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(Resolutions, recommendations and opinions)

RESOLUTIONS

EUROPEAN PARLIAMENT

P8_TA(2019)0005

Autonomous driving in European transport

European Parliament resolution of 15 January 2019 on autonomous driving in European transport (2018/2089(INI))

(2020/C 411/01)

The European Parliament,

— having regard to the Commission communication of 17 May 2018 entitled 'On the road to automated mobility: An EU strategy for mobility of the future' (COM(2018)0283),

— having regard to the Commission communication of 30 November 2016 on a European strategy on Cooperative Intelligent Transport Systems, a milestone towards cooperative, connected and automated mobility (COM(2016)0766),

— having regard to its resolution of 1 June 2017 on internet connectivity for growth, competitiveness and cohesion: European gigabit society and 5G [1],

— having regard to its resolution of 13 March 2018 on a European strategy on Cooperative Intelligent Transport Systems [2],

— having regard to Rule 52 of its Rules of Procedure,

— having regard to the report of the Committee on Transport and Tourism and the opinions of the Committee on the Internal Market and Consumer Protection, the Committee on Legal Affairs and the Committee on Industry, Research and Energy (A8-0425/2018),

A. whereas the EU strategy on connected and automated mobility is closely linked to the Commission's political priorities, notably those of its agendas for jobs, growth and investment, research and innovation, the environment and climate change, clean and safe mobility and transport, road safety and traffic decongestion, the digital single market and the Energy Union;

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[1] OJ C 307, 30.8.2018, p. 144.
[2] Texts adopted, P8_TA(2018)0063.

B. whereas the rapid pace of technology development, both in the transport industry and in the robotics and artificial intelligence sector, has a significant impact on the economy and society; whereas autonomous vehicles will significantly change our daily life, determine the future of worldwide road transport, reduce transport costs, improve road safety, increase mobility and reduce environmental impacts; whereas the road transport sector could open the door to new services and modes of transport, thus satisfying the growing demand for individual mobility and goods transport, and could even help revolutionise urban planning;

C. whereas the Commission aims to halve the number of annual road fatalities in the EU by 2020 compared to 2010, in line with the Vision Zero objectives; whereas progress in reducing the total numbers of fatalities and injuries seems to have stagnated recently, considering that in 2016 more than 25 000 people lost their lives on roads in the EU while a further 135 000 were seriously injured; whereas our cities are facing major mobility problems that are being compounded by pollution and climate change;

D. whereas advanced driver assistance systems such as lane departure warning and automatic emergency brakes have already proven to contribute to road safety and to reducing the numbers of severe accidents;

E. whereas the overwhelming majority of road accidents are due to human error and, as such, there is an imperative need to reduce the possibilities for such accidents, by requiring the use of advanced vehicle systems which improve safety while maintaining personal mobility;

F. whereas the positive trend in road safety that the EU has witnessed over the past decade has slowed; whereas road transport is still responsible for the bulk of transport emissions, in terms of greenhouse gases and air pollutants;

G. whereas transport needs, for both passengers and freight, are increasing all over the world, in a context of greater awareness of the limits of our planet's resources, and whereas the efficiency of transport will, therefore, become an increasingly crucial issue;

H. whereas the EU should encourage and further develop digital technologies for automated mobility to offset human error and reduce traffic incidents and road fatalities;

I. whereas automation and deployment of new technology will increase the safety of transport and transport systems and eliminate some of the human factors involved; whereas in parallel with automation, both the diversity and the condition of transport systems in different Member States should be taken into account; whereas new transport systems need to be built and both new and existing transport systems equipped with adequate safety features before automation can be rolled out;

J. whereas automation levels exist, levels 1 and 2 already being on the market, but the conditional, high and full automation levels (when a vehicle becomes self-driving) are expected to become available only in 2020-2030, and whereas driver assistance systems are therefore important as an enabling technology on the path towards full automation;

K. whereas it is necessary to invest both at research stage and at the subsequent development stage in order to improve the available technologies and implement a safe, intelligent transport infrastructure;

L. whereas several countries around the world (e.g. the US, Australia, Japan, Korea and China) are moving rapidly towards making both connected and automated mobility available on the market; whereas Europe needs to respond much more proactively to the rapid developments in this sector, to encourage initiatives and to promote stringent safety requirements for all traffic participants travelling by sea, waterway, road, air or rail and using mixed-mode transport;

M. whereas the Commission expects the new market for automated and connected vehicles to grow exponentially, with revenues estimated to exceed EUR 620 billion by 2025 for the EU's automotive industry and EUR 180 billion for its electronics sector;

N. whereas the Declaration of Amsterdam (2016) outlines cooperation between the Member States, the Commission and industry in the field of connected and automated driving;

O. whereas autonomous transport covers all forms of remotely piloted, automated and autonomous means of road, rail, air, sea and inland waterway transport;

P. whereas the Commission communication on the road to automated mobility constitutes an important milestone in the EU strategy for connected and automated mobility;

Q. whereas emphasis must be placed on autonomous mobility, given that fully autonomous vehicles will bring noticeable road safety benefits and will be able to operate without connected functionalities; whereas ancillary capabilities and services may still require digital communication;

R. whereas the roll-out of autonomous vehicles, expected already in 2020, will bring considerable benefits, but also entails a variety of new risks, namely regarding road traffic safety, civil liability and insurance, cybersecurity, intellectual property rights, data protection and data access issues, technical infrastructure, standardisation, and employment; whereas it is impossible to predict the full extent of the long-term impact of autonomous mobility on jobs and the environment; whereas it is of crucial importance to ensure that the EU legal framework is suitable to respond appropriately to those challenges and to increase public awareness and acceptance of autonomous vehicles;

S. whereas the ethical issues surrounding the use of these technologies make it necessary to develop guidelines for the deployment of artificial intelligence, together with systems to ensure that these ethical issues are addressed coherently;

General principles

1. Welcomes the Commission communication on the road to automated mobility, which lays out an approach to make the EU the world leader in the deployment of safe systems for automated mobility, increasing road safety and efficiency, combating congestion, reducing energy consumption and emissions from transport, and gradually phasing out fossil fuels;

2. Recognises the initial steps taken by the Commission and Member States on automated mobility of the future and acknowledges the legislative initiatives regarding the ITS Directive ([1]) and the proposed revisions of the road infrastructure safety management directive ([2]) and the general safety of motor vehicles regulation ([3]);

3. Affirms the important role of cooperative intelligent transport systems (C-ITS) in providing connectivity for Society of Automotive Engineers (SAE) level 2, 3 and possibly 4 automated/autonomous vehicles; encourages the Member States and industry to further implement C-ITS, and calls on the Commission to support the Member States and industry in deploying C-ITS services, notably through the Connecting Europe Facility, the European Structural and Investment Funds and the InvestEU programme;

4. Highlights the innovation potential of all autonomous means of road, rail, waterborne and air transport; underlines the need for European actors to join forces in order to reach and maintain a position as a global leader in autonomous transport; notes that advances in autonomous mobility, particularly in road transport, require the synergistic cooperation of many sectors of the European economy, including vehicle manufacturing and the digital sectors;

5. Acknowledges the significant potential of automated mobility for many sectors, offering new business opportunities for start-ups, small and medium-sized enterprises (SMEs), and the industry and enterprises as a whole, in particular in terms of the creation of new mobility services and employment possibilities;

([1]) OJ L 207, 6.8.2010, p. 1.
([2]) COM(2018)0274.
([3]) COM(2018)0286.

6. Underlines the need for the development of autonomous vehicles that are accessible for persons with disabilities and reduced mobility (PRMS);

7. Urges the Commission to present a strategy, particularly regarding data, data access and cyber security, as per Parliament's resolution of 13 March 2018 on a European strategy on C-ITS, ensuring a technology-neutral, market-ready approach; recognises the opportunities presented by the Commission's upcoming recommendations on access to in-vehicle data and resources;

8. Affirms the need to explore legislative actions to ensure fair, secure, real-time and technology-neutral access to in-vehicle data for some third party entities; takes the view that such access should enable end users and third parties to benefit from digitalisation and promote a level playing field and security with regard to storage of in-vehicle data;

9. Notes that similar questions in relation to intellectual property rights and corresponding usage rights will arise in respect of artificial intelligence for the purpose of autonomous mobility as in other areas, such as proprietary or usage rights to code, data and inventions created by the artificial intelligence itself; considers, however, that solutions which are as general as possible should be found to these questions;

10. Draws attention to the need, when drafting the new legislative framework on the regulation of autonomous mobility, to ensure that any obstacle to furthering technological progress, research and innovation can be overcome;

11. Points out that the Commission communication on the road to automated mobility lacks analysis of and proposals for autonomous vehicles in all modes of transport; calls on the Commission to ensure mode-specific analyses and strategies, including in the fields of intermodal transport and mobility;

12. Calls on the Commission and the Member States to enlarge their policies on autonomous driving so as also to include collective transport, as well as to expand their vision to cover all modes of transport;

13. Welcomes the work done at the Council High Level Meetings on autonomous driving and would like to see that work extended also to address modes of transport other than road transport;

14. Underlines that technical standards for vehicles and infrastructure (e.g. traffic signs, road markings, signalling systems and C-ITS) should be developed and aligned at international, EU and national level, building on existing work and forums to prevent duplication, based on the principles of an open, transparent and technology-neutral approach, increasing road safety, and ensuring seamless cross-border interoperability;

15. Notes that reliable in-vehicle and route data are fundamental building blocks for the achievement of both autonomous and connected driving in a single European transport area and for competitive services for end users; urges the Commission, therefore, to ensure that obstacles to the use of such data are dismantled and a robust regulatory system in this respect is put in place before 1 January 2020, ensuring the same data quality and availability across Member States;

16. Notes the urgency of providing legal certainty for both users and stakeholders as regards the conformity of autonomous vehicles with key existing legislation, with particular reference to ePrivacy legislation and the General Data Protection Regulation [1]; calls on the Commission to specify which categories of information generated by autonomous vehicles are to be treated as open data and made available in real time, and which are to be treated as confidential;

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[1] OJ L 119, 4.5.2016, p. 1.

17. Highlights the importance of ensuring that users have control over and access to both personal and in-vehicle data produced, collected and communicated by autonomous vehicles; stresses that consumers must be offered a maximum level of cyber protection;

18. Stresses the expected massive increase in data produced by and gathered and transmitted from autonomous vehicles, and underlines the need to use these data, in particular non-personal and anonymised data, to facilitate the deployment of autonomous vehicles and to further develop innovations within the framework of new mobility solutions; points out that the protection of privacy and sensitive data generated by autonomous vehicles must be an absolute priority;

19. Underlines that fully autonomous or highly automated vehicles will be commercially available in the coming years and that appropriate regulatory frameworks, ensuring their safe operation and providing for a clear regime governing liability, need to be in place as soon as possible in order to address the resulting changes, including interaction between autonomous vehicles and infrastructure and other users;

20. Notes that the existing liability rules, such as Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products [1] (the Product Liability Directive) and Directive 2009/103/EC of the European Parliament and the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability [2] (the Motor Insurance Directive), were not developed to deal with the challenges posed by the use of autonomous vehicles and stresses that there is growing evidence that the current regulatory framework, especially as regards liability, insurance, registration and protection of personal data, will no longer be sufficient or adequate when faced with the new risks emerging from increasing vehicle automation, connectivity and complexity;

21. Takes the view that, in the light of the dynamic technological changes in the sector, there is a need to clarify who should bear the damage in the event of accidents caused by fully autonomous vehicles, and when the level of autonomy is such that the vehicle can operate either fully autonomously or be driven by a driver it must be established beyond a shadow of a doubt who the responsible party is in each specific scenario; stresses that there is a particular need to examine whether the view that a very small proportion of all accidents has so far been attributable to technical factors would justify a shift in liability to the manufacturer which, as a risk factor that is independent of negligence, can be linked simply to the risk posed by bringing an autonomous vehicle onto the market; stresses also that there is a further need to examine whether specific road safety obligations on the part of the vehicle owner and instruction obligations applicable to the driver in each case might adequately compensate for this liability shift; calls, therefore, on the Commission to carry out a thorough assessment, to adapt the current EU legal framework and to introduce, if necessary, new rules on the basis of which responsibility and liability are allocated; calls also on the Commission to assess and monitor the possibility of introducing additional EU instruments to keep pace with developments in artificial intelligence;

22. Maintains that global navigation satellite system (GNSS)-based technologies and the Galileo project have an important part to play in improving the interaction and interoperability of on-board and network digital systems; calls for the remaining satellites to be finalised and launched as soon as possible, so that the European Galileo positioning system can be used as the default positioning system in automated vehicles;

23. Notes that universal access to automated mobility technologies will not be possible without access to high-speed internet and 5G networks; regrets that there are regions where the roll-out of the current generation of 4G networks is still lagging behind expectations, especially in rural areas;

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[1] OJ L 210, 7.8.1985, p. 29.
[2] OJ L 263, 7.10.2009, p. 11.

Road transport

24. Recalls the new safety rules contained in the guiding principles for human machine interface proposed in the GEAR 2030 final report;

25. Underlines the need for road safety legislation at United Nations Economic Commission for Europe (UNECE), EU and national level to be primed to support technological innovations and autonomous driving as soon as possible, so as to reduce human error, traffic incidents and road fatalities;

26. Underlines the importance of adopting an ambitious new General Safety Regulation for motor vehicles, given the short-term life-saving potential of the mandated installation of new vehicle safety technologies, which will, furthermore, also be used for the deployment of connected and automated vehicles (CAVs) in the future;

27. Recalls that the development of CAVs has largely been driven by the technology push; stresses the need to study and acknowledge the human and societal aspects of CAV development and ensure that their deployment fully respects societal, human and environmental values and goals;

28. Urges the Commission and the Member States, bearing in mind the importance of mobility in the EU, to reach a common position and to cooperate in order for the EU to take and maintain a leading role in the international technical harmonisation of automated vehicles within the framework of the UNECE and the Vienna Convention, in particular in all discussions by the UNECE World Forum for Harmonisation of Vehicle Regulations (Working Party 29) and the Working Party on Automated/Autonomous and Connected Vehicles (GRVA);

29. Underlines that market surveillance procedures related to automated vehicles throughout their lifetime should be as standardised, transparent and verifiable as possible, including cross-border testing performed on open roads and in real driving conditions as well as periodic roadworthiness tests;

30. Underlines the need for clear legislation, that is regularly reviewed, updated where necessary, and harmonised, obligating the installation of event data recorders in line with the revised General Safety Regulation in order to improve accident investigations and to clarify and enable the tackling, as soon as possible, of issues of liability; notes that these event data recorders are necessary to determine the responsibilities of the different actors involved in the event of an accident;

31. Highlights the necessity of incorporating safeguard systems right from the transition phase, during which automated vehicles will coexist with vehicles with zero connectivity and zero automation; stresses the importance of driver assistance systems as a step towards fully automated driving, in order even now to prevent road accidents by means of active safety systems or mitigate the seriousness of accidents by means of passive safety systems;

32. Calls on Member States to provide safe, high-quality road infrastructure, which will facilitate the use of automatic and autonomous vehicles;

33. Calls on the Commission and Member States to ensure that all systems that include digitally communicated road traffic information are interoperable;

34. Underlines the emerging concerns over user complacency when using vehicles that require a degree of driver intervention; calls for better clarification of the definition and differentiation of requirements of 'vehicles with advanced driver-assistance systems' (SAE levels 1 to 3) compared with 'automated vehicles' (SAE levels 4 to 5) in road safety legislation, and for further studies to be conducted on the feasibility and safety of level 3 automated vehicles, especially regarding the issue of signalling the need for intervention to the driver and dangers that can arise from any delays in intervening;

35. Calls on the Commission to lay down clear ethical guidelines for artificial intelligence;

36. Calls on the Commission to develop responsibility criteria and safeguard systems to protect people, in order to provide a coherent approach to the ethical issues surrounding autonomous systems for automated vehicles;

37. Stresses that ethical aspects of self-driving vehicles need to be addressed and resolved by the legislator before these vehicles can be fully accepted and made available in traffic situations; emphasises, therefore, that automated vehicles need to undergo a prior assessment to address these ethical aspects;

38. Highlights the congestion challenges to urban mobility expected to result from a widespread uptake of autonomous vehicles; considers that autonomous vehicles and solutions such as car sharing and ride hailing should contribute to addressing these challenges; calls on authorities to develop policies to ensure that autonomous vehicles improve travel options, including public transport and other solutions, for all citizens;

39. Stresses that platooning has a promising future, as it saves fuel and energy and improves road safety, and therefore calls on Member States, the Commission and the industry to implement the measures set out in the Declaration of Amsterdam; calls on the Commission to propose a regulatory framework to promote vehicle-to-everything (V2X) connectivity for highly and fully automated vehicles (e.g. platooning), especially in long-haul road transport;

40. Argues that both passive and active safety features in autonomous vehicles have an important role in reducing the number of collisions, and injuries and fatalities resulting from collisions, since collisions may still occur, especially during the intermediate mixed-traffic stage; calls on the Commission and Member States to increase road safety;

41. Underlines the risks pertaining to a growing trend of mixed traffic featuring both traditional and autonomous vehicles, thus calling for more on-site tests in order to support future-proof research and development by public and private enterprises and bodies, but also to provide concrete data helping to duly adapt civil liability rules;

42. Underlines that a possible solution to address the existing gaps and shortcomings could be the setting up of a no-fault insurance framework for damage resulting from autonomous vehicles;

43. Stresses that, as stated in its resolution of 16 February 2017 on civil law rules on robotics [1], there should be no limitation of liability regarding the nature and extent of the damage to be compensated in order to guarantee adequate victim protection;

Air transport

44. Highlights the recently adopted EASA Regulation [2] on the updated aviation safety rules which include, among other things, provisions offering a sound legal basis for the first-ever set of comprehensive EU rules for all kinds of civil drones; recalls how very necessary the adoption of the EASA Regulation was, given that new technologies, such as unmanned aerial vehicles (UAVs), are also appearing in European skies, and that it required the adaptation of the current EU regulatory framework and diverging national rules;

45. Urges the Commission also to present without delay detailed rules for automated aircraft, which require specific and tailor-made specifications, given that a single UAV and operational approach is not appropriate to ensure the safe integration of automated aircraft into airspace shared with manned aircraft; recalls that UAVs will need safe, and where appropriate, certified intelligence systems, as well as a specific air space management environment; stresses that such rules applicable to UAVs should also take into account the nature and risk of the operation or activity, the operational characteristics of the unmanned aircraft concerned and the characteristics of the area of operations, such as population density, terrain characteristics, and the existence of buildings and other sensitive infrastructure;

46. Points to the importance of protecting personal data when automated aircraft are used in the aviation sector;

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[1] OJ C 252, 18.7.2018, p. 239.
[2] OJ L 212, 22.8.2018, p. 1.

47. Recalls the 2016 Warsaw Declaration on Drones as a lever for jobs and new business opportunities; reiterates the importance of the planned actions to develop the EU drone ecosystem, which are expected to be in place by 2019, and to build on the guiding principles of the Riga Declaration;

48. Points to the importance of coordinated development of technologies and operating concepts that will enable aircraft to be safely integrated for the purposes of air traffic management services in line with the aims of U-Space, a programme run by the SESAR Joint Undertaking (SESAR JU); acknowledges the activities carried out to date by the SESAR JU, which should continue to be supported;

49. Recalls that funding for current research and experimentation programmes concerning UAVs, such as U-Space, will have to be increased in future budgeting periods; notes that these experiments, which have made it possible to test the deployment of a large fleet of UAVs in real-life conditions while ensuring maximum safety in air-traffic management and the attendant security conditions, could serve as an example for experiments on autonomous surface vehicles;

50. Notes that it is necessary to create suitable test areas for autonomous aircraft technologies, including drones, in order to provide safe conditions for simulating new technological solutions before their final implementation;

Sea and inland waterway transport

51. Underlines the potential and added value of autonomous ships, especially on inland waterways and in short-sea shipping, which can lead to a decrease in the number of accidents at sea and on waterways, most of which stem from human error;

52. Underlines the potential of automation to eliminate a portion of human error and to allow personnel on the bridge more time for optical observation, especially in narrow sea lanes and port areas; stresses, however, that information exchange and communication are imperative to safety, especially in close proximity with other ships, and therefore that bridges need to be kept staffed;

53. Welcomes the work of the PIANC working group on smart shipping and the International Network for Autonomous Ships;

54. Calls on the Commission to outline and define the levels of automation for both inland and sea navigation and common standards, including for ports, in order to harmonise and stimulate the uptake of autonomous vessels in interaction with automated and non-automated users and infrastructure;

55. Emphasises the importance of developing and expanding digital hubs and interconnected Trans-European Transport Networks (TEN-T) corridors by means of up-to-date terminal facilities and efficient electronic traffic management systems, such as River Information Services and the RhinePorts Information System (RPIS), in order to achieve a fully multimodal autonomous transport system;

56. Calls on the Commission to develop a comprehensive strategy with the aim of stimulating further automation in inland shipping, its infrastructure, fairways and traffic management and the development of automated ports, taking into account the position of inland ports as multimodal hubs when preparing the Digital Inland Waterway Area (DINA);

57. Calls for more support for and promotion of cross-border test areas, as well as for more projects like NOVIMAR and Maritime Unmanned Navigation through Intelligence in Networks (MUNIN), co-funded by the EU under its Seventh Framework Programme and Horizon 2020 to further develop autonomous shipping and automated infrastructure technology in the EU;

58. Stresses that the standards applicable to vessels must be developed with, and aligned with those of, the International Maritime Organisation in order to establish an international legal framework for the safe operation of ships;

Rail transport

59. Calls on the Commission, in consultation and coordination with the industry and other stakeholders, to create common protocols and standards enabling autonomous train and light-rail systems;

60. Calls for improvements to the framework conditions for autonomous vehicles in rail transport and for the transition to a digital rail sector to be accelerated; notes that the European Train Control System (ETCS) serves as the basis for automation in the rail sector, which is achieved by linking the ETCS to automatic train operation (ATO); urges the Commission to accelerate and prioritise the deployment of the ETCS in existing and future EU funding schemes;

61. Emphasises the importance of digital interlockings as an important new milestone to foster the digitalisation of railway infrastructure, and calls on the Commission and Member States to support this deployment;

62. Calls on the Commission to continue the Shift2Rail programme with a view to providing for further developments towards a digital rail network and fully automated train operation, including the development of a standard for ATO over ETCS and of cybersecurity;

63. Underlines the growing challenges to urban mobility related to congestion, as well as the opportunities afforded by rail-based automated public transport systems to tackle those challenges; calls on the Commission and the Member States to promote and support projects addressing those challenges through rail-based automated public transport innovations;

Consumer rights and competitive conditions

64. Calls on the Commission to create comprehensive rules setting out the responsibilities and rights of manufacturers, drivers and operators at every level of automation across all modes of transport; underlines that those responsibilities need to be communicated to drivers or operators in a clear, self-explanatory manner through commercial labelling or other forms of communication; considers it essential to ensure the safety of vehicles and their regular maintenance throughout their life cycle and points out the enabling role of fair market access to in-vehicle data and resources for relevant stakeholders in this regard;

65. Calls on the Commission to ensure that all systems in autonomous vehicles are designed in such a way as to enable vehicle owners or users to choose freely between competing service providers, without having to rely solely on the services offered by the vehicle manufacturer;

66. Stresses the need to guarantee fair market access for independent automotive service providers in the area of the servicing and repair of autonomous vehicles; recalls that entities of this kind, in particular, parts manufacturers, small workshops and service centres, are an important competitive element in the automotive market and have a positive impact on the availability and prices of these services;

67. Notes that in a digitised automotive services market, direct and timely access to data and functions in the vehicle will determine whether the market for automated and combined mobility services will be subject to fair competition; recalls that independent operators play a very important role throughout the automotive supply chain;

68. Predicts that competition on the single market in the autonomous vehicle servicing industry could be put at risk if manufacturers make it difficult for independent repairers to access the systems installed in these vehicles; stresses that this market segment should be subject to the provisions of Commission Regulation (EU) No 461/2010 ([1]);

69. Stresses that consumers should be informed in advance about the vehicles they purchase and the repair services they can access;

([1]) OJ L 129, 28.5.2010, p. 52.

70. Takes the view that the switch to automated vehicles, besides its positive impact on road safety, fuel consumption, the environment and the creation of new employment in the telecommunication and automotive sectors, might also lead to job losses in the transport sector and have negative consequences on the insurance sector, which must be tackled as soon as possible to ensure a smooth transition;

Research and educational needs

71. Stresses the need to develop key autonomous technologies (e.g. formalisation and simulations of the human brain and cognition when driving, environmental perception systems and artificial intelligence) in the EU to keep up with global competition and create new jobs;

72. Emphasises the fact that once available on the market, automated vehicles will have a deep impact on the distribution and consumption of goods; considers, therefore, that there is an urgent need to assess this impact and ensure measures to support the affected sectors and people;

73. Calls for initiatives to map and address issues of changes in employment supply and demand in view of the need for new and specialised skills both in vehicle production and professional use through educational reconversion (for instance, courses and training sessions), with a view to facilitating the transition towards new forms of mobility;

74. Urges the Commission, together with the Member States, to propose initiatives promoting the skills, education and training needed to keep the EU at the forefront of the autonomous transport sector; emphasises that it is important for Member States to take into account these newly arising trends in their educational programmes in order to respond to the need for a highly qualified and skilled workforce in the different transport sectors;

75. Recalls the EUR 300 million dedicated under Horizon 2020 to research and innovation programmes on automated vehicles from 2014 to 2020 and recommends that these programmes be continued and extended for all modes of transport in the next multiannual financial period for 2021-2027 (Horizon Europe);

76. Stresses the important role of collaborative research in ensuring the swift advancement of transport automation through the involvement of the entire innovation ecosystem;

77. Calls on the Commission to establish a Joint Undertaking along the same lines as Shift2Rail for rail transport and CleanSky for the aeronautics industry, so as to create an industry-driven strategic initiative on autonomous transport, which should be compelling for EU citizens, make significant commercial sense, leverage the EU's research and innovation potential on the basis of the wide collaboration of the industrial, public and academic spheres, and foster the development and deployment of technologies in a harmonised and interoperable manner, in order to create a globally scalable multi-modal transport system for autonomous transport;

78. Stresses the need for real-life testing sites across the EU in order to thoroughly test and develop new technologies; urges each of the Member States to designate, by 2020, urban and extra-urban areas where autonomous research vehicles can be tested in real-life traffic conditions, while safeguarding road safety in those areas, and to ensure that EU cross-border and interoperable testing frameworks are created;

79. Points out that some EU citizens have expressed distrust of automated mobility; stresses, therefore, that legislators must address the ethical dimension in order to improve public acceptance in this respect; calls for investment in extensive research on artificial intelligence and on other dimensions of automated mobility;

80. Calls for extensive research on the long-term effects of autonomous transport on issues such as consumer adaptation, societal acceptance, physiological reactions, physical responses and social mobility, reducing accidents and improving transport in general;

81. Urges all stakeholders, including vehicle manufacturers, component suppliers and software and design services, as well as the Member States and authorities involved, to cooperate in fostering innovation, in ensuring investment in infrastructure fit for automated mobility, both on highways and on city roads, and in facilitating cross-border testing; highlights the need to increase investment in adjusting current infrastructure, building new infrastructure and improving the connectedness of European roads; points out that a distrust of European citizens towards automated driving can be observed and that awareness campaigns to increase their confidence should be put in place; calls for investment in extensive research on artificial intelligence and on the ethical dimension of autonomous and connected transport;

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82. Instructs its President to forward this resolution to the Council and the Commission.