaction with infrastructure, security and safety of digital systems, regulation and full scale demonstration); **b) Improved production processes in ship building**, addressing innovative technologies for ship building including single and small series, simulation tools, automated assembly and out fitting, integration of machine vision and internet of things technology to the production and supply chain.

### 3.2 Contribution from cross-modal sections

**Intelligent transport systems (C-ITS)** (possible number of topics: 1)

Research related to C-ITS could explore next generation C-ITS messages for automated vehicles for smart, smooth and efficient traffic flows in all transport environments (“open message definitions” for all stakeholders in Europe as well as additional application specific ideas for the demonstration of the validity of the next generation messages such as for vehicle and public transport vehicle interactions or for platooning of different types of vehicles and brands, etc)

- **SSH** (possible number of topics: 1)

Socio-economic relevant research under this section could address the issue of new regulatory frameworks to enable effective deployment of emerging technologies and business models. It would focus on new approaches and regulatory frameworks that will be flexible enough to cope with the fast pace of technological change and will foster effective deployment of emerging new technologies and business models, while preserving adequate level of protection with regard to security, safety, data privacy, social protection etc.

#### **4. ACCOUNTING FOR THE PEOPLE**

This section is cross modal and it encompasses the socio-economic research section of the previous work programmes in an extended manner. At this initial stage it includes also socio-economic relevant issues directly linked to automation although it is possible that such topics could fit better in the Automated Road Transport call.

Research would address issues linked to:

- **User needs and mobility dynamics** (possible number of topics: 3)

Possible issues to be addressed cover: **a) The new roles of users in the digitally interconnected transport system**. It will examine the effects of digital technologies which put travellers at the centre of the travel process but at the same time create a digital divide for people unable to fully use all the potentialities of the ICT services offered to mobility. Research will aim at improved understanding of the needs and attitudes of various travellers - in particular vulnerable groups such as elderly or migrants - in this new digital travel ecosystem and of the skills and strategies needed in order to be able to fully benefit from it and minimize the "automotive digital divide" also between urban and rural areas; **b) demographic change and women's participation in transport**, focusing on the assessment of both specific needs and employment opportunities in the future transport system (for example, the capability of use of new technologies, the specific features needed for public transport (including diminishing the risk of violence), needs and opportunities for professional careers etc), including intersectional aspects such as gender, age, social level, ethnic origins, family composition; **c) New forms of mobility and spatial planning** examining the impact of the new forms of mobility (electro-mobility, connected and automated vehicles, shared-use mobility, etc.) on city redesign in terms of changes to the patterns of land use and urban space sharing, the creation of spatialized economic opportunities,

investments in transport infrastructure, electric charging infrastructure and collective transport, and the long term consequences for physical and social environments.

- **Updating the knowledge tool-box** (possible number of topics: 3-4)

Research could address: **a) Elaborating advanced methods and tools in support of transport/mobility researchers, planners and policy makers** (covering for example, new solutions for transport/mobility planners for on-demand, shared, low-emission transport services (including rural issues); advanced methods and tools to support the planning of novel and legacy transportation systems taking due account of land-use, environmental and social implications; scenario analyses, data and decision-making planning tools that can cater for uncertainty as well as for short and medium term trends, such as shared space, convergence shared-automated-electric transport services, smart infrastructure and operations using clean, connected and automated transport, etc); **b) Digitisation of the transport system: data sharing and analytics** (given the increasing reliance of the transport system on big data, research is needed on appropriate collection, storage and sharing methods across various stakeholders such as, for example, various types of transport cloud tools -taking into account the FAIR data principles. In addition, appropriate tools and methods allowing for extracting maximum value out of available data need to be identified); **c) Building Open Science platforms and codes of conduct in transport research**. The rapid development of digital technologies and new collaborative tools are the basis of an on-going transformation and opening up of science and research, referred to as Open Science which can accelerate the advancement and dissemination of knowledge and innovation. In this context support will be provided to networks of research organisations in the area of transport to jointly identify current practices and devise concrete approaches for operationalising Open Science, and to adopt them in the form of codes of conduct.

- **Support for transport related events** (possible number of topics: 2)

In this section there could be certain Coordination and Support Actions in support of major events such as the TRA and Aerodays.

## **5. POSSIBLE OTHER ACTIONS :**

A number of “Other Actions” will complement the Work Programme with smaller scale studies in the form of public procurement, expert groups, as well as a possible Inducement Prize on “best intra-EU solutions for enhancing the transport possibilities of persons with reduced mobility”.

## II. CALL GREEN VEHICLES – FOCUS AREA "Building a low-carbon, climate resilient future"

Possible topics (expected number of topics: 10-12) under the Green Vehicles Call would address:

- **Technologies for 3<sup>rd</sup> generation electrified vehicles optimized for their infrastructure:** research and innovation would include advanced electric/electronic and electro-mechanical architectures and the development of improved components and sub-systems for the 3rd generation of electrified vehicles.
- **Next generation and realisation of batteries for FEVs and PHEVs:** research activities would cover both **a) next generation and post-Li-ion electrochemistry** for low cost, safe, high energy and high power density battery cells. Production technologies for this new generation of batteries are also included **b) technologies for high energy density battery packs** in order to maintain the strength of European automotive supply industry in this area.
- **Urban electro-mobility:** research and demonstration would cover **a) next generation electric vehicles** for urban use easily adaptable to different usage and allowing for optimal functionality in terms of operation, safety and efficiency. Activities will include both passenger cars and commercial vehicles and might include automated functions where applicable. **b) integrated vehicle solutions for urban mobility** in order to achieve optimal combination of transportation modes within urban trips taking into account changes in customer demand and the use of new type of energies, new organisations of the mobility and automated and connected driving. Special attention will be paid to public transport and the new generation of urban bus.
- **User centric charging infrastructure:** activities would include research and demonstration to allow drivers to have similar or even better mobility experience than with conventional fossil fuels vehicles in terms of availability, convenience, performance and costs of recharging.
- **Reducing the environmental impact of future light duty road vehicles:** To achieve real near-zero emissions capability when the internal combustion engine is active, hybridised powertrains must be optimised in view of their special characteristics, in particular discontinuous operation. On the other hand, they also need to be further optimised in terms of cost, volume and weight to make plug-in hybrids competitive with conventional vehicles.
- **Sustainable long-distance trucks and coaches:** the research and demonstration would develop next generation Heavy Duty long-distance multi-technology vehicles operated on a mix of renewable fuels and possibly hybridisation.



- **Advanced industrial processes for electrified vehicle application:** activities would address **a)** the use of new light materials along with their manufacturing and recycling processes in line with circular economy **b)** the development of a virtual product development and production environment exploiting the potential of digitization and radically new multi-disciplinary and cross-organisation approaches to vehicles design and production based on industry 4.0.
- **Support for defining a common European Research and Innovation strategy for the future of Road Transport:** activities in support of the definition of R&D roadmaps for a sustainable and efficient road transport system in Europe assisting also European Technology Platforms (such as ERTRAC) and the European Green Vehicle Initiative cPPP, in defining the research and innovation needs for their upcoming programmes. It would help to achieve both technological road transport targets such as electromobility and connected and automated driving and broader targets set at EU and global level (EU Transport White Paper, COP21 for decarbonisation, etc.).

### III. CALL AUTOMATED ROAD TRANSPORT – FOCUS AREA "Digitising and transforming European industry and services"

Topics within the Call on Automated Road Transport (expected number: 7-8) would address the following issues:

- **Testing, validation and certification procedures for highly automated driving functions under various traffic scenarios based on pilot test data.** There is a great need for a comprehensive approach to develop common procedures and virtual approaches for testing, validation and certifying for highly automated driving functions in various traffic scenarios.
- **Human Centred Design of AV.** Significant research efforts are addressing driver performance and behaviour in automated driving use cases where the driver is still required to be prepared to assume control (level 3 and lower). In highly automated driving (level 4) the driver is not required during defined use cases, and may take on different behaviours. Research should focus on safe and controlled transfer between use cases of different automation levels for all types of drivers.
- **Developing and testing shared, connected and automated vehicle fleets for the mobility of all.** The scope is to develop and test a fleet of shared, connected and automated vehicles providing innovative mobility services moving passengers and/or goods in urban areas. Pilot testing should include a variety of different business models/implementation scenarios which meet demands of different user groups in different regional and operating environments.
- **Developing, testing and demonstrating automated long distance freight logistics operations.** The focus of this topic is to develop, test and demonstrate automated long distance freight logistics operations going from hub to hub on public roads in mixed traffic and at terminal logistics sites.
- **Large-scale, cross-border demonstration of highly automated driving functions for passenger cars.** Based on ongoing demonstration pilots, new large-scale, cross-border demonstration projects will be needed, which focus on highly automated driving technologies (automation level 4) for different use cases in particularly challenging and complex environments.
- **Socio-economic and regulatory aspects of Automated Driving Systems.** This could address: **a) The expected social and economic impacts**, benefits and costs of different scenarios/use cases of connected and automated driving systems (for passengers and goods) **b) Understanding how users perceive and value** future use of connected and autonomous vehicles' for specific purposes (including issues of public acceptance); issues of **certification and regulation** (for example virtual certification approaches, verification of safety and regulatory compliance, etc) **c) the employment effects of the introduction of connected and automated vehicles** (assessing the possible direct and indirect impact of the adoption of connected and automated vehicles on jobs in

the transport sector including changes in work patterns, business models of automakers, logistic chains, etc.

- **Cooperation and networking activities in support of road automation.** This action will help to set up new cooperation and networking activities at EU and International level (e.g. conferences, work on research issues, global framework and standardisation, etc.) or support existing ones (e.g. the tri-lateral working group on road automation).