

Main action area (2): Automation and Connected Driving

Roadmap on Automation and Connected Driving

Main action area (2): Automation and Connected Driving				
Action Field (1) Technical and Operational Layers of Mobility	Action Items			Responsible Stakeholders
	Short term (2020)	Mid-term (2025)	Long term (2030)	
1,a) Vehicles	<p>Promote technological development by adding further research topics to FP9, e.g. sensors, artificial intelligence, machine learning, predictive maintenance, enabling Mobility everywhere for everyone. This concerns especially</p> <ul style="list-style-type: none"> developing improved safe and secure vehicle software and electronics (e.g. sensors) allowing adequate testing and learning phases of control software of automated vehicles under real driving conditions. At the same time, fostering solutions which reduce the number of individual vehicles on the road and hence, the complexity of real driving situations <p>fostering research and development of technologies to compen-</p>	<p>Facilitate the development of pilots for fully automated vehicles in cities and rural areas and promote automated vehicles in public transport and automated E-Trucks by</p> <ul style="list-style-type: none"> supporting innovation and testing of vehicles and infrastructure (sensors etc.) creating a policy framework including security and safety aspects for automated vehicles in public areas <p>Promote safety enhancement in automated and connected transport by</p> <ul style="list-style-type: none"> extensive testing of self-learning systems for automated and connected transport in terms of ethical compliance of its decisions <p>providing training in automated driving for transportation providers, administrators, etc.</p>	<p>Implement automated transport across EU by means of the rollout of good practices agreed upon.</p>	<ul style="list-style-type: none"> Industry R&D community Policy makers

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	state drivers' inattentiveness			
		Foster inclusive use of automated and connected vehicles by performing a comprehensive design-to-needs analysis. Prioritize and implement research into how vehicle automation can support an ageing population. Bring this to market.		<ul style="list-style-type: none"> • Industry • R&D community • User representatives • Policy
	Foster higher efficiency and operating capacity in rail transport thus supporting also modal shift especially in freight by <ul style="list-style-type: none"> • funding and performing projects for automated railway maintenance (vehicle and infrastructure) • initiating further R&D on automated transfer of goods between modes (e.g. automated robots) 	Enhance efficiency and operating capacity in rail transport by <ul style="list-style-type: none"> • developing automated trains for freight and passengers based on experience in airtrain and subway solutions • running first pilots for automated transfer of goods between modes 	Enhance impact regarding modal shift by installing full automated multi-modal logistics center, including automated (re)packaging.	<ul style="list-style-type: none"> • Policy makers • Industry • R&D community • Shippers of goods • Freight operators
		Enhance safety in air transport by increasing the degree of automation in commercial flight operations incrementally (auto pilot will take over more tasks during the flight, e.g. take-off and landing procedures).		<ul style="list-style-type: none"> • Industry • Operators • R&D community

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1,b) Infrastructure	Promote the development of infrastructure for automated transport (road, rail) by increasing the number of projects and pilot regions for testing, e.g. of infrastructure-supported automated driving and of rail tracks for autonomous trains.	Intensify the development and use of automated trains and automated road vehicles including busses in the European transport system by continuously supporting more investment and funding programs for respective solutions. Further exploit possibilities for conversion of existing infrastructure into smart infrastructure enabling the integration of new mobility services and at the same time, deployment of new smart infrastructure. Ensure IT security.	Evaluate pilot regions of automated transport (road, rail) and foster investments into the infrastructure for automated and connected driving by providing a comprehensive cost analysis for certain user scenarios, based on experiences from pilots. Promote roll-out of good practices.	<ul style="list-style-type: none"> • Policy makers • R&D community • Industry • Operators
1,c) Transport offers	Research and demonstrate possibilities for enhancing last-mile transport by autonomous vehicles (robot cars/drive robots), autonomous drones for freight etc.	Improve door-to-door transport services by integrating automated vehicles in multi-modal seamless transport chains, e.g. for last mile transport with autonomous drive robots and automated freight drones, especially in low dense rural areas.		<ul style="list-style-type: none"> • Industry • Mobility providers • R&D community • Operators • Freight service operators
	Optimize the transport system and traffic management by <ul style="list-style-type: none"> • developing smart strategies for the exploitation of Big Data solutions that take into ac- 	Enable smart travel demand management through Big Data analytics and artificial intelligence by creating intelligent decision support systems for pas-		<ul style="list-style-type: none"> • Industry • R&D community • Operators

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	count and forecast user needs (e.g. the ability of users to make informed decisions) <ul style="list-style-type: none"> integrating sensors and using proactive traffic management including re-routing options. 	sengers and transport operators.		

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Action Field (2) Societal Aspects of Mobility	Action Items			Responsible Stakeholders
	Short term (2020)	Mid-term (2025)	Long term (2030)	
2,a) Policy and regulatory framework	Facilitate the use of fully automated vehicles on public roads and across borders by <ul style="list-style-type: none"> assessing the needs for a regulatory framework to accommodate the roll-out of automated (urban) transport and mixed traffic solutions preparing development of legal and regulatory framework for automated driving, focussing on controversial 	Promote the roll-out of automated driving by <ul style="list-style-type: none"> developing legal and regulatory framework for the use of automated vehicles on public roads in Europe which ensures safety for all road users and enables the exploitation of the potential of automated and connected driving. Focus is on the coexistence between automated 	Adapt and optimize the legal and regulatory framework for automated and connected driving according to experiences in pilots.	<ul style="list-style-type: none"> Policy makers Industry R&D community

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	situations and questions, e.g. product liability and data ownership, by means of an ethical board/commission or the establishment of a dialogue with existing ones <ul style="list-style-type: none"> creating conditions to start pilots for fully automated vehicles in cities and rural areas that provide the opportunities to make experiences with automated driving and accordingly, the basis to adapt legal framework and/or find new regulations as required. Define liabilities in case of accident/incident (transparency, safety). 	and non-automated vehicles in mixed traffic solutions. <ul style="list-style-type: none"> anticipating regulation needs and exploring needs for access regulations providing transparency to all stakeholders by revealing legal framework on automated and connected vehicles in the EU and member states for all recommended solutions strive for greatest possible harmonization between member states. 		
	Enable real-time communication between vehicles and infrastructure and efficient processing of high data volumes by promoting the implementation of an efficient standardized 5G mobile communications network. Support existing activities for legal clarification of 5G roll-out in EU and the im-			<ul style="list-style-type: none"> Policy Industry R&D community

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	Implementation of the “5G For Europe” Action Plan from the European Commission, especially regarding the coordination of activities in the member states.			
2,b) User perspective	Improve users’ acceptance and confidence in automation by <ul style="list-style-type: none"> exploring the conditions for users acceptance and adoption of automated vehicles and new mobility services raising awareness for benefits and informing about developments communicating the clearing of safety and security as well as ethical concerns to the public assessing user perspectives in terms of regulatory changes and new legal framework needed to make users feel comfortable with automated driving supporting automation in public transport and sharing concepts and hence, allowing first experiences of users 	Support users to understand the impact of automation on sustainability and seamless transport by <ul style="list-style-type: none"> including automated transport in planning tools using automation as an incentive for public transport and shared mobility developing convenient sharing concepts through automated maintenance of vehicles and defining ways for implementation 		<ul style="list-style-type: none"> Policy makers Industry R&D community User representatives Operators

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	<p>with automated transport. The driver should still be present in autonomous public transport vehicles or shuttle services to make people feel more comfortable but - instead of driving- can provide services supporting to the users to facilitate transport.</p> <ul style="list-style-type: none"> • providing trainings for drivers of automated vehicles, especially in transport companies, and for administration • exploring the impact of automation on jobs and supporting related projects in the dissemination of results. 			

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Action Field (3) Multi-Stakeholder Interaction and Processes	Action Items			Responsible Stakeholders
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3,a) Collaboration of Stakeholders	<p>Exploit potentials and address risks of automated driving with a focus on mixed traffic solutions and support safety issues for all road users by</p> <ul style="list-style-type: none"> • initiating a dialogue between stakeholders and municipalities on the potentials of automated driving and preconditions to create for enabling the use of automated cars in urban areas. • discussing issues of safety and possible social consequences of automated and connected driving with relevant stakeholder groups, municipalities and users. • creating an ethical board for automated and connected transport built upon a broad coverage of society for discussing and clearing ethical dilemmas. Find agreements on controversial situations and give recommendations for legal framework. Establish cooperation between this 	<p>Sustaining the dialogue between stakeholders through continuously monitoring developments in R&D and tests and pilots. Issues for discussions have to be updated and specified and discussed with a broad stakeholder base.</p>		<ul style="list-style-type: none"> • Industry • R&D community • Operators • Policy makers • User representatives

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	board and the European HLE on Artificial Intelligence.			
	Promote automated maintenance for vehicles and infrastructure in public transport by <ul style="list-style-type: none"> providing strategy meetings between manufacturers and cities for planning implementation and clearing financing issues of automated maintenance defining roles of hubs and warehouses in automated transport 	Increase safety, predictability and resilience of public transport through the support of automated maintenance for vehicles and infrastructure by <ul style="list-style-type: none"> implementing means to secure data and promoting research on technical measures for the improvement of quality of data sensed by monitoring tools agreement on an EU wide database with static and dynamic data to capture each infrastructure component's current state sharing data, techniques and methods with responsible stakeholders 		<ul style="list-style-type: none"> Policy makers Operators Freight service operators R&D community
3,b) Standardization	Foster the use of automated trains for passengers and freight across borders by defining harmonized standards for rail vehicles and infrastructure in the legal framework by manufacturers and customers.		Standardize and homologate automated systems in all modes (vehicles, infrastructure, other systems as e.g. for maintenance).	<ul style="list-style-type: none"> Policy makers Industry R&D community Standardization bodies

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	Increase usability of cooperative ITS across borders and hence traffic safety and energy efficiency in the European transport system by <ul style="list-style-type: none"> • supporting standardization activities for V2X Day-2 applications and bringing the user perspective into dedicated meetings for exchange between experts and users and standardization committees • exploring potentials to create standardized interfaces for data transfer and communication between modes in a discussion of relevant stakeholders 			<ul style="list-style-type: none"> • Industry • R&D community • Policy • User representatives • Standardization bodies