

Transport and Innovation: Unleashing the Potential

Secretariat Background Paper

This paper is presented under the responsibility of the International Transport Forum Secretariat, and does not necessarily represent the views of the Forum's member countries. This paper is supported by extensive analysis carried out in preparation for the 2010 Forum, which is listed in Annex A.

Transport and Innovation: Unleashing the Potential

Secretariat Background Paper

1. Introduction

The 2010 International Transport Forum provides an important opportunity to strengthen global co-operation in the field of transport innovation. To foster this co-operation, the 2010 Forum has identified specific actions and new opportunities for international collaboration among the public sector, private companies and the end-users of the transport system across continents.

This paper supports the 2010 Key Messages.

The Key Messages, discussed by Ministers in their closed session at the 2010 Forum, point to areas for action that can be carried out by Countries and the appropriate international organisations and representative bodies. This paper is designed to support these Key Messages, setting out in more detail some of the main issues raised there. The Annex provides references to the analysis, as well as special events, stakeholder views, and Country inputs that were used in preparing the Forum.

The paper explores, in turn, the following topics:

- A context and vision for transport;
- The barriers to innovation;
- Government support for innovation; and
- Fostering innovation: immediate actions and initiatives.

2. A Context and Vision for Transport

Transport is vital to development and social cohesion.

Transport will remain the key to independent living, to trade and to social cohesion, as well as a positive force for integration, economic development and peace. However, there are too many uncertainties to be definitive about what the transport system will look like in the longer term. Recent decades have led to significant advances in the transport system's overall sustainability that, with continued robust policy action and sustained innovation, should enable the sector to realise its full potential to be safe, clean, interconnected and secure.

Challenges to the vision

However, current demographic and economic trends will engender significant pressures on the transport system; these factors seen on a roughly 2050 horizon include some the following:

- The global population will increase from its present level of 6.9 to about 9.1 billion people.

Demographic and economic changes...

- The trend toward urbanisation will continue, with over 70 per cent of the world's population living in cities in 2050, compared to 50 per cent at present.
- The population is ageing; 22 per cent of the population will be over 60 compared to 11 per cent now. Globally the number of people over 80 will more than triple. Ageing is not just a developed world phenomenon and, for example China too will have an older population.
- Incomes will be significantly higher; at only 2 per cent annual growth in income, global GDP will more than double.

... will mean that transport continues to grow.

Environment, safety, congestion and other policy demands will profoundly affect transport.

Changes in society, the economy and technology will profoundly influence the nature and requirements of the global transport system for the foreseeable future. Based on current trends, transport is likely to grow very significantly on a global scale; for example, aviation could increase threefold, as could car ownership and container traffic. Trade will continue to support economic growth and will lead to increased volumes of goods travelling longer distances. Future social and economic policy objectives will include providing accessibility to economic opportunity for all, leading a demand for increased capacity and flexibility in the transport system. There will thus be enormous pressure on transport systems, particularly in cities and in the developing world. Much of the transport infrastructure that is already in place will be the backbone of the future system; similarly, many aircraft, ships and trains coming into service in this decade will still be in operation. At the same time, environmental, security and safety objectives and the need to reduce dependency on fossil fuels will also have major impacts on the system. There will also likely be fewer available public resources for the foreseeable future.

Responding to these pressures is a major challenge for Governments, service providers, industry and users alike.

Objectives for the transport system of the future

The future transport system needs to:

- be more efficient,

- provide better information for users,

To address these challenges, the global transport system should aim to achieve the following features:

- Freight and passenger transport services should be safe (seeing a major reduction in fatalities), efficient, seamless (from door-to-door), accessible, secure, environmentally sustainable, and affordable. Transport markets should be open and competitive and operate to high-quality standards.
- Users should have information systems that provide immediate and easily accessible data on the system and their trips.

- be cleaner,

- have a higher skilled workforce,

- benefit from better data and more linked-up institutions.

- Transport's environmental impacts on human health and wellbeing, climate and biodiversity should be reduced dramatically. Traffic growth should be decoupled from growth in demand for fossil fuels. Very low or zero carbon transport should be widespread and total CO₂ emissions from the sector greatly reduced.
- Skill levels in the sector should be raised to correspond to its increasing needs. Research and analytic capability should be strengthened so that policy decisions are more fully evidence-based. To support this aim, transport data should be significantly improved, and new sources of data – such as from the application of intelligent transport systems (ITS) – should be exploited. It will be particularly important to improve the capacity for data collection in developing countries, as well as the compilation of existing data, given the role of transport data as a basis for decision-making, including in such key policy domains as infrastructure development, reducing CO₂ emissions and improving urban planning.
- Institutions should better respond to the horizontal nature of many transport challenges with far greater integration between the different interests involved, including financial, environmental, industrial and regional and local planning.

The importance of innovation

Innovation is essential in technology policy and processes.

Achieving these aims will require bold action to implement many known policies and measures that are not yet widely employed, as well as robust initiatives to promote the development and deployment of new technologies, techniques and policy approaches. The solutions to many of transport's persistent problems must be found in innovation. This will include advances in technology, such as intelligent transport systems (ITS) and more effective and sustainable energy carriers (e.g., electricity, hydrogen fuel cells). Furthermore, it includes efficiency-enhancing designs for aircraft, vessels, trains and automobiles, as well as new scanning techniques for greater security. Also essential will be changes in decision-making and organisational structures, as well as in policies and practice that can enhance the efficiency of existing infrastructure, equipment, rolling stock and services.

Transition pathways for innovation are needed under public sector leadership.

To meet the 2050 objectives for transport, the sector must embark on an ambitious and continuous process of innovation. Several transition “pathways” based on continual innovation and running in parallel could be set out, involving:

- Robust policy action to create the right incentive structures to promote innovation, including user-driven innovation, standardisation, harmonisation, public procurement and (de-)regulation;

- Research “road maps” to develop the knowledge needed to realise the vision and these ambitions on a global scale;
- Business and industry initiatives and investments to bring innovation from research to market uptake and implementation;
- Measures to stimulate drivers for innovation, in particular in new, as well as in small and medium-sized enterprises;
- New partnerships and co-operation arrangements that facilitate and drive innovation forward; and
- Public sector leadership where barriers to innovation occur.

3. The Barriers to Innovation in Transport

Developing and implementing innovative solutions to the challenges of transport has often proven difficult. The nature of impediments to innovation can be broadly understood in the following ways:

Barriers that need to be overcome include:

- incoherent economic incentives,

Market failures: In transport, the economic incentive structures often do not lend themselves to investment in, and adoption of innovation. To begin with, there are structural market failures, such as a lack of direct linkages between pricing structures and costs. Developing and implementing innovation can entail large up-front costs and, given the long life of assets, returns are far from immediate. Often, the benefits to innovation accrue universally, while not providing sufficient returns on private investment. Furthermore, the benefits of innovation are, in many instances, felt in the long term, although political and business objectives are more often short and medium-term in nature, while consumers discount future benefits very heavily and are often reluctant to incur extra costs. In addition, it is difficult to establish an intellectual property rights regime that both provides adequate returns on investment in innovation, and ensures that the benefits are widely shared.

- unwillingness to change,

Resistance to change: Besides individual users, existing organisations and institutions are also often unwilling to accept or pay for changes in established practices that do not provide short-term returns. Moreover, truly radical and disruptive change will produce both winners and losers, and the latter reasonably resist the deployment of new applications.

- weak institutional coordination,

Governance structures and institutional co-ordination: The challenges facing transport are global in nature, but the governance structures for organising the sector are predominantly local or regional. Often, the modes are subject to different organisational and governance structures, as well as a

general lack of integration, all of which limit innovation across the sector. Transport involves an array of actors who often do not work in close collaboration, or understand each other's needs. Furthermore, transport is heavily affected by decisions in other areas — such as land use and finance — where interaction with transport decision makers is not always sufficient.

- *inappropriate rules and regulations,*

Legal and regulatory impediments: Rules and regulations that are inappropriately prescriptive, inadequate or lacking may increase costs and prevent the introduction of new designs and processes. At times, regulation does not keep pace with innovation. Where appropriate, regulation should be harmonised across borders, increasing the potential for co-operation on innovation and for its dissemination.

- *fear of risk,*

Risk: Inevitably, in the process of research and development and in the deployment of new ideas, there will be failures, as well as successes. First movers face a higher level of uncertainty and risk than those who follow later. Political and corporate cultures need to accept this risk of failure as an inherent part of the innovation process.

- *liability and data protection,*

Liability and data protection: Legal structures have yet to fully address questions of risk associated with new technologies. An example of this is co-operative vehicle highway systems, which may potentially reduce the driver's control over the vehicle; international legal norms currently assume that the driver has full control over the vehicle. In addition, a growing number of applications raise privacy issues associated with the electronic transfer of data, and there are serious concerns related to the transfer of commercially sensitive data along the supply chain. These questions are too often not foreseen in the development of new applications, and therefore impede their deployment.

- *and inappropriate skills and knowledge.*

Lack of skills and knowledge: In many countries, there is a serious lack of skilled labour in transport, and of sufficient investment in ensuring that the right skill sets and knowledge will be available in future. There are also often insufficient linkages between universities and the application of knowledge in Government and industry. The wide array of transport data that is becoming available through many different sources has the potential to provide a much stronger analytical basis for transport planning and operations. However, the full exchange and application of such data are often hampered by the existing business models of the actors involved. A general lack of adequate data in transport prevents the identification of areas where investment is most needed, as well as other policy improvements.

Overcoming these barriers is a major challenge and will require new initiatives and forms of co-operation, as well as strengthened communication with the public and other actors.

The governance of innovation is not so much an issue of technology and hardware, but rather the management of the social and economic factors determining the direction and speed of evolution in the global transport system. The following section sets out some principles underlying interventions to support innovation.

4. Government Support for Innovation

Markets and consumers are vital.

Markets and private market players – including producers and consumers – are essential drivers of innovation. Consumers will decide if an innovation is in their interest.

Governments also have a key role.

Much innovation will occur without public intervention. However, a second key driver is the “public interest” and public policy requirements, and markets may not always provide for innovation required to meet these, meaning that selective public support may be required. This can be in basic research, in R&D and demonstration projects, through incentives provided to consumers or industry, such as through favourable fiscal regimes, as well as via regulatory measures and in Governments’ own procurement and practices.

They shouldn’t pick winners but should:

Governments should not be tempted to “pick winners” where particular technologies are concerned, but rather establish the basis on which private industry can innovate to address specific challenges. The identification of priorities for action on innovation in transport should take place in close consultation with industry stakeholders, other levels of Government and transport users.

The following are areas where Governments could particularly support innovation:

- provide a clear and stable framework,

- Industry expects Governments to provide stable and predictable policy and regulatory environments, which then provide a clear framework to guide innovation by private enterprise. Wherever possible, Governments can do this by establishing clear medium and longer-term policy objectives, backed up by concrete targets, with regard to the major challenges facing the transport sector. To the extent possible, policy objectives and targets should be harmonised internationally.

- support training and new skills,

- Governments also need to reduce or remove the barriers to the deployment of innovation. These may include different incentive schemes to overcome market failures, strengthening legislative frameworks to better manage the risks associated with the application of new technologies, and resolving the dilemmas that are involved with the issue of intellectual property rights.
- Support for basic training, education and research is essential, to ensure the existence of a workforce that is able to develop

and integrate new ideas. Furthermore, a lack of skilled labour is increasingly impacting on the ability of the transport sector to generate and deploy innovation, and Governments could ensure that transport is included in training and skills-development initiatives.

- support R&D across the economy,

- Selective investment in R&D and pilot projects aimed at assisting the deployment of innovation and sharing best practices can yield important returns, especially if efforts are made to ensure that the resulting applications can be widely applied within the sector. Governments could ensure that the transport sector is included when broad research programmes are developed and implemented. Focusing national or international research clusters on particular policy challenges can do much to create critical mass and prepare for the dissemination and validation of results.

- support open systems...

- Furthermore, both nationally and internationally, Governments could promote initiatives to foster more open innovation systems that allow for collaboration between public and private actors, including research institutes, to fund and carry out R&D. Examples can be found, for instance, in the application of new materials in the aeronautics and aviation industry or with small and medium-sized companies in the supply chain of automobile-producing companies.

- ... with private partners, and

- Governments could also work in partnership with the private sector to support the integration of innovation into existing systems, with particular assistance to new, small and medium-sized enterprises in integrating new applications, for example by way of fiscal measures and training opportunities.

- set example in their own practices,

- Governments should show leadership by incorporating innovation into their own practices. For example, Governments should ensure that new ideas and technology are built into public procurement and investment plans. Infrastructure investment should look to include information technology applications to improve safety and user information to allow for more efficient use of infrastructure. Governments should employ cutting-edge practices that facilitate innovative practices, such as the use of electronic documentation, and be open to these in their dealings with the private sector and citizens. Finally, Governments need to ensure the availability of the basic infrastructure required to develop and share innovation, such as broad-band Internet.

in international partnerships,

- Partnerships – involving different industries, sectors, research, and/or Governments across jurisdictions and borders – are important to fostering the innovation process, including the development and deployment of new ideas, practices and technologies, and government can play a proactive role in encouraging these. At the same time, it is important to note the Countries have distinct ways of promoting innovation, and that innovation is occurring at a different pace around the world.

and in PPPs for service delivery.

- By engaging in public-private partnerships, particularly in the delivery of services and infrastructure, Governments can allow for the injection of new ideas and business models from private partners.

5. Fostering Innovation in Transport - Immediate Actions and Initiatives

Immediate actions include:

The new concepts that are needed for transport services, management and operations to bring the vision for transport in 2050 closer to reality require innovative thinking in technology, operational procedures and techniques, as well as implementation of appropriate regulatory measures and market-based instruments. The following are areas where actions can be undertaken in the short term to address the challenges facing the transport sector:

Setting the Right Framework

- more coordinated R&D globally,

- creating global knowledge networks,

- *Optimising R&D at the global level:* Fragmentation in research and development can be an impediment to wider deployment; if new systems and technologies are developed at a regional or local level, incompatibilities on a global level may result. Joint efforts across Countries to fund research for technological applications could help reduce fragmentation and result in common standards and more even deployment. Networks of knowledge exchange on transport, including the improvement of data availability, should be further developed and strengthened. National Governments and regional organisations, as well as research institutes, could help to facilitate this. This could include promoting co-operation between major equipment manufacturers on the pre-competitive development of essential new technologies that have important implications for policy objectives, such as lighter-weight materials or more efficient engines.

- reducing fragmentation in research,

Major research actors and Governments are invited to examine the extent to which fragmentation can be reduced. At the international level, the European Union has an opportunity to emphasise the global context for challenges to the transport system in its Eighth Framework Programme for research, technology development and demonstration in transport to be developed for implementation after 2013. Major industrial research actors should examine how they can strengthen co-operation in pre-competitive research to meet the shared goals set out above

- Harmonising performance standards.

- *Harmonising technology standards:* Common standards for the application of new technologies, such as ITS and co-operative vehicle highway systems, can facilitate the dissemination of this technology, improving safety and facilitating greater efficiency. Services such as electronic tolling, E-Call or Intelligent Speed Adaptation can benefit from common agreement on parameters. National and regional authorities are invited to replace detailed

regulations by a functional approach focusing primarily on objectives.

Many bodies have roles and opportunities to cooperate.

Many bodies can play a role here. These include international organisations engaged in the development and implementation of standards, such as the United Nations Economic Commission for Europe (UNECE) and the International Telecommunications Union (ITU). Also important are regional and national ITS bodies. And, at the regional level, the European Committee for Standardization (CEN) and the European Committee for Electro-Technical Standardization (CENELEC) are important. These organisations, together with industry actors, have opportunities to provide parameters and performance standards so that innovation is facilitated without over specification on technical solutions.

- *Improving intellectual property regimes:* It is important to identify regimes for the global protection of intellectual property rights that both protect innovators, and thus provide incentives for innovation, and also ensure the dissemination of new technologies and methods that can lead to important improvements. The World Trade Organization (WTO) has a role in ensuring that the minimum intellectual property standards as set out in the TRIPS (Trade-Related Aspects of Intellectual Property Rights) Agreement are followed.

Improving Transport Efficiency

Logistics needs new platforms for information exchange.

- *Improving logistics and the use of ITS:* There have been impressive improvements in the use of technology in logistics, especially new software. Countries and other actors, such as ports, are invited to work together to create and develop platforms that help transport service providers to exchange information electronically with actors across the different modes of transport. Such systems can and will help to promote multi-modal travel information.

- Countries, the European Union and other international organisations could play a greater role in developing research activities for more dynamic route planning systems to create intelligent intermodal freight transport chains.

Border crossing remains a problem and needs a new vision based on cooperation.

- *Improving border crossing procedures:* Recognising that this issue is not only within the purview of transport authorities, a new vision is needed for crossing borders, based on integrated management of all the services involved. In particular, agreement on the use of electronic documentation for border procedures would do much to facilitate efficiency and the movement of trade. The World Customs Organization (WCO), the World Bank, and specialised bodies of the United Nations, like UNECE and United Nations Conference on Trade and Development (UNCTAD), as well as the International Transport Forum, can all work more effectively together to combine the

needs of customs, fiscal and security authorities with those of trade and transport.

- *Improving traffic management:* Various innovations could be developed and deployed to improve the management of traffic in all modes.

Air traffic management can be improved...

For air traffic, common agreement on the co-ordination of functional airspace blocks (FABs) and air traffic management (ATM) could greatly increase the seamless flow of aircraft at both the regional and global levels, leading to important improvements in fuel consumption. This would include agreement on interoperability and reciprocity for new ATM systems, such as in the context of Europe's SESAR and the US NextGen programmes.

... and surface congestion better managed.

With a view to better managing surface transport, the introduction of new traffic management instruments and incentive measures would allow transport to become more efficient and sustainable, and reduce congestion. Technological possibilities are developing rapidly to better manage congestion and traffic flows, to apply charging schemes, and to provide real-time information to users.

Rail freight corridors are needed along with better links between shipping and inland modes.

For rail transport, the identification and introduction of transport corridors (e.g. Trans-European Network corridors) can enhance the capacity and reliability of the rail network.

Technologies and processes that improve the linkages between shipping and surface transport would make an important contribution to port operations, freight flows and supply-chain efficiency.

Compatibility in satellite systems can improve transport.

Compatibility between the different systems can be very useful for global travellers, and Countries are invited to exchange information and experiences on these systems. In particular, satellite navigation systems are going to play an important role in improving transport. In this field, the European Union, United States, the Russian Federation and China are invited to continue their negotiations towards interoperability and reciprocity for their respective global navigation satellite systems.

Many measures exist to improve urban transport.

- *Improving passenger mobility:* In the face of changing demographics, including growing urban populations, there will be increasing challenges to sustainability and liveability in urban areas due to growing congestion and the negative externalities of transport, such as air and noise pollution. These have important implications for human health and social integration. Here, there are many known policies and measures that are unevenly applied around the world. These include measures like Bus Rapid Transit and bus priority, parking controls on cars and the provision of safe facilities for walking and cycling. In addition, innovative policy initiatives, such as road user charging, where appropriate, and better linkages between land-use and transport planning, supported by new technological applications, including

ITS, could help to optimise the use of road space in urban and other highly congested areas. There is also room to increase the efficiency of public transport through increased involvement of the private sector in service delivery. Technological applications, including real-time information, can increase ridership and improve intermodal linkages, including with cycling and walking. National, regional and local authorities and agencies need to collaborate on these issues, and there is also an important role for national and regional ITS organisations.

Emerging ideas include real-time information.

Innovative technology could also do much to improve the accessibility of transport for persons with limited mobility. With 11 per cent of the global population now over 60 years-old rising to 22 per cent by 2050, fully integrating accessibility for all transport system users – including older and disabled people – into long-term transport policy and planning will be increasingly a priority in many Countries. Working toward innovative planning based on Universal Design, whereby all infrastructure, products and environments are usable by all people to the greatest extent possible without adaptation or specialised design, will bring significant societal benefits. Greater collaboration among authorities, industry and users is needed to maximise funding for improved transport system accessibility and create an integrated approach to the delivery of more accessible transport services and infrastructure.

Transport must reduce oil dependence.

Reducing Transport's Impact on Climate Change

- International collaboration should be pursued to identify the alternative sources of energy and propulsion systems that will allow transport to reduce GHG emissions and oil dependence.
- In particular, as far as electricity is concerned, it will be important to work together to overcome hurdles such as battery costs, vehicle range and energy distribution. This work will necessarily include linkages with work on energy systems beyond the transport sector, particularly the development of electrical generation plants and smart grids. To the extent possible, new applications should be developed jointly, and experiences shared. The wide dissemination of this technology will require collaboration in many related areas, such as charging mechanisms and the standardisation of plugs. National Governments and regional organisations should work closely with the appropriate international organisations, including the International Energy Agency, to arrive at solutions that serve the needs of the customer in the transport system. Local Governments and energy suppliers, as well as private partners, will also need to engage in ensuring the availability of infrastructure required to make electric vehicles a reality.
- At the same time, it will also be important to work with automotive and auto parts manufacturers to bring about the improvements in drive trains (electric, hybridised and low-carbon internal combustion engines) to produce vehicles that will

Electricity is promising, but progress is still needed in batteries and their costs.

Traditional vehicles can be made much more efficient.

provide the greatest GHG reductions in the short, medium and long terms. There is significant potential to reduce the fuel consumption of existing vehicles, through a combination of measures, including fuel efficiency standards, fiscal incentives and information campaigns. Setting long-term targets will also provide a clear framework for industry.

Behaviour needs to change...

- Also important are efforts to change behaviour with regard to transport system use, with a view to inducing more sustainable patterns of mobility. This could include incentives, as well as better information about the impacts of transport use on the environment.

... and planning mechanisms improved.

- Integrated and co-ordinated planning frameworks that account for the CO₂ impacts of different policy options can help authorities at all levels to reduce the climate change impact of land-use decisions and infrastructure investment.

Rail can contribute significantly...

- Rail transport can play a significant role in improving the environmental performance and energy efficiency of transport systems. Electric railways should preferably employ renewable energy sources, thus helping to reduce their carbon footprint. New designs focusing on weight reductions and more efficient drive systems, such as hybrid technology, could further reduce carbon emissions. Energy recovery systems are already implemented today in several types of train sets and locomotives.

... as can air and sea.

- Where maritime and air transport are concerned, the International Maritime Organization (IMO) and International Civil Aviation Organization (ICAO) must play key roles.

The maritime sector can make improvements...

- A system-wide approach is needed from the maritime sector to the global challenge of reducing GHG emissions, as sea transport is predicted to continue growing along with world trade. The IMO's work on enhanced energy efficiency and GHG emission control has three distinct building blocks and the Organization has developed technical and operational measures currently under consideration as mandatory regulations for all ships, irrespective of flag and ownership:
 - The Energy Efficiency Design Index (EEDI) for new ships will require a minimum energy efficiency level per capacity mile (e.g. tonne-mile) for different ship segments (type and size). With the level being tightened incrementally every five years, the EEDI could stimulate continuous technical development of all the components influencing ships' fuel efficiency.
 - On the operational side, a mandatory management tool for energy efficient ship operation (SEEMP) has been developed to assist the shipping industry in achieving improvements in their operations using the Energy Efficiency Operation Indicator (EEOI) as a monitoring tool and benchmark.

... as can aviation.

- The IMO is working on market-based mechanisms (MBM) in accordance with a work plan culminating in 2011. The MBM proposals under review range from a contribution scheme (levy) for all CO₂ emissions from shipping or only emissions from those not meeting the EEDI requirement, via emission-trading systems, to schemes based on ships' actual efficiency both by design (EEDI) and operation (EEOI).
- In aviation, innovation in airframe and aero engine designs will be critical to reducing GHG emissions. Design cycles are long and very capital-intensive. As with the auto industry, a regulatory framework that provides strong incentives for research, development and investment decisions over the long term is required. As in the maritime sector, studies and discussions are underway on the global use of market-based instruments like emissions trading.
- Low-carbon technologies will make an important contribution, but may remain insufficient alone to meet GHG reduction objectives. New policies and practices and different behaviours are required if major reductions in emissions are to be achieved. Here, Governments and the international community need to share experiences and learn from each other.

Both technology and policy improvements needed.

Improving Safety

Road crashes can be reduced using known policies...

- Reducing the risks of road crashes and casualties is a central policy aim. There are great differences in safety performance across Countries. Implementing known, tried and tested measures, can contribute enormously to reducing deaths and injuries in many Countries. Technology has already made major contributions, and equipping vehicles with modern technologies has the potential to make enormous further improvements. Among the areas for development are advanced driver assistance systems; RTTI (Real Time Traffic Information); free provision of information on road safety for road users; and co-operative vehicle highway systems.
- The legal and liability consequences of changes in the underlying framework should be considered, and the practical testing of co-operative vehicle highway systems, vehicle guidance and management systems undertaken. Of key importance is the human-technology interface, and ensuring that systems take into account and compensate for human limitations. Bodies like the UNECE and the European Commission (responsible for the Action Plan for the Deployment of Intelligent Transport Systems in Europe) are invited to examine the issues involved. It is also vital that experiences and information be shared on the tests underway.
- In all modes, increased use of Safety Management Systems (SMS) – also known as management-based regulation – could continue to reinforce safety in all modes while limiting the

.... but more is possible and technology has great potential.

Roads can learn from other modes.

pressure on Governments to oversee this. Furthermore, by placing responsibility for ensuring safety in the hands of service providers, this can open up room for increased innovation with a view to improving performance.

Enhancing Transport Security

The key challenge in security will be improving security and efficiency at the same time.

- The targeting of transport by terrorists over the last decade has already forced profound changes in Government operations, policy, legislation and regulations. Constant innovation will be required to enhance the efficiency and effectiveness of transport security systems, including by way of legislative and regulatory frameworks, governance structures, intelligence systems, the design and management of risk-based programmes, as well as state-of-the art technologies. A key focus will need to be on balancing security, efficiency and human rights. Improved scanning and pre-screening techniques and procedures, as well as information exchange, have a key role to play here.

Conclusions

Further innovation is urgent.

The transport system has shown many examples of robust innovation over the last two centuries. The second half of the 20th Century has seen an unprecedented growth in volumes of passenger and freight transport. At the same time, in many parts of the world the transport sector has to face the challenge of unmet demand, particularly that of the poorest citizens. Innovations are urgently needed in order to increase the efficiency of the global transport system, and improve sustainability.

Existing good practice can be better disseminated.

Major players in transport, research and innovation, need to strengthen their co-operation in sharing lessons learned and in developing good practice. There is great scope to extend the reach of innovations that have been successfully applied in some Countries or regions. In doing so, it is recommended that international bodies; national, regional and local authorities; along with industry, engage in regular exchange with users, who should have an active role in influencing innovation processes.

Rapid progress requires new partnerships.

The challenge is for all actors mentioned above to join forces in new ways so that rapid progress is made towards the policy objectives set out for transport.

The International Transport Forum can act as a catalyst in this process, encouraging innovation in the sector, highlighting and disseminating examples of good practice and facilitating dialogue with industry and other interests.

Annex A

Analytical Material in Support of the 2010 International Transport Forum on *Transport and Innovation: Unleashing the Potential*

In preparation for the 2010 Forum, the Secretariat has conducted a significant body of analysis on the theme of *Transport and Innovation*. This work included surveys, workshops and research papers. All of this material is available on the 2010 Forum web site, at <http://internationaltransportforum.org/2010>. In addition, the following links provide access to specific papers and presentations:

Surveys:

- **Survey of Countries' Policies and Initiatives Related to Innovation in Transport.** This includes a summary of countries' views on the primary priorities for, and barriers to innovation, as well as summaries of national responses.
- **Stakeholder Consultation on Innovation in Transport: Summary and Analysis.** This includes a summary of the results of a survey of international transport stakeholder organisations and of input from a consultation session, held in Paris on 18 February 2010.

Events:

- Roundtable on **Information and Communications Technologies for Innovative Global Freight Transport Systems.** This event was held in Genoa, Italy, on 8-9 March 2010, with the support of the Istituto Internazionale delle Comunicazioni.
- **Experts Session on Innovation and the Future of Transport,** held in Paris on 26 January 2010. This session brought together experts in the fields of transport and innovation to explore future scenarios. Related papers are listed below. A **Summary** of the session is also available.
- **Workshop on Innovation in Accessible Transport for All,** held in Washington, DC, USA, on 14 January 2010, in collaboration with the World Bank.
- **Notes from the International Transport Forum Advisory Board Meeting,** in The Hague, The Netherlands, on 30 November 2009, with the support of the Netherlands Ministry of Transport, Public Works and Water Management.
- **Seminar on Innovation in Road Transport: Opportunities for Improving Efficiency.** This seminar was organised in Lisbon, Portugal, on 2 October 2009, with the support of the Instituto da Mobilidade e dos Transportes Terrestres of Portugal. A **Summary** is also available.

Background papers:

The following papers were written in support of the 2010 Forum. Please see individual papers for summaries of their conclusions.

- **Transport and Innovation: Towards a View on the Role of Public Policy,** by the International Transport Forum Secretariat

- **In Search of Innovative Policies in the Transport Sector**, by Louis Ranger
- **Wireless Technologies and the Transformation of Transport**, by Eric Sampson
- **Driving Forces of Innovation in the Transport Sector**, by Yves Crozet
- **A Vision for Railways in 2050**, by Louis Thompson
- **Achieving 80% Reduction in Transport Greenhouse Gas Emissions, Using the USA as a Case Study**, by David McCollum, Christopher Yang and Dan Sperling
- **Maritime Transportation: Drivers for the Shipping and Port Industries**, by Jean-Paul Rodrigue
- **The Transport Infrastructure Sector and Innovation: Issues, Challenges and a Possible Way Forward**, by Nils Bruzelius
- **Urban Transport and Mobility**, by Anthony May and Gregory Marsden

Other Research Work:

The following work of the Joint Transport Research Centre also supports the 2010 Forum theme:

- **Innovation in Truck Technologies**, extracted from the forthcoming JTRC report on “*Moving Freight with Better Trucks*”
- **Round Table on Implementing Congestion Charging**, held in Paris, 4-5 February 2010.
- **Round Table on Stimulating Low-Carbon Vehicle Technologies**, held in Paris, 18-19 February 2010.
- **The Future for Interurban Passenger Transport: Bringing Citizens Closer Together**, 18th Symposium on Transport Economics and Policy, 16-18 November 2009, Madrid, Spain, including various papers related to the theme of *Transport and Innovation*.