

Draft revisions of the ECE Road Map on Intelligent Transport Systems

Note by the Secretariat

Following Decision 18 of the Inland Transport Committee (ITC) at its eighty-second session in February 2020, the UNECE 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 IWG on ITS, on the basis of the existing 2012-2020 Roadmap and sought guidance on necessary amendments to the existing roadmap. The secretariat launched consultations of the Working Parties and subsidiary bodies by using online collaboration tools. The text below is the outcome of this process as of 6 November 2020. Highlighted sections in yellow are proposed for further editorial revisions.

I. Draft ECE Road Map on Intelligent Transport Systems – Overview [Revision for the decade 2020 – 2030]

Table 1
Summary

<i>No.</i>	<i>Action title</i>
1	Reaching a common definition for ITS
2	Harmonizing policies
3	Forging International cooperation
4	Facilitating interoperability via ITS Reference Architectures
5	Ensuring data security
6	Promoting vehicle to infrastructure communication
7	Vehicle-to-vehicle communication
8	Improving road safety
9	Addressing the liability concerns
10	Enabling Safer Transport of Dangerous Goods
11	Integrating with Rail Transport
12	Integrating with Inland Water Transport
13	Enhancing the modal integrator's role of ITS
14	Developing cost-benefit assessment methodologies
15	Improving the long-term environmental sustainability of transport
16	Promoting analytical work amongst contracting parties
17	Contributing to capacity-building, education and awareness-raising, with special attention to emerging economies
18	Organizing the United Nations annual round table on ITS
19	Wheeled vehicle automation and emerging technologies.

II. Revised actions (insertions are marked in bold)

Action 1 - Reaching a common definition for ITS

1. Inland transport systems to which information and communication technologies have been applied to improve mobility are generically referred to as “Intelligent Transport Systems” (ITS). ITS systems are comprised of Information and Communications Technology (ICT) and ITS-unique applications, technologies, and communications.
2. However, the scope and nature of the framework for the 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.
3. As a global partner, the UNECE 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

4. 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.
5. In this context, the UNECE offers an advantageous platform through its intergovernmental structures whose mandate includes safe, efficient and sustainable policies relating to dedicated legal instruments (such as The Global Forum for Road Traffic Safety (WP.1), the Working Party on Road Transport (SC.1), Working Party on Dangerous Goods (WP.15) and the World Forum for Harmonization of Vehicle Regulations (WP.29)) to lead and collaborate in shaping key ITS strategies, such as harmonization and deployment. Within such 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 UNECE ITS vision conveyed through this Road Map would be the tool for offering a reliable, safe and seamless both for freight and passengers at a global level.

Action 3- Forging International cooperation

6. The status and implementation of the UNECE ITS Road Map until 2020 showed that Governments and stakeholders support the work of UNECE 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. In addition, it will facilitate environmental protection, energy efficiency, inter-modality and logistic operational optimization. At the same time, 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 of urban settlements. In addition, UNECEs 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- EU countries of ECE neighbouring regions.

Action 4 - Facilitating interoperability via ITS Reference Architecture

7. 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 the 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.

8. 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, www.arc-it.org) identifying 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.

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

Action 5 - Ensuring data security

10. 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 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.

11. Data security shouldn't be an obstacle to allow the appropriate access to the systems and data to authorities and other relevant stakeholders, having in mind the technical development, enforcement, lifetime and life cycle performance and maintenance over the time.

12. Ensuring data protection and IT security is a basic requirement for the successful introduction of connected and automated mobility. Regulations on automated driving create trust and have a long-lasting effect only if the consumer can safely, securely and independently control the data flow to and from his vehicle. This also includes the possibility for authorized parties, to check and maintain the safety, security and environmental health of a vehicle. Another aspect relevant to the environment and consumers as well, is the sustainability of vehicle technology. IT security must be guaranteed over the lifetime of the vehicle. This creates trust in the products and keeps the value of the assets for a long time. Moreover, only a very large number of connected and automated vehicle will have significant impact on improved vehicle safety worldwide. UNECE already took first steps in this direction by adopting the regulations 155 and 156 on Cyber Security and Over the Air Updates. The new decade needs to foster the trust of consumers towards automated and connected driving. (This is also of particular relevance for actions 7,8 and 9)

Action 6 - Promoting vehicle to infrastructure communication

13. 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.

14. 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.

15. 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.

16. The development of provisions for ADAS - such as Automatically Commanded Steering Functions (ACSF) and Advanced Emergency Braking Systems (AEBS), the actions of which are 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 these systems has the potential to prevent the loss of around 5,000 lives and avoid 35,000 serious injuries a year across the EU27.

17. In promoting a cohesive and integrated approach to the rapid deployment of advanced automotive technologies to aid Intelligent Transport Systems in transport, traffic management and logistic architectures it is important that the relevant working parties coordinate their activities. The World Forum for the harmonization of vehicle regulations will act to coordinate with the Global Forum for Road Traffic Safety (WP.1), the Working Party on Road Transport (SC.1), the Working Party on Dangerous Goods (WP.15) and the Working Party on Intermodal transport and Logistic (WP.24) to avoid delays, duplication and to share best practice experience.

Action 7 - Vehicle - to – vehicle communication

18. 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.

19. Cooperative systems are expected to make use of 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.

20. Close cooperation among UNECE, 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. The competent UNECE body that will interact with Governments and global players, dealing with cooperative safety systems in transportation in information technologies has yet to be identified.

Action 8 - Improving road safety

21. The UNECE is actively involved in promoting solutions that can lead to improved national, regional and global road safety. To this end, UNECE has prioritized a continuous stream of tailored road safety activities through the Inland Transport Committee, in particular through the work of the Global Forum for Road Traffic Safety (WP.1) and the World Forum for the Harmonization of Vehicle Regulations, working closely with the secretariat of the UN Road Safety Trust Fund, the secretariat of the UN Secretary General Special Envoy for Road Safety, and other relevant working parties supporting education and raising awareness.

22. 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. In particular, working in partnership, the Global Forum For Road Traffic Safety and the World Forum for the Harmonization of Vehicle Regulations will monitor the evolution of Advanced Driver Assistance Systems (ADAS), and identify how contracting parties 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.

23. In addition, since some Advanced Driver Assistance Systems can identify safety-critical situations and provide warnings to the driver, the Global Forum will work cooperatively with the World Forum and other organizations to update guidelines for driver training (newly licensed, conventional driver, older driver) to ensure safe interaction with these on-board systems, and preserving the safe interaction of highly automated vehicles in traffic environment.

24. Capturing the societal benefits of highly automated vehicles will be a key element of improving road safety in the years ahead. There is evidence that [>85%] 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.

Action 9 - Addressing the liability concerns (unchanged)

25. The 1968 Convention on Road Traffic states that “Every driver of a vehicle shall in all circumstances have his vehicle under control...”. How are ITS solutions linked to the issue of liability? Devices that assist the driver to drive safely already exist. UNECE has played a crucial role in that development. Technologies such as navigation systems, cruise control and systems optimizing the braking of vehicles are already widely used and have contributed to fewer accidents and better fuel consumption.

26. Other vehicle-based systems are at various stages of development and will be incorporated into UNECE Vehicle Regulations later. ITS devices are also widely applied in traffic management and control through, for example, variable message signs, speed cameras, electronic vehicle detection and toll charging systems, and vehicle positioning and tracking.

27. The current critical debate concerns devices that act on behalf of the driver, or even override the driver’s decisions. While driver assistance systems contribute to intelligent and efficient mobility as well as to efficient and safe roads, they also introduce new challenges. For example, in a system failure and accident situation: who is legally liable? In some

European countries, for example, the law in this respect clearly states that the liability of driving remains exclusively with the driver.

28. WP.29 already closely cooperates on this matter and will present a solution in the near future, particularly in the case of ADAS systems. To bridge the gap, an agreement over the following overarching principle is emerging: ITS assisted driving is in harmony with the current legal instruments, while most of the governments are not ready to accept ITS that override driver's decisions.

Action 10 - Enabling safer Transport of Dangerous Goods

29. 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 11 - Integrating with Rail Transport

30. 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.

31. 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 12 - Integrating with Inland Water Transport

32. The UNECE "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 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.

33. 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.

34. Resolution No. 95 "Enhancing international cooperation to support the development of automation in inland navigation", adopted by the Working Party on Inland Water Transport (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 UNECE 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 UNECE on issues related to ITS and automation.

Action 13 - Enhancing the modal integrator's role of ITS

35. 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.

36. 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 14 Developing cost-benefit assessment methodologies

37. 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.

38. It is an area where UNECE 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 15 - Improving the long-term environmental sustainability of transport

39. The potential contribution of ITS to reduced pollution and congestion is crucial. In January 2011 the UNECE 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.

40. 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 region. It provides a robust framework for analysing different scenarios of sustainable transport, proposing transport-policy strategies, among them the further development of ITS.

41. 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-terms

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 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 16 - Promoting analytical work amongst Contracting Parties

42. Every ITS service depends on the availability of an Information and Communication Technology (ICT) backbone and enabling systems that constitute the core of ICT infrastructure.

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

Action 17 - Contributing to capacity building, education and awareness raising, with special attention to emerging economies

(a) Assisting Governments

44. The major aim of the UNECE 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 of 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 (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)).

45. The growth of road transport 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 growing 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.

46. 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

47. The UNECE platform could be used as a bridge to disseminate knowledge and best practices and 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 UNECE 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 18 - Organising the United Nations Annual Round Table on Intelligent Transport Systems

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

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

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

Action 19 – Wheeled vehicle automation and emerging technologies

51. 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, WP.29 and contracting parties are directing their efforts to facilitate market access in order to maximise the societal benefits.

52. The UNECE World Forum for Harmonization of Vehicle Regulations, 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 UNECE 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.
