



Economic Commission for Europe**Inland Transport Committee****Eighty-third session**

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Item 7 (d) of the provisional agenda

Strategic questions of a horizontal and cross-sectoral policy or regulatory nature:**Intelligent transport systems****Draft revision of the UNECE Road Map on
Intelligent Transport Systems****Note by the secretariat***Summary*

Following the decision of the Inland Transport Committee (ITC) at its eighty-second session (ECE/TRANS/294, para 32), the ECE Secretariat initiated activities, **in close cooperation with relevant Working Parties and subsidiary bodies**, to prepare a revision of the UNECE Roadmap on Intelligent Transport Systems (ITS).

The secretariat launched consultations of the Working Parties and subsidiary bodies and requested inputs from the stakeholders by using online collaboration tools. The draft received numerous comments, despite disruptions created by the COVID-19 pandemic, that were all incorporated.

At its session in November 2020, the ITC Bureau reviewed the draft revised UNECE Road Map on ITS and recommended its submission to the ITC for consideration at its eighty-third session in February 2021.

The Inland Transport Committee may wish to:

- **consider and endorse** the draft updated Road Map on ITS for the period 2021–2025;
- **note** that, in full recognition of the fast pace of technological change and in order to ensure the relevance of the Road Map in this respect, informal consultations could be initiated by the secretariat to prepare a post 2025 document.

I. Background

1. Intelligent transport systems (ITS) are considered a part of the solution to current and future transport challenges. They are widely recognized as an efficient instrument towards achieving efficient, safe and sustainable mobility. Notwithstanding its perceived benefits, the use of various ITS solutions has faced obstacles. To overcome these challenges, the Inland Transport Committee (ITC) and the ECE secretariat launched activities for the formulation



of a common strategy for future implementation of ITS solutions. This initiative resulted in the elaboration of the 2012–2020 Road Map on ITS – 20 global actions to promote the use of ITS.

2. The Road Map on ITS outlined areas and listed activities that ECE could embark upon in addressing impediments to the broader and faster dissemination of ITS applications. At its 2020 session the ITC noted with satisfaction that the 2012-2020 Road Map on ITS encouraged ITS activities linked to infrastructure and all transport modes and contributed to addressing ITS issues in an integrated approach.

3. As the 2012-2020 Road Map on ITS had come to its conclusion, the ITC at its eighty-second session (ECE/TRANS/294, para 32) decided that an updated Road Map on ITS would be warranted and, therefore, requested the secretariat to, in close cooperation with relevant Working Parties and subsidiary bodies, prepare it for consideration in the framework of relevant Working parties and the ITC Bureau and possible endorsement at its eighty-third session.

4. Following this decision, the ECE Secretariat initiated activities, in close cooperation with relevant Working Parties and subsidiary bodies, to prepare a revision of the UNECE Roadmap on ITS. The secretariat consulted the Co-Chairs of the Informal Working Group on ITS, on the basis of the existing 2012–2020 Road Map and sought guidance on necessary amendments. The secretariat then launched consultations of the Working Parties and subsidiary bodies and requested inputs from the stakeholders by using online collaboration tools. The draft received numerous comments, despite disruptions created by the COVID-19 pandemic, that were all incorporated. The proposed text below is the outcome of the described process, as of 14 December 2020, based on the version reviewed by the Bureau of the ITC and incorporating the latest suggestions of the WP.1 Chair.

II. UNECE Road Map on Intelligent Transport Systems 2021-2025

5. This Road Map contains 18 Actions that aim to guide the work of ITC in the field of ITS during the period 2021–2025.

Action 1 - Reaching a common definition for ITS

6. Inland transport systems to which information and communication technologies have been applied to improve mobility are generically referred to as ITS. ITS systems are comprised of Information and Communications Technology (ICT) and ITS-unique applications, technologies, and communications.

7. However, the scope and nature of the framework for collecting, processing, communicating and distributing information needed to create ITS have been envisioned in a variety of ways due to differing economic and development priorities of interested Governments and institutions. Accordingly, this may lead to confusion across borders. To improve the prospect for collaboration and coordination across borders, the development and agreement upon a harmonized definition is highly desirable.

8. As a global partner, the ECE endeavours to facilitate the dialogue about ITS deployment, and, to that end, seeks to contribute to the search for a common definition that can be used by all stakeholders.

Action 2 - Harmonising policies

9. The lack of harmonized policies for ITS deployment at the global level could hamper the implementation of available approaches. Implementation should proceed now, with the caveat that the chosen approaches should not unnecessarily hinder or complicate the future transition to utilize more advanced ICT.

10. In this context, the ECE offers an advantageous platform through its intergovernmental structures (the ITC Working Parties) whose mandate includes safe,

efficient and sustainable policies relatable to dedicated legal instruments, to lead and collaborate in shaping key ITS strategies, such as harmonization and deployment. Within such a unique operative framework, ITS infrastructure and services could be more effectively planned and, coordinated, and efficiently implemented both in terms of technical regulations and legal instruments. Once implemented at national level, the ECE ITS vision conveyed through this Road Map would be a tool for offering reliable, safe and seamless, both for freight and passengers, transport at a global level.

Action 3 - Forging International Cooperation

11. The status and implementation of the UNECE Road Map on ITS until 2020 showed that Governments and stakeholders support the work of ECE in this field, especially its policy and regulatory work, as ITS is the enabler of the connected, cooperative automated mobility of the forthcoming decades. It will enhance traffic safety, by reducing the number of casualties on the roads, as expected by the Road Safety Decade of Action 2020–2030. It will facilitate environmental protection, energy efficiency, inter-modality and logistic operational optimization. It will provide the necessary outputs to reach the targets of the UN Agenda 2030, by contributing to the accomplishment of transport related goals for a safe, sustainable inclusive mobility, as well as the quality of life. In addition, ECEs bridging function as regulatory platform for transport harmonised policies, has proved to be fundamental, especially with reference to the cross-border international cooperation with non- European Union countries of ECE neighbouring regions.

Action 4 - Facilitating interoperability via ITS Reference Architecture

12. Innovative digital technologies in various transport fields are rapidly developing. Given that the design and industrial development cycle of innovative technologies is often shorter than the policy cycle, national regulatory authorities may lag behind. This is particularly evident at the international level and could lead to technical fragmentation and eventual interoperability issues within and across countries. Therefore, efforts to develop and implement guidelines, regulations and agreements on technical and technological compatibility and neutrality, based on data and science, are warranted, to assure, among others, safety of all road users.

13. Suitable ITS reference architectures can provide a means to identify and describe ITS services, identifying interfaces throughout overall ITS system-of-systems that can support interoperability between and within the ITS infrastructure and among vehicles and other mobile participants in the transportation system along with appropriate ICT and ITS technical standards to facilitate interoperability and cybersecurity. Reference architectures can support identification of interfaces for interoperability while supporting needed regional and local customization of the ITS system. For example, the US Department of Transportation makes available the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT)¹ identifying about 140 ITS services along with companion software toolsets for use by any interested ITS implementers to develop their own regional and project ITS architectures to support needed services and desired levels of interoperability. Currently, international services and ICT/ITS standards are represented in ARC-IT Version 9, based on contributions via international collaborations with Australia, Canada, Europe, and Japan.

14. The updated UNECE Road Map for ITS seeks to harmonize and ensure coverage and implementation of the commonly adopted strategy throughout its 56 member States and beyond.

Action 5 - Ensuring data security

15. Security and privacy concerns could become potential barriers to ITS deployment. Data losses and the danger of identity theft could reduce the potential performance and benefits of ITS. ITS should be implemented by way of viable business cases that require

¹ www.arc-it.org

consistent data driven guidelines, standards and regulations on liability and highest levels of security for personal data guaranteed during the lifecycle of the technology and in an impartial manner.

Action 6 - Promoting vehicle-to-infrastructure communication

16. The World Forum for Harmonization of Vehicle Regulations (WP.29) is promoting technological innovations in vehicles through guidelines, voluntary standards and, when needed, regulations that are applicable on worldwide scale.

17. Cooperative Driving Automation technologies include infrastructure and vehicle related intelligent transport devices that are active and ‘cooperate’ to perform a common service. Consequently, in cooperative systems, communication could be vehicle-to-vehicle or vehicle-to-infrastructure, or both.

18. Given that Advanced Driver Assistance Systems (ADAS) technologies are important advances in vehicle safety, the cost beneficial optimization of their potential benefits is crucial. In 2002, WP.29 established an ITS Informal Group to consider the necessity for a regulatory framework on ADAS, which are becoming more common in vehicles.

19. The development of provisions for ADAS - such as Automatically Commanded Steering Functions (ACSF) and Advanced Emergency Braking Systems (AEBS), the actions of which were restricted to emergency situations - are expected to bring about draft regulatory text proposals that will take the form of new standalone UN Regulations under the 1958 Agreement. According to an impact assessment made by the European Commission, the mandating of AEBS systems has the potential to prevent the loss of around 5,000 lives and avoid 35,000 serious injuries a year across the EU27.

20. In promoting a cohesive and integrated approach to the rapid deployment of advanced automotive technologies to aid ITS in transport, traffic management and logistic architectures it is important that the relevant working parties coordinate their activities. The ITC Working Parties will collaborate to avoid delays, duplication and to share best practice experience.

Action 7 - Vehicle - to - vehicle communication

21. Vehicle - to - vehicle (V2V) communication can be defined as the cooperative, peer-to-peer exchange of data among/between vehicles and portable traveller devices through wireless technology, with the focus on crash-imminent safety and public safety, system efficiency, and mobility.

22. Cooperative systems are expected to make use of a dedicated spectrum, free from harmful interference from other types of devices. Cooperative communications are highly tailored forms of Wi-Fi or cellular technologies, and allow for 360 degree awareness of the threats and hazards forming on the roadway so that the driver, pedestrian, or vehicle can take proactive action to avoid crashes, while simultaneously alerting other V2V users in the nearby area.

23. Close cooperation among ECE, the International Telecommunication Union (ITU), and the International Organization for Standardization (ISO) and other ITS standards development organizations, is essential and will be further broadened on matters of frequencies and international standards. An ECE body dealing with cooperative safety systems in transportation and information technologies will interact with Governments and global players.

Action 8 - Improving road safety

24. ECE is actively involved in promoting solutions that can lead to improved national, regional and global road safety. To this end, ECE has prioritized a continuous stream of tailored road safety activities through the Inland Transport Committee, and the relevant working parties. The activities, by leveraging on the potentialities on ITS systems applied to traffic and safety systems deployed on vehicles, aim to promote road safety principles, support, education and raising awareness on road traffic harmonized rules, with specific

attention to road Vulnerable Road Users. In this context, to further improve road safety, it is important to continue the coordinated and consistent cooperation between the Global Forum For Road Traffic Safety (WP.1) and the World Forum for the Harmonization of Vehicle Regulations (WP.29) to appropriately address the evolution of Advanced Driver Assistance Systems (ADAS), which can reduce human error and dramatically improve road safety, by acting on crash prevention, crash trauma minimization (reducing the severity of injury if a crash occurs) and optimizing the chances of survival through post-crash systems. ECE's dedicated attention to automotive technologies advancement, together with the updating and introduction of related road safety frameworks, will promote a new culture of road safety worldwide. This will also facilitate the role, action and strategy promoted by UN Road Safety Trust Fund, as well as facilitating the role of UN Secretary General Special Envoy for Road Safety.

25. Now more than ever, automotive advancement, coupled with ITS technologies are seen as fundamental to reducing road traffic casualties, and to limit the severity of injuries where collisions occur. The Road Map should promote how contracting parties can enhance the design and management of national road safety systems, and implement the well-known five pillars – safe users, vehicles, infrastructure, post-crash response and the overarching road safety management pillar.

26. In addition, in the automotive technological evolving context, where Advanced Driver Assistance Systems serve safety-critical situations and provide warnings to the driver, it looks vital capturing the societal benefits of highly automated vehicles, as they will be a key element of improving road safety in the years ahead. There is evidence that about 85 per cent of road traffic collisions are a result of human error and the early introduction of automation as part of an integrated intelligent transport system could provide the basis for a safe, inclusive and sustainable transport network to the benefit of users and our wider society.

27. To this end, all the relevant working parties, including the Global Forum for Road Traffic Safety and the World Forum for Harmonization of Vehicle Regulations, may update their agendas and work plans as necessary to accommodate the automotive technologies mobility revolution, by offering timely the appropriate guidelines for the new road environment of the future, as for examples setting specific tasks to cast operative references for innovative cooperative and connected road traffic, bearing in mind the needs of vulnerable road users and facilitate inclusiveness; or the framework for a new concept of driver training for the safe interaction of highly automated vehicles in traffic environment.

Action 9 - Enabling safer Transport of Dangerous Goods

28. The Working Party on the Transport of Dangerous Goods (WP.15) will continue to consider how ITS applications such as telematics could be used to improve safety and security and facilitate the transport of dangerous goods by standardization and by use of monitoring and tracking systems linking consignors, transport operators, emergency responders, enforcement and control authorities and regulators.

Action 10 - Integrating with Rail Transport

29. Harmonized ITS solutions have become a fundamental part of making rail activities efficient. This is seen through: the safety of rail operations (using advanced signalling systems); the way in which freight is tracked; how ticketing is made smarter, facilitating accessibility; and to the manner in which rail infrastructure is monitored and maintained. All these ITS activities are making the rail sector more competitive and facilitating the modal shift of passengers and freight.

30. The take-up of these solutions is not consistent across the region, however. To extract the greatest benefits for an integrated sustainable transport sector it is important that member States consider how best to implement these solutions in a harmonized manner in order to avoid that the adopted solutions do not have the opposite effect of creating barriers within the sector. The Working Party on Rail Transport, along with the Trans European Railway project will continue to explore these areas further.

Action 11 - Integrating with Inland Water Transport

31. The ECE White Paper on the progress, accomplishment and future of sustainable inland water transport, endorsed by ITC at its eighty-second session, has set out the following policy recommendations that are related to ITS: (a) Policy Recommendation No. 5: Promote the development and pan-European application of River Information Services (RIS) and other information technologies and (b) Policy Recommendation No. 6: Promote the development of automation, digitalization and other innovations in the inland water transport sector.

32. The Working Party on Inland Water Transport (SC.3) will continue work on the promotion of RIS and other information technologies on European inland waterways through updating its resolutions relevant to RIS and harmonizing them with state-of-the-art international, regional and national RIS standards.

33. Resolution No. 95 Enhancing international cooperation to support the development of automation in inland navigation, adopted by SC.3 on 8 November 2019, and the annexed road map for 2020–2024 Forging international cooperation towards an international legislative basis for automation in inland navigation, have set up seven actions for SC.3 and its subsidiary body, the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3). In particular, they include preparations for the deployment of automated inland navigation in the national capacity building support provided by the ECE secretariat to assist member States and the dissemination of information and awareness raising on automation in inland navigation and related issues through (a) organizing workshops and round tables on automation in inland navigation in the ECE framework with the engagement of the key stakeholders and (b) the participation and contributions of governments, river commissions, international organizations and other stakeholders to the United Nations round table discussions convened under the aegis of ECE on issues related to ITS and automation.

Action 12 - Enhancing the modal integrator's role of ITS

34. The mandate of the Working Party on Road Transport (SC.1) includes the simplification and harmonization of rules and requirements related to international road transport and its relevant administrative procedures and documentation. In addition, the mandate of the Working Party on Intermodal Transport and Logistics (WP.24) includes the monitoring of rules and requirements related specially to intermodal transport. Over the past decade, the trend has been towards digitizing information on road freight traffic operations as well as on intermodal transport operations and supply chains to make freight transport, logistics and security more integrated and automated, thereby increasing the efficiency and security of administrative procedures.

35. For example, the Additional Protocol to the Convention on the Contract for the International Carriage of Goods by Road concerning the electronic consignment note (e-CMR) provides a supplementary legal framework for the digitalization of consignment notes from that of paper consignment notes which have been well established since the 1950s. As at the date of this document, the use of electronic consignment notes has arisen from pilot projects and been on a voluntary basis. It is hoped that with the increasing number of accessions to e-CMR that contracting parties will be motivated to adopt electronic consignment notes as standard practice.

Action 13 - Developing cost-benefit assessment methodologies

36. A lack of harmonized methodology for cost-benefit analysis of ITS hampers the deployment of the innovative solutions with greatest overall community benefits and may encourage the use of other less beneficial solutions adding further costs to customers. More information in this area is needed since it is commonly accepted that cost-benefit analyses have major effects on future sustainable transport planning. It is a tool of great interest to Governments and policymakers.

37. It is an area where ECE and in particular WP.5 are also tasked to work more and to provide guidance, building on earlier achievements and technical assistance in investment

assessment methodologies. Transport Canada and the United States Department of Transportation might be of assistance since they have advanced knowledge and experience in this area. All Governments and policymakers are encouraged to share related data and methodologies, to include open source code and documentation, to accelerate shared learning on cost-benefit assessment methodologies and outcomes.

Action 14 - Improving the long-term environmental sustainability of transport

38. The potential contribution of ITS to reduced pollution and congestion is crucial. In January 2011 the ECE Sustainable Transport Division launched the United Nations Development Account funded project on climate change and transport. The goal was to develop and implement a monitoring and assessment tool for CO₂ emissions in inland transport to facilitate climate change mitigation.

39. As the outcome of this project, the ForFITS (For Future Inland Transport Systems) tool is primarily focused on CO₂ emissions from inland transport, including road, rail and inland waterways, and predicts future emissions based on current patterns. The tool is freely available to all United Nations Member States and has been used by a number of member States across the ECE region. It provides a robust framework for analysing different scenarios of sustainable transport, proposing transport-policy strategies, among them the further development of ITS.

40. Our cities are increasingly suffering from the negative environmental effects of transport. The implementation of ITS solutions for urban transport are fundamental for the long-term sustainability of transport in particular through the implementation of managed mobility solutions, vehicle sharing, Mobility as a Service, smart ticketing and schemes such as congestion charging to name a few. The continued work of the Inland Transport Committee Working Parties and the Transport, Health and Environment Pan-European Programme (THE PEP) in this area will further ensure that member States can maximise the benefits that ITS can provide in reaching the environmental goals within the Sustainable Development Agenda.

Action 15 - Promoting analytical work amongst Contracting Parties

41. Every ITS service depends on the availability of an ICT backbone and enabling systems that constitute the core of ICT infrastructure.

42. The success rate of ITS implementation is closely related to the availability of data driven ICT infrastructure.

Action 16 - Contributing to capacity building, education and awareness raising, with special attention to emerging economies

(a) Assisting Governments

43. The major aim of ECE is to promote economic integration. To this end, it provides analysis, policy advice and assistance to Governments; it supports the United Nations global mandates in the economic field, in cooperation with other global players and key stakeholders. Considering this mandate, the Sustainable Transport Division is prepared to assist Governments and stakeholders in the deployment of ITS. This could be done through capacity building workshops and in cooperation with the other regional commissions such as the Economic and Social Commission for Asia and the Pacific (ESCAP), the Economic Commission for Latin America and the Caribbean (ECLAC), the Economic Commission for Africa (ECA) and the Economic and Social Commission for Western Asia (ESCWA).

44. The growth of road transport volumes continues to be significant, especially in emerging economies. The growth has been accompanied by rapid urbanization that is expected to continue unabated in the future. The rising concentration of population in cities is accompanied by mounting social problems such as worsening traffic congestion,

increasing air pollution and an escalating number of road accidents. However, not only urban areas are affected by these developments. Road transport growth can exceed the capacity of existing infrastructures and additional improvements in modern transport management may be needed. These are all areas where ITS could offer practicable solutions.

45. Education and awareness-raising is the key to innovation in transport. There is a need to ensure guidelines and regulations are based on science and data drive. In addition, there is a need to inform the public how the future mobility may look like to foster this new culture, keep the public abreast of what is going on, to plant understanding and gain acceptance and support.

(b) Leapfrogging

46. The ECE platform could be used as a bridge to disseminate knowledge and best practices in order to become the umbrella for coordinated policy action in the field of Intelligent Transport Systems worldwide. Developing countries can leapfrog far more rapidly to an ITS-enabled infrastructure and far less expensively than developed countries. The important role of ECE in fostering the integration of landlocked regions (such as central Asia) would be reinforced, providing new opportunities to a broader range of emerging economies to become better integrated, promoting economies of scale and a greater ability to cooperate and exchange information.

Action 17 - Organising the United Nations Annual Round Table on Intelligent Transport Systems

47. Under the aegis of ECE, all countries will have the opportunity for dialogue and develop cooperation on ITS issues through round table discussions convened annually.

48. The outcome of these round tables would provide guidance for and direct the work of the relevant ECE bodies where actions would be initiated by Governments, other key stakeholders and global players, including the business community.

49. The ECE Sustainable Transport Division will provide the platform for exchange of views and a record of discussions to inform Governments as they develop their own national policies and programs.

Action 18 - Wheeled vehicle automation and emerging technologies

50. The technology to allow the widescale introduction of vehicle automation is developing rapidly, with the established vehicle manufacturing sector and new market entrant innovators forging new relationships to deliver new products at pace. These innovative and emerging technologies must be seamlessly integrated into vehicles to ensure their safe and efficient operation, while simultaneously improving the safety and security of road users. Recognising the pace of development, the contracting parties are directing their efforts to facilitate market access in order to maximise the societal benefits.

51. The ECE World Forum for Harmonization of Vehicle Regulations (WP.29), as a global platform, is enabling integrated discussions on intelligent and connected transportation systems (including intermodal transport), telecommunications, infrastructure planning, Mobility as a Service (MaaS) and similar fields related to the deployment of vehicles equipped with Automated Driving Systems. The WP.29 Informal Working Group on ITS is strengthening the Working Party's outreach to other ECE groups and external organisations so as to maintain its awareness of developments related to automated vehicle technologies; and to ensure those other organizations and institutions are aware of WP.29, its role and responsibilities in this important area.