Submission to the
Canada Transportation Act Review

Intelligent Transportation Systems Society of Canada

June 2015

About ITS Canada - Our Vision

The underpinnings of intelligent transportation are to bring people and goods to their destinations safer, faster and more economically, through the development and effective application of state-of-the-art technologies.

ITS Canada is the national thought leader on advanced technologies and their application to the Canadian transportation system. ITS Canada supports the use of these technologies by advocating and practically demonstrating their benefits to stakeholders throughout Canada.

Consequently, we see a new Canadian transportation landscape, brought about by the use of innovative technologies, that:

- *Dramatically decrease the number of traffic collisions on our roadways and, as a result, save lives and, prevent and reduce injuries;*

- *Reduce congestion, through better real-time traffic management, better public transport and the adoption of advanced mobility options;*

- *Connect all facets of our transport system to ensure the most efficient movement and mobility of people and goods; and*

- *Ensure Canada's transportation networks remain globally competitive by keeping pace with dramatic transformations taking place in the transportation systems of the rest of the world*

EXECUTIVE SUMMARY

Advances in commercialization and adoption of technology throughout the transportation system are inevitable and the consequences of delay or lack of readiness are dire for the economy and for the safety and mobility of Canadians. Accordingly, ITS Canada offers the following set of 16 recommendations to the Canada Transportation Act Review Panel.

ESTABLISH A POLICY FRAMEWORK FOR TRANSPORTATION TECHNOLOGY INNOVATION

- Provide leadership and forums for stakeholders
- Enhance investigation and fulfill the regulatory role in areas of federal policy responsibility
- Identify and remove barriers to technology deployment in motor vehicle regulations
- Build a national knowledge resource to monitor developments and trends, and assess policy issues and implications
- Ensure interoperability of transportation technologies through development and promotion of technology architecture and standards

PROVIDE LEADERSHIP IN DEVELOPING PARTNERSHIPS

- Build federal / provincial partnerships to better understand the influence of technology on complex jurisdictional issues
- Engage new stakeholders from the technology-influenced transportation environment

ENHANCE TRADE AND COMPETITIVENESS

- Establish a domestic East-West and South-North trade corridor technology program
- Sustain investments in cross border strategic gateways and trade corridors
- Facilitate implementation of user pay principles through deployment of technology
- Support and accelerate efforts of the Canada-U.S. Regulatory Cooperation Council

ENCOURAGE EFFECTIVE USE OF TECHNOLOGY

- Engage in public discussion and increase outreach efforts to the general public
- Require explicit consideration of technology and a "life-cycle" perspective on operations and maintenance, in the planning of federally (and provincially) funded transportation infrastructure projects

STIMULATE CANADIAN TRANSPORTATION TECHNOLOGY RESEARCH AND DEVELOPMENT

- Develop and implement a comprehensive and coordinated strategy for advanced transportation technology research, development, and deployment

- Establish a research and development strategy that explicitly supports small and medium-size Canadian high tech enterprises

- Initiate research to develop technology to support enhanced accessibility

Introduction

The submission of ITS Canada to the Canada Transportation Act Review is based on three inter-related premises.

- Existing technology can be cost effectively applied to expedite coast-to-coast-to coast transport of goods across inter-provincial and international boundaries without disruption.

- Barriers in existing federal and provincial legislation could impede introduction of motor vehicle technologies that have extraordinary potential to improve road safety, reduce fatalities and injuries, and enhance mobility options for elderly and disabled Canadians.

- Advances in vehicle, point of sale and ubiquitous telecommunication technologies, coupled with broad societal change in notions of "ownership" and "sharing" will present fundamental opportunity to re-shape cities and reduce the impact of roadway and parking infrastructure on the urban form.

INEVITABILITY OF CHANGE CAUSED BY TECHNOLOGY

Advances in technology are driving an era of rapid revolutionary and "disruptive" change throughout society. Whether it be the Internet of Things, Big Data, the shared-use economy, or development and commercialization of connected and autonomous vehicles, these changes will have profound positive impacts on mobility and transportation. In January 2015, the Conference Board of Canada published a significant report entitled **Automated Vehicles: The Coming of the Next Disruptive Technology[1],** just one example of the profound change coming to personal and goods transportation.

Canada, with its complex and diverse geography and demographic distribution needs to be a leader in utilization of transportation technology.

WHAT ARE THE CONSEQUENCES IF CANADA DOES NOT STEP UP TO THE PLATE?

Canada is rapidly losing its place among nations with respect to transportation technology research, development, deployment, and adoption. In this period of profound change, lack of leadership by the Canadian government will:

- Cost lives due to foregone or delayed adoption of enhanced vehicle safety technologies;

- Decrease national competitiveness due to sub-optimal investment in transportation systems and networks;

- Unnecessarily increase the national transportation infrastructure deficit through increased congestion and decreased productivity;

- Relocate high value-added jobs from Canadian transportation industries to countries that are investing much more heavily than Canada in transportation technology;

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[1] http://www.conferenceboard.ca/e-library/abstract.aspx?did=6744

[2] International Transport Forum, "Automated and Autonomous Driving – Regulation Under Uncertainty", OECD, Paris, 2015

[3] Transport Canada, "ITS Architecture for Canada 2.0", Queen's Printer, Ottawa, 2010

- Prevent Canadian society from benefitting from the many other security, environmental, efficiency, mobility, and accessibility benefits that could result from greater adoption of technology; and

- Lead to poorly planned urban environments with unnecessary increase in the carbon footprint.

LEADERSHIP TO SHAPE AND GUIDE APPLICATION OF TRANSPORTATION TECHNOLOGY

It is evident that the private sector is a prime stakeholder in developing and commercializing technology, whether through large multinational corporations or small high tech start-ups. Nevertheless, technological development in such a complex and regulated environment as transportation cannot rely solely on the market. Governments must play a role in shaping an enabling policy and legislative framework.

The U.S. and the European Commission have devoted enormous resources to developing and implementing transportation research, development and deployment initiatives. Even smaller countries, such as the Netherlands, the UK, and Australia, have made impressive efforts to develop policy frameworks for transportation technology and the interoperability standards that will guide deployment and adoption of technology for years to come. Numerous states in the US have already passed legislation to permit autonomous vehicles on roads and highways under various conditions, similar legislation is being considered in some Provinces, but will inevitably be required in all.

Federal leadership is needed to shape and guide transportation technology development in Canada. This can only be accomplished by ensuring that the Canada Transportation Act enables and encourages a regulatory environment (for example in the Motor Vehicle Safety Act) that stimulates investment by the private sector and governments in technologies that can make transportation safer, more accessible and more affordable, while reducing environmental impact.

ITS Canada sees technology as an essential tool to save lives, reduce congestion, improve mobility and accessibility, and promote competitiveness in Canada's economy, through a world-class transportation network. Among other collateral benefits, application of advanced technologies in the transport sector will create high value-added jobs and new opportunities for businesses throughout the country and substantially reduce green-house gas and pollution currently attributable to transportation.

We therefore submit a series of recommendations for consideration by the Canada Transportation Act Review Panel. These recommendations fall broadly within the scope of the National Transportation Policy, as set out in Section 5 of the Act, and are guided by an expectation that effective application of technology in vehicles, infrastructure and related services will:

- Maximize benefits for Canadians in terms of safety, mobility, and productivity that might be derived from the adoption of technology;

- Enhance domestic and global competitiveness for producers, resource entities, and manufacturers;

- Optimize goods movement in integrated trade corridors north, south, east and west;

- Prepare for the future, and expedite disruptive changes enabled by Big Data, the Internet of Things, and revolutionary vehicle-to-vehicle and vehicle-to-infrastructure technologies; and

- Stimulate further innovation in all transportation modes and services.

RECOMMENDATIONS TO USE TECHNOLOGY TO IMPROVE SAFETY, EFFICIENCY AND SUSTAINABILITY OF THE TRANSPORTATION SYSTEM

ESTABLISH A POLICY FRAMEWORK FOR TRANSPORTATION TECHNOLOGY INNOVATION

There is a critical need to develop a policy framework that enables and facilitates transportation technology innovation.

Recommendation 1.   Provide leadership and forums for stakeholders

The federal government should provide leadership in coordinating broad industry efforts and shaping policy to promote development of transportation technology and its deployment among the many private and public sector stakeholders.

The federal government is best positioned to establish forums that can bring together the diverse stakeholders to develop a vision and discuss the complex economic, social and technical issues. Pertinent stakeholders include different levels of government (federal, provincial, local), the research and development community including universities and research centres, original equipment manufacturers, small and medium enterprise industrial partners and users.

Recommendation 2.   Enhance investigation and fulfill the regulatory role in areas of federal policy responsibility

As a starting point the federal government must be prepared to research, investigate and initiate actions in policy areas within their direct scope of responsibility. The recent example of the Takata airbag recalls was a prime example of the Motor Vehicle Safety Act being insufficient to respond expeditiously and pro-actively to a serious safety issue, in that instance relying completely on voluntary vehicle manufacturer recalls.

Recommendation 3.   Identify and remove barriers to technology deployment in motor vehicle regulations

One of the prime focus areas for transportation technology involves the growing role of information and communication technologies in motor vehicles.

Data is being collected by a growing number of on-board sensors and communicated in increasingly sophisticated ways to connect vehicles to each other and to connect vehicles with wayside infrastructure such as traffic signals. These sensors and systems already enable automation of functions such as parallel-parking and many industry and

technology leaders anticipate wide-spread commercial availability of fully autonomous vehicles no later than 2025.

These technologies are already changing the nature of vehicles and how they will be operated, the relationship of one vehicle to surrounding vehicles and infrastructure, liability and insurance.

There is a pressing need for the federal and provincial governments to conduct comprehensive reviews of their regulatory regimes related to such complex issues, to assess and remove potential barriers to technology development and to permit the use of autonomous vehicles on Canadian roadways. The OECD published report **"Automated and Autonomous Driving – Regulation Under Uncertainty"**[2] sets out the scope of many of the relevant issues.

Recommendation 4.   Build a national knowledge resource to monitor developments and trends, and assess policy issues and implications

Over the past few years, this capability has been eroded in Canada, while other countries have been investing in equivalent resources.

The Canadian government needs to rebuild its knowledge resource capacity to monitor developments and trends, and to assess policy issues and implications. Trends and technology developments are evolving at an extraordinary pace and the related technical and non-technical issues are complex with significant policy implications. Some of the more critical non-technical issues include: intellectual property ownership, protection of individual privacy, data security, management and access to open data, risk and liability management, accessibility to mobility options, the 'sharing economy', and public-private partnerships, among others.

One option might be to create a national office or centre of excellence that is provided with the resources to monitor, assess and disseminate the implications of trends and issues as they evolve.

Recommendation 5.   Ensure interoperability of transportation technologies through development and promotion of technology architecture and standards

Within Canada, different levels of government have responsibility for different aspects of the transportation system, from vehicle manufacturing and safety to transportation operations on different types of networks. Consequently, interoperability is essential. It is critical that a standard reference architecture be in place and that standards are developed and adopted to ensure interoperability of transportation technologies.

ITS Canada assisted the Canadian government in publication of an **"ITS Architecture for Canada 2.0"**[3], in 2010. However, the environment is changing so rapidly that a new effort is necessary; in particular to bring the Canadian architecture into alignment with U.S. initiatives for a *Connected Vehicle / Autonomous Vehicle* Architecture. In this regard, there is a Memorandum of Cooperation between the governments of Canada

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[2] International Transport Forum, "Automated and Autonomous Driving – Regulation Under Uncertainty", OECD, Paris, 2015

[3] Transport Canada, "ITS Architecture for Canada 2.0", Queen's Printer, Ottawa, 2010

and the U.S. that permits both governments to work together to keep their respective national architectures in alignment.

The USDOT, the European Commission and to a lesser extent government sponsored agencies in Japan and China are engaged in large-scale initiatives to establish international technical standards that will inevitably impact Canadians. Canada is under-represented in these initiatives; and should reinsert itself to ensure that Canadian interests are effectively articulated and protected in these global deliberations.

PROVIDE LEADERSHIP IN DEVELOPING PARTNERSHIPS

Advantageous deployment and adoption of the emerging transportation technologies involves a wide range of pertinent stakeholders. This requires partnerships, and the federal government is uniquely positioned to take the lead in developing these partnerships without enormous fiscal contribution.

Recommendation 6.   Build federal / provincial partnerships to better understand the influence of technology on complex jurisdictional issues

The federal and provincial governments have different responsibilities related to the transportation system, ranging from ensuring the safety of manufactured vehicles to operation and maintenance of the many components of the overall transportation network.

As technology evolves, communications between nearby vehicles (known as V2V communication) and between vehicles and roadway infrastructure (known as V2I communication) are becoming more complex, systems are increasingly integrated, and policy issues are more cross-cutting in nature. Consequently, boundaries between areas of jurisdiction and competence are increasingly blurred, making more robust federal/ provincial/municipal government and industry collaboration a compelling imperative, through partnerships to share information, coordinate efforts, and reduce duplication.

Recommendation 7.   Engage new stakeholders from the technology-influenced transportation environment

The transportation world is rapidly changing as a result of diverse trends including the explosion of wireless communications and mobile devices, the increasing trend towards shared-use economy, the growing importance of big data, and the evolutionary development and deployment of connected / automated / autonomous vehicles. This is introducing a range of new stakeholders that need to be included in discussions of transportation policy and technology deployment policy issues. Among others, the federal government should engage in dialogue with these new stakeholders, including:

- Providers of new mobility modes (e.g. Mobility as a Service companies);
- Insurance providers;
- Processors of Big Data; and
- Emerging 'smart' cities;

An Illustration of Good Practice in Partnership

Governments across Canada, led by the federal government, have made good progress under the current Act to enhance Canada's global competitiveness and make Canada a better place to live, work and travel for their citizens.

As one example, the "National Policy Framework for Strategic Gateways and Trade Corridors" used five distinct 'lenses' to assess the opportunities afforded by federal government engagement and leadership that many provinces leveraged and adapted as a workable framework for other multi-lateral opportunities to improve the transportation system throughout Canada to.

1. *Align Canada's major transportation systems with important opportunities and challenges in global commerce.*
2. *Focus on systems of transportation infrastructure that carry nationally-significant levels of trade.*
3. *Address major trends in international transportation based on empirical evidence and analysis, not just optimism.*
4. *Address interconnected issues that directly impact how well the system works and how well Canada takes advantage of it.*
5. *Ground federal actions in concrete federal responsibilities and effective partnerships with other governments and the private sector.*

These lenses might be readily adapted and leveraged to assess advantageous levels of direct government engagement and leadership in other contemporary technology-driven initiatives to further enhance the national transportation system.

ENHANCE TRADE AND COMPETITIVENESS

Transportation technology can play a significant role in enhancing trade and competitiveness. This can occur through deployment of technologies that reduce commercial vehicle bottlenecks, such as border crossings, or to enhance the productivity and efficiency of commercial fleet operations. In addition, Canada has the intellectual and industrial capacity in the transportation sector to develop world-class products and services and continue to be competitive in global markets, which will help to create even more high-skill jobs at home.

> **Recommendation 8.   Establish a domestic East-West and South-North trade corridor technology program**
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> Throughout the past decade, there has been considerable focus on development of technology enabled cross-border trade corridors between Canada and the U.S. and

abroad. These initiatives are adding value to the Canadian economy, by increasing transport efficiency.

There is an equally important need to establish a national East-West and South-North Technology Corridor program to enhance commercial vehicle productivity, security and safety in key corridors across Canada and to the Territories, and thereby support inter-provincial trade and enhance economic competitiveness.

A range of emerging technologies based on the *Internet of Everything* will enable a fully integrated system of systems to expedite the flow of goods transport throughout Canada, including: greater utilization of weigh-in-motion and road weather information systems sites, enhanced "511" traveler information[4], electronic manifests, broadband communications to monitor real-time performance and hours-of-service regulations, decision systems for routing hazardous materials, connected truck programs for weigh station bypass, inter-provincial greenlight programs, truck parking planning and reservation, truck platooning, and so on. These systems are the future and as a nation heavily dependent upon efficient transportation, Canada cannot lag.

The Government of Canada should utilize the scope of the National Transportation Policy as set out in Section 5 of the Canada Transportation Act to encourage establishment of technology enabled corridors from sea to sea to sea and integration between Provincial programs and systems should be encouraged.

Recommendation 9. Sustain investments in cross border strategic gateways and trade corridors

In 2006, the Government of Canada launched a multi-modal initiative to improve efficiency, safety, security and sustainability of strategic transportation gateways. The Asia-Pacific, Continental and Atlantic Gateway programs, and funds associated with them, provided for the development and deployment of pilot intelligent transportation technologies at border crossings from the Pacific to the Atlantic. These pilots were externally evaluated as having met their objectives and being very successful.

The revised Act needs to enable a sustainable partnership environment in which all stakeholders recognize and buy into the on-going expansion and improvement of these important national assets.

Recommendation 10. Facilitate implementation of user pay principles through deployment of technology

Canada's deficit in modern and efficient public transportation infrastructure (roadways and public transportation systems) and the high cost of funding infrastructure is well known to Canadians and to all levels of government.

The principle of *user pay* is that a user should pay for service commensurate to the amount of service consumed, including a portion to offset negative externalities. This principle is at the heart of a society based on market economy principles. While it can be an imperfect and difficult principle to implement in a local context, for social and political reasons, it has great value in a broader or national context.

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[4] "511" is the telephone number designated for traveler information, but is commonly used to designate provincial traveler and transportation information systems delivered through web sites or other means.

Available technology has made a number of relevant applications feasible, including:

- Electronic tolling for expressways or bridges;

- Consumption based (vehicle-kilometre) taxes and/or insurance;

- Mobility as a service (i.e. bundling of payment for public and private services similar as is done for cable television or mobile phones).

The federal government should encourage efforts to use technology to facilitate the expansion of the *user pay* principles to achieve desired economies of scale and efficiencies.

Recommendation 11.   Support and accelerate efforts of the Canada-U.S. Regulatory Cooperation Council

The federal government is well engaged in the Joint Canada-U.S. Regulatory Cooperation Council to address many barriers inhibiting trade between our two countries. Some efforts relate to using technology to improve border crossings and to harmonize transportation technology standards. These efforts should be accelerated to support North-South Gateway Corridors and broadened to include the impending 'disruptive' technologies on our doorstep.

ENCOURAGE EFFECTIVE USE OF TECHNOLOGY

The potential benefits of increased safety, security, mobility and productivity derived from transportation technology will only accrue to Canadian citizens and companies to the extent that such technologies are actually deployed and adopted. This in turn will occur only if there is an explicit strategy to build national awareness of transportation technology applications and their benefits through dissemination and to encouragement of effective technology transfer to potential users.

Recommendation 12.   Engage in public discussion and increase outreach efforts to the general public

In other countries, politicians and professionals engage in useful dialogue and debate regarding the vision of the evolving transportation system and related transformative issues. The federal government should broadly promote these sorts of discussions, to provide the general public, agencies and industry with a more enlightened vision of the future, the benefits for individuals and businesses, the impacts on conventional practices and the related policy issues to be resolved, and the investments that will need to be made.

Recommendation 13.   Require explicit consideration of technology and a "life-cycle" perspective on operations and maintenance, in the planning of federally (and provincially) funded transportation infrastructure projects

Assessment of public-private partnership financing alternatives is now required of all federal, and most provincial, transportation infrastructure projects. This assessment

should be based on a life-cycle framework for a project, including full consideration of operation and maintenance costs.

In 2015, such assessments are unrealistic without explicit consideration of the impact of inevitable technological innovation, and technology-driven societal change, on the performance of any major project throughout its lifetime. Historically, this has not been the case; the use technology and its impact and have been treated as afterthoughts.

The federal government should require a life-cycle perspective including explicit consideration of relevant technological factors in the design, operation and maintenance of capital projects. The assessment should include determination of the financial capacity to operate the infrastructure and technology over the life of the infrastructure.

This approach should apply to provincial projects and to municipal road and transit investments as well. The work might be effectively undertaken during consideration of alternatives as part of the environmental assessment process.

STIMULATE CANADIAN TRANSPORTATION TECHNOLOGY RESEARCH AND DEVELOPMENT

Transportation technology is evolving rapidly, fed by a constant stream of research and development occurring around the world. Canada has the intellectual and high tech industrial capacity to aspire to be more than a consumer of foreign technology, and be among the world's leaders in the development of technology that will serve both the Canadian market, but also markets abroad. However, Canada is rapidly losing its position among peer countries with respect to research and development of advanced transportation technology.

The federal government can demonstrate leadership, based on its own immediate requirements and mandates related to safe and secure transport of people and goods, to reinvigorate research and development in the field of advanced transportation technology in Canada.

Recommendation 14.   Develop and implement a comprehensive and coordinated strategy for advanced transportation technology research and development

Canadian capability is well regarded by professionals in the U.S. and Europe and Canada enjoys relationships that can be capitalized upon. Such relationships begin at the government-to-government level and the Canadian government should encourage and build partnerships in research and development to leverage Canadian investment.

We have done little, for example, to take advantage of the European Framework Agreement, which permits Canadian access to all European transportation research programs, many of which are directly applicable to Canada.

The federal government needs to assert leadership to establish a comprehensive vision for execution and dissemination of advanced transportation technology research and development. This vision should be articulated in a *Transportation Technology Strategic Plan* that ensures adequate emphasis on distinctly Canadian issues, including transportation to, from and within the north, rural transport and the reality of Canadian weather and environment.

The strategy should be long term in nature and be coordinated with provincial partners, universities, industry and institutions like the National Centres of Excellence program and the Canadian Foundation for Innovation, to avoid duplication.

Recommendation 15.   Establish a research and development strategy that explicitly supports small and medium-size Canadian high tech enterprises

One element of a *Transportation Technology Strategic Plan* (Recommendation 14) should focus explicitly on enabling a continuous stream of new small high-tech start-up firms, especially those engaged in application of non-traditional technologies to transport problems. There is currently very limited support for these firms to help them spread risks and costs. Moreover, the support that exists is short-term in nature and rarely helps to carry research and development to the operational test and deployment stage. This is in stark contrast to many competitor countries and a crucial lapse in an era of extraordinarily fast cycles of development to commercialization.

Recommendation 16.   Initiate research to develop technology to support enhanced accessibility

Advances in vehicle and public transportation technology have particular potential to enhance mobility of the elderly and persons with disabilities. Examples range from the use of way-finding beacons for the sight-impaired or of special-purpose mobile device applications for persons with cognitive disabilities, to the use of driverless cars for persons with limited mobility.

Efforts should be made to encourage public-private partnerships for research and development into the application of technologies to enhance accessibility and mobility for disadvantaged persons.

CONCLUSION - LOOKING TO THE FUTURE

Transportation is a vital component of the Canadian economy and mobility is key to the well-being of Canadians. Recent and accelerating advances in data processing, sensor and computer technology are leading to highly disruptive and unprecedented opportunities to save lives, to improve mobility and to enhance economic productivity.   Collectively these advances will reduce congestion in cities, improve accessibility for disadvantaged Canadians and create high-value jobs through the development of software, hardware, products and technology-driven services.

There is urgency. Canada and Canadian governments are largely unprepared for the inevitable and unprecedented change predicted for the transportation system, compared to peer G7 countries.

Canada needs to take a more proactive role in supporting the use of technology to improve the Canadian transportation system. Key roles for the federal government include enabling legislation and supporting national guidelines and policies for data management, privacy, intellectual property, and building knowledge.

ITS Canada will offer its support to help make Canada ready for the tremendous change and extraordinary opportunities that can become available to Canadians in the next decade.