EXPERT PANEL SUMMARY

Interconnected and Integrated: Optimising Intelligent Infrastructure

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Background

More intelligent transport infrastructure, exploiting advanced telecommunications technologies to interconnect transport systems and users, promises to deliver significant improvements in efficiency.

The session reviewed the potential of intelligent infrastructure and infrastructure-to-vehicle communications for electronic links for all transport modes. It examined also the development of satellite technology and future technologies and potential applications such as automated highways and guidance systems. The session also considered possible obstacles to the introduction of more intelligent transport systems including interoperability between different technologies and regions.

The Panel

- Chair: Peter Sweatman, Director, University of Michigan Transportation Research Institute, USA
- John Augustine, Managing Director, Intelligent Transportation Systems, Joint Program Office , Research and Innovative Technology Administration, USA
- Gabriel Colceag, Vice President, Urban Rail, Thales Transportation Systems
- Volker Kefer, Member of the DB AG Board of Management for Rail Technology and Services, Deutsche Bahn AG
- Joseph Lam, President, Systems Business, Canada and International Operations, Delcan
- Hermann Meyer, CEO, ERTICO – ITS Europe
- Pedro Pedreira, Executive Director, European GNSS Supervisory Authority
- Kentaro Sakamoto, Senior Vice President, ITS Japan

A number of existing policy challenges highlight the role of "intelligent" infrastructure

The policy challenges of pollution, congestion and road accidents highlight the need to improve the efficiency and safety of the transportation system. Over 1.3 million people die on the road every year. Congestion causes nearly three billion gallons of wasted fuel in the United States alone. Lack of funding, exacerbated by the economic crisis, increases the need to do more with current physical infrastructure. "Intelligent" infrastructure solutions, that integrate information and communication technology into transport infrastructure and vehicles, have a potential to improve the efficiency of existing transportation systems. Vehicle-to-vehicle and vehicle-to-infrastructure applications, using technologies such as dedicated short-range communications (DSRC), offer potential to improve speed and reliability of trips and reduce road accidents through better information on traffic and road conditions.

Intelligent transport infrastructure brings real benefits to system users

There are already a number of examples of intelligent infrastructure with major benefits for transport service providers and users. The integrated light rail system in Vancouver, for example, uses moving-block advanced automatic train control which allows for very short headways and facilitates rapid changes in capacity according to demand. Freight operators are using dynamic route guidance in a number of countries, saving money and time. Information can also be used to help drivers by co-operative safety systems helping them to avoid accidents by using data from other vehicles in the same area.

In many cases, users require seamless and reliable transport from origin to destination, regardless the mode. Changing mode can be made as easy as possible by multimodal travel information systems. However, it is still difficult to find many successful examples of interconnected and integrated systems, operating across the modes. Some examples do exist. Multi-modal transport tickets are in operation in some countries and innovations such as the Octopus card that was originally introduced for fare payment on the Honk Kong Mass Transit Railway allow for combining different functions of travel. It has quickly expanded for multiple other purposes. The card can now be used to pay fares for majority of public transport in Hong Kong and to make purchases for consumer products at many stores in the city.

Releasing data through open access platforms is likely to accelerate innovation in the development of new services and maximise the use of intelligent infrastructure by allowing users to develop services that match their needs. The overriding objective in developing intelligent infrastructure must always be on building technology that focuses on value for the transport system user.

Standardisation is needed to overcome barriers to introducing new technologies

Obstacles to widespread deployment and use of new technologies can delay their use for years. For example, the share of satellite navigation in road traffic management is still very small because of slow progress in ensuring the interoperability of tolling systems. This

increases the unit costs of on-board equipment and in some cases limits the value of the system to the user. Defining common service provision standards and technical specifications is required, especially in the use of satellite navigation technologies in traffic management.

In the European context, the European Union's directive on the European Electronic Tolling Service (ETS) has the potential to increase significantly the interoperability of automatic toll collection systems by establishing a single European toll service. Users may subscribe to the ETS provider of their choice and the latter will generally provide or accept existing on-board equipment meeting the agreed technical requirements. This directive together with standards for satellite navigation (e.g. ISO technical specification and other complementary road-side and on-board equipment standards) will help provide a critical mass that ultimately may drive down production costs for on-board equipment. These improvements will drive greater uptake of on-board equipment that can be used for other applications than tolling, allowing for a change in focus of satellite navigation from tolling to traffic management.

The way information is transformed and distributed needs harmonisation

. A lot of information is already produced and made available using intelligent infrastructure including for measuring traffic flow, detecting road incidents, tracking vehicles and providing of real time traffic information. The volume of this information is likely to increase. Ensuring data interoperability between different systems is a key challenge. The future innovation in intelligent infrastructure comes less from technology and more from the way information is transformed, distributed and shared.

There is room for greater standardisation of information enabling various actors to cooperate, share and distribute information. This can be done either through standards or by creating bridges connecting different datasets. There is also a danger of information overflow in the future and care needs to be taken in ensuring the reliability and quality of data provided. Governments could act as a facilitator to insuring that information of public interest is available to all and by facilitating greater interoperability. The question of who controls the data and the quality of data remains an open issue. Political leadership is likely needed to ensure that different actors collaborate.

Transition towards more intelligent infrastructure needs to be managed

There is a danger in introducing new technology if proper care is not taken in design and planning of these systems. In some cases, operators and infrastructure managers have rushed to implement new solutions with too much focus on the short-term. In railway signalling, for example, interlockings are partly based on old and partly on new technologies. This mixture of new and old technologies can lead to sub-optimal solutions that are not integrated with other parts of the system. This is not to say that intelligent infrastructure cannot be introduced incrementally, but rather that unless the process of renewal is carefully managed it can lead to unnecessary barriers for subsequent, more optimized solutions for the overall transport network.

In Europe, the opening of national rail markets is challenging because signalling, safety and power supply systems differ substantially between railways in neighbouring countries. Close co-operation between all actors to manage costs and maximise benefits for the long-term is critical. Sufficient resources need to be assigned to this planning and management task to manage the risks of premature investments and in Europe merited the creation of agency to coordinate the process.

In introducing intelligent infrastructure technologies particular attention needs to be directed at safety. The introduction of some other technologies has had unintended consequences. New risks have been created for example in car communications devices and more generally by mobile phones. In the United States alone, nearly 6000 people die every year in crashes involving a distracted driver, and more than half a million are injured. More broadly new vehicle equipment needs to be assessed for its ergonomic simplicity of use and for its potential to distract attention from the core tasks of driving. Research on areas such as human behaviour, is critical to implementing ITS well.