



## SMART TRANSPORT INFRASTRUCTURE TECHNOLOGY FORUM

AT NICTA  
WEDNESDAY, 28 APRIL, 2010

Summary  
Project Proposals  
Open Discussion

### Summary

Ian Macdonald, NSW Minister for State and Regional Development, opened the forum with a vision for the future and a call for us to collaborate on the big challenges facing the transport sector. The forum drew on the skills and experience of more than 80 Transport sector participants with representatives from industry, industry bodies, infrastructure suppliers, end- users of infrastructure, vendors, research organisations and state and federal governments. Its aim was to identify areas for collaboration, with a view to developing proposals for significant projects in Smart Infrastructure, enabled by ICT R&D and to provide information for policy makers.

There is strong interest in the area. The event was planned for 25 participants and demand took this to over 80. While the event was focussed on technology the need for *Business Cases* to justify investment and *Cultural Change* to realise gains were strong themes.

From the discussion and themes emerging on the day we have distilled potential project areas which will be explored further through with participants.

### Project Proposals

#### Autonomous Vehicles for Inland Ports

Michael Haines of Westgate Ports invited participants to a workshop to plan implementation of an *Inland Port using Autonomous Vehicles*. The project would see autonomous vehicles optimise movement of containers from ports along a dedicated corridor to an inland facility. The planning process aims to encourage collaboration by stakeholders much earlier than is usual. While based in Victoria, the thinking around this project proposal is applicable to all states. *Potential participants: Port, Rail and Road Transport authorities, NICTA, CSIRO, Fraunhofer, Universities.*

#### Interactive Infrastructure

Smart Infrastructure may be seen as providing a service to people. This means people and infrastructure interact, making new interfaces and ways of representing performance and managing demand important. This project would explore how to model infrastructure as a service, how we can leverage the latest smart-phone and web technologies for this and how we consider people in the feedback loop in the optimisation process. *Potential participants: Port, Rail and Road Transport authorities, NICTA, CSIRO, Universities.*

## Measurement and Data

To make rational investment decisions we need to collect and interpret transport system performance data. At the moment we do not collect enough data, or enough kinds of data. We do not have a good idea of what is collected or sufficient access to what is already collected. We need install more sensors, liberate existing data, and determine how to aggregate and visualise what we have. Virtual Australia might cover the geospatial aspect of this. A project in this area would survey known sources of data, investigate other forms of data which need to be collected, and propose methods for aggregation, analysis and visualisation. An aspect of the project would be to identify data which is collected but not accessible and also emphasise national approaches.

*Potential participants: Road Transport authorities, Private Road Operators, Fraunhofer, Government Regulators and Policy makers, NICTA, CSIRO, Universities.*

## Leverage across Infrastructure Sectors

Smart Infrastructure across Transport, Energy and Water will have common problems such as demand management, and common solutions such as sensor network technology and real-time optimisation. This project would concentrate on looking across infrastructure sectors and abstracting the common problems, solutions and techniques which would lead to economies of scale in technology, insight into how people interact with infrastructure and potentially provide policy input. *Potential Participants: Transport Providers, Water and Energy Utilities, Federal and State Governments.*

## Extended Supply Chain

A supply chain extends, in reality, from producer to consumer. It is also well understood that an efficient flow of goods requires an equally efficient free flow of information up and down the supply chain. One of the barriers to this transparency is the lack of uniformity of information which moves up and down the chain leading to a loss of semantics and limited efficiency. This project would identify where such semantic disconnects occur and develop techniques to translate or harmonise information up and down the supply chain. It would link strongly with NICTA's Fraunhofer project group. *Road Transport Providers, Freight Providers, Private Road Operators, NICTA, CSIRO, Fraunhofer, Universities.*

## Proceedings

### Minister's Address

Minister Macdonald opened the forum with a vision for the future and a call for us to collaborate on the big challenges facing the transport sector. He outlined the economic importance of the sector, its expected growth, underlined the need for innovation and the contribution NSW makes nationally.

### Setting the Scene

Terry Percival (NICTA), Norm Pidgeon (ITS Australia) and Michael Kilgariff (ALC) began by defining the term "Smart Infrastructure" and the technologies and principles which support it, describing ITS Australia's draft strategy which calls for *zero harm, zero avoidable congestion, and significant reduction in emissions*, and the importance of logistics and a smart supply chain to the national economy.

### *Discussion points*

The need to overhaul the way we currently pay for roads - congestion and road-user charges need to be considered, but if they are, should *replace* other charges such as fuel excise.

Impediments to smarter transport included:

- the business case for new technology
- cultural resistance to changing existing road charging schemes
- the need for more collaboration across the entire sector
- the lack of national rules

## **Technologies for Smart Infrastructure**

NICTA speakers Glenn Geers, Terry Percival and Abbas Bigdeli and Chris Skinner (DISplay) gave an overview of technologies for sensing traffic, wireless systems for vehicle-to-vehicle and vehicle to infrastructure communications, advanced surveillance and imaging technologies and the role of the NBN in providing a foundation for smarter infrastructure.

### *Discussion points*

The role of carriers in providing the needed robustness, security and performance for networks used to enable Smart Infrastructure is under-rated.

That the NBN needed to cover public spaces and transport corridors as well as premises. This may not be addressed unless we raise the issue. Further there is a perception that the NBN was consumer-focussed and may not be secure enough for an infrastructure role.

There will be a time lag in fitting new smart technologies (such as DSRC) to the vehicle fleet, as well as questions around whether such systems could perform at scale.

## **Case studies**

Bernard Kachoyan (DSTO), Simon Dunstall (CSIRO), Michael Haines (Westgate Ports), Aruna Seneviratne (NICTA) and Dan Hill (Arup) provided a broad description of applications of smart technologies and alternative approaches to improving transport efficiency and amenity. Studies ranged across more efficient techniques for developing marine charting, using "holistic" optimisation to complex mining logistics, autonomous vehicles to provide high efficiency inland ports, the use of sensors for managing transport and other structures, and examples of counter-intuitive *laissez-faire shared-spaces* where pedestrian and vehicular traffic self-organise across all modes.

### *Discussion points*

Shared-spaces where people, bikes, cars and light rail all shared the same space without any controls work much better than expected. Overall speeds are slower, accident rate is marginal, but perhaps overall efficiency is higher. The idea goes against Western norms.

## Open Discussion

There was an energetic discussion among all participants at the end of the formal presentations. Out of this discussion came a proposal to workshop a the project proposal from *Westgate Ports*, and the themes of an *Extended Supply Chain*, *Leverage across Infrastructure Sectors*, *Interactive Infrastructure*, *Measurement and Data* and, practically, *How do we move into the future?* Pervading the discussion was the theme of taking *People* and *Cultural Change* into account.

*Westgate Ports Project* – Michael Haines of Westgate Ports invited participants to a workshop plan an *Inland Port using Autonomous Vehicles*. While based in Victoria, the thinking around this project proposal is applicable to all states.

*Extended Supply Chain* – the idea that a supply chain is producer to consumer, not just transport; efficient goods (and vehicle) flow needs a good data flow, but not just data, needs consistent semantic understanding up and down a transparent supply chain. Note that GS1 is working in this area.

*Leverage across Infrastructure Sectors* – a suggestion that we look for common problems, needs and solutions across different kinds of smart infrastructure and further forums or workshops along these lines. Demand management using pricing is common across all infrastructure sectors, as is the need for cultural acceptance.

*Interactive Infrastructure* – need to consider people in the move to smarter infrastructure. Smart infrastructure provides a service to people and that there needs to be interactivity between infrastructure and people. The performance of infrastructure needs to be visualised in human terms, perhaps with mobile and web-based interfaces and new dynamic public displays. We should leverage emerging interfaces across smart phones, laptops and new public displays for interacting with infrastructure. Further, understanding the intent and purpose of humans making demands on infrastructure was needed to better optimisation. How do we assess intent? What is the transaction data of people interacting with the infrastructure? New interfaces like smart-phones can facilitate this.

*Measurement and data* – not enough data and kinds of data is being collected (more sensors), there is not enough access to the data which is collected (regulatory, standards), there is insufficient understanding of what needs to be collected, how we need to collect it and what is being collected already. We also need to understand underlying demand (why is a person driving?). We need fundamentally good data to build good business cases – so that rational policy can be driven by facts and science. PSMA's Virtual Australia is addressing the need for geospatial audit of infrastructure, noting that effort is needed to collect and maintain at the source.

*How do we get from now to the future?* – What are the practical steps in going from what we have to realising the dream?