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Intelligent Transport Systems

Transport Technology Connecting Australians

National
Intelligent Transport Systems Strategy
2010-2015

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INTRODUCTION

Our national transport system faces unprecedented challenges. These challenges affect the safety and mobility of its users across all modes of transport and the ability of government agencies to effectively manage, operate and meet environmental goals. Traditional solutions alone cannot hope to solve these issues; new approaches are needed.

Intelligent Transport Systems Australia (ITSA) has a mission to promote the contribution of Intelligent Transport Systems (ITS) across Australia to the improvement of:

- transport safety and security
- efficient operation and management of all modes of transport
- the movement of freight and people
- the environmental impacts of transport
- transport information for the community across all modes.

This ITSA proposal for a National Intelligent Transport Systems (ITS) Strategy encompasses a five year timeframe from 2010 to 2015. It draws on the excellent contributions from participants in the Australian ITS Summit, held in Melbourne in November 2009. Feedback from the draft plan prepared from the Summit outcomes has been incorporated in this updated version.

Feedback on the draft plan included requests to provide stronger definition of actions and the roles of various groups, including ITSA. This has been addressed in this document with a special focus on one of the areas undergoing strong development across Australia and the world – Cooperative Mobility. The strategy proposes the implementation of a Cooperative Mobility Initiative (CMI) Program that will guide the coordinated development of initiatives in this area and be a vehicle for establishment of ITS architecture and roadmap development initiatives.

No single organisation has the capacity to deliver the strategy. It will require a co-operative approach amongst industry, government, transport operators and supporting organisations, such as ITSA. Our hope is that this strategy and the coordinating frameworks proposed will deliver true benefits to Australia's transport system.

THE NEED FOR A NATIONAL ITS STRATEGY

Well designed and deployed Intelligent Transport Systems enhance the safety, efficiency and environmental performance of our transport network. However, solutions developed in isolation will not deliver true benefits to the nation. A national strategy for the development and delivery of ITS solutions will ensure that:

- Solutions work together seamlessly and provide consistent outcomes in each region and jurisdiction;
- Emerging Australian and international standards are applied uniformly, and providing access to global technology and supplier solutions
- Transport users gain access to reliable information about all modes of transport, delivered in timely and familiar ways
- Economies of scale are achieved as projects delivered in each jurisdiction build on the achievements of others
- A coherent position on priority projects are presented to transport agencies and feed into the development of national priorities for infrastructure and technology development
- Expenditure on ITS accurately reflects stakeholder priorities.

This National ITS Strategy provides a framework for delivering priority intelligent transport solutions in recognition of the needs and aspirations of government, industry, transport operators, academia, road users and the wider community. At a practical level, the National ITS Strategy is used as a framework to:

- Provide direction to the development and deployment of ITS solutions to optimise transport system performance
- Define mechanisms for development of an ITS architecture for Australia, supported by a road-map of project directions and databases of national skills and capabilities
- Overcome barriers to the deployment of ITS infrastructure
- Enable stakeholders in ITS solutions to maximise the available benefits through open interfaces that support the exchange of information and the sharing of resources and infrastructure whether it is between road users, private corporations or government jurisdictions
- Promote a strong, competitive market for ITS products and services
- Maximise the value from investments in ITS by fostering ITS innovation, research and development in a targeted way.

THE NATIONAL ITS STRATEGY

In November 2009, ITSA and the Victorian Government hosted the inaugural Australian ITS Summit. This was used as a working forum for representatives from across the nation and invited international experts to explore ideas for the development of components of a national ITS Strategy. Input from the Summit was captured and sorted into strategic themes, project concepts, policy opportunities and potential action plan components. These were refined by ITSA and a draft ITS Strategy was subsequently published for comment.

The Strategy is an evolving entity. In order to achieve the objectives set for ITS, there is a need to invest in governance and coordination processes to deliver continuous improvement and evolution of initiatives. Proposed mechanisms are defined in later sections of this document.

Feedback received on the draft plan

ITSA was pleased to receive a wide range of constructive responses to the draft strategy from the full span of government, suppliers, operators, R&D agencies and user representative organisations. Responses to the draft reinforced the project directions derived from the Summit input. Some submissions proposed further emphasis of particular components of the strategy. These have been taken into account in this revision.

A consistent theme within the feedback received was a call for better definition of the actual mechanisms for delivery, especially in relation to the over-arching activities, such as development of a national ITS architecture, project roadmap and national databases of expertise and capabilities. This prompted ITSA to refine and refocus its own proposed role as a lead agency in coordination of development and delivery of Australia's National ITS Strategy.

The current strong focus of the industry on the emerging topic of "co-operative mobility" was also noted in the responses. This incorporates the technology solutions for vehicle-to-vehicle and vehicle-to-infrastructure communications as well as the wide potential range of applications for improvement of safety, mobility and environmental performance.

Taking this feedback into account, this revised strategy defines a proposed process for ITSA to take a co-ordinating position in the development of a national cooperative mobility activity. This also provides a focal point for the development of a national ITS architecture, project roadmap and supporting databases.

Safety, Mobility and the Environment

The Strategy is aligned to three core pillars of **Safety, Mobility** and the **Environment.** This matches the themes used in the program of national transport reform, under the auspices of the Australian Transport Council (ATC) and the National Transport Commission (NTC).

These three pillars in turn inspire an overall vision of stakeholder and a context within which success can be measured:

- zero harm to users of the transport network,
- zero avoidable congestion, and
- a significant (50-70%) reduction in transport greenhouse gas emissions based on 2010 levels.

ITS Australia recognises that more than just intelligent systems will be required to achieve such a vision. Many other factors, such as land use planning, engineering design, civil works, social behaviour, and government economic policies will all play their part. However, ITS can make a very important and significant contribution to attainment of the overall vision. Indeed in many cases, ITS will not only provide for further optimisation of existing infrastructure but it will multiply the impact of new infrastructure investments.

Drawing from the collected outcomes of the Australian ITS Summit and the work of the other stakeholders mentioned earlier, ITSA has articulated a vision for the contribution ITS can make to the three impact areas summarised in Table 1:

Safety	Mobility	Environment
In-vehicle, vehicle to vehicle and vehicle to infrastructure collaborative systems will help prevent crashes wherever possible and minimise harm when they occur.	Readily accessible information will improve traveller mobility and optimal choice of modes (including public transport). Systems capable of utilising increasingly rich information about vehicles and networks will support intelligent management of transport operations.	Intelligent systems will increasingly support the monitoring, evaluation and mitigation of the environmental impact of transport.

Table 1 - Contribution of ITS to the three pillars

Enabling Solutions

Intelligent Transport Systems use a range of communication, detection and processing components to support solution delivery. A conceptual view of the relationships amongst vehicles, systems, services and users in the ITS domain is shown in Figure 1.

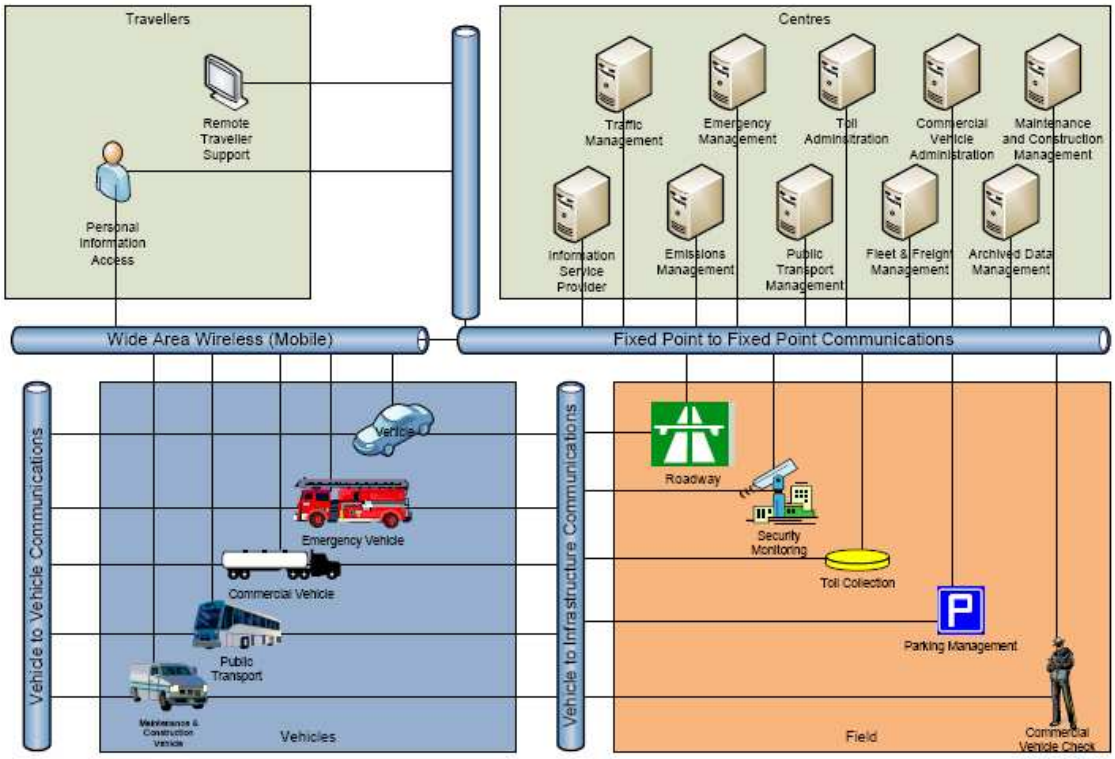

Figure 1 - A high-level Intelligent Transport Systems architecture

Areas of focus under this strategy have been grouped into eight categories as shown in Table 2, each of which may deliver solutions across one or more of the impact areas.

ITS Focus Areas	Areas of Impact		
	Safety	Mobility	Environment
1. **Advanced Traffic Management Systems**, such as lane control and ramp metering components of controlled motorway solutions	✓	✓	✓
2. **Vehicle detection and enforcement solutions** to support tolling systems, access control and providing a base for road user charging systems		✓	✓
3. **Driver Assistance Solutions** (e.g. predictive terrain adaptive cruise control)	✓		✓
4. **Intelligent speed assistance or adaptation**, automatically updating the vehicle with speed-limit information	✓		✓
5. **Traveller Information Systems** delivering information to drivers and travellers across all modes	✓	✓	✓
6. **Vehicle to vehicle and vehicle to infrastructure communication** solutions, delivering automated safety solutions, information and potentially further pricing options (“Cooperative ITS”)	✓	✓	
7. **Vehicle performance tracking and monitoring**, using in-vehicle logging systems and communication options, with a preference for a single operational platform in freight vehicles	✓	✓	✓
8. **Vehicle Environmental Solutions** to enhance the performance and utility of low emission vehicles, for example managed charging of electric vehicles			✓

Table 2: ITS Focus Areas

National ITS Strategic Framework

Drawing on the priorities established in the ITS Summit and the subsequent feedback, a strategic framework for the evaluation and development of ITS initiatives has been constructed. This has five components:

1) **Architecture, Standards and Tools.**
   The first step is to develop a technical and solution architecture, drawing on developed architectures in Europe and/or the USA. This will define a framework for common definition of ITS initiatives and components as well as the standards and tools that will support their development. This can be accompanied by a roadmap of potential development paths and supporting information on resources, best practice strategies and potential impact on government objectives.

2) **Roadmap for coordinated development**
   This will provide a national view of the development required to deliver solutions in priority areas. The objective will be to establish the timeframe for project execution and the likely participants in delivery.

3) **Projects.**
   This involves the definition of solution development opportunities relating to one or more of the pillars. Each project definition will include a scope of work, timeframe, deliverables and measures of success. It will describe a fit with the reference architecture and the standards and tools which underpin solution development, integration and implementation.

4) **Distributed ITS Centre of Excellence.**
   There are many organisations across the country contributing to the development of ITS initiatives. This component will define groupings of organisations that are contributing to particular streams of ITS development and propose coordinating mechanisms to enhance coordination and cooperation.

5) **Policy.**
   This is a set of public policy initiatives required to give further shape or clarity to the Strategy. The outcomes of the Australian ITS Summit also included ideas for the promotion of adoption of ITS through public policy initiatives. These include action to promote the adoption of advanced ITS applications across government fleets and operations, to support the adoption of international standards wherever possible and raising awareness of opportunities and elements of ITS education.

The tables below are a summary of the strategic framework components that were identified in the outcomes of the ITS Summit. These provide the starting point for detailed development in each case.

Architecture, Standards and Tools
• Adopt a National ITS Architecture drawing on world best experience i.e. USA, Europe or Japan • Develop a road-map for the potential application of ITS in Australia over the next ten years • Establish a universal database for the gathering and sharing of transport performance information • Establish and maintain a database of current ITS expertise, research and capability (including human resources) • Determine the best practices in ITS deployment strategies both nationally and internationally • Evaluate the contribution of ITS initiatives to the attainment/enhancement of government transport objectives

Table 3: Architecture, Standards and Tools

Projects		
Safety	**Mobility**	**Environment**
• Vehicle to vehicle and vehicle to infrastructure communication trial and demonstration program • Deployment of ITS field operational tests in every State (test-beds/demonstrators) using the adopted ITS architecture • Application of ITS to support transport infrastructure management, monitoring health of structures, roads and tunnels		
Intelligent speed assist/adaptation	Expansion of next generation route navigation systems based on real time traffic	Evaluation tools to test the environmental impact of ITS initiatives, pricing regimes.
Heavy vehicle driver fatigue and speed management	A multi-modal transport portal, with ability to opt in or out, incorporating articulation of true performance and cost of all journeys and real-time journey planning	Support for real-time tracking of environmental performance of fleet vehicles
Promotion of advanced driver assistance solutions	Management of road and lane access and enforcement, e.g. transit priority, dynamic bus lanes, priority based on passengers, on-board vehicle mass monitoring	Evaluation of opportunities to support Green Car concepts, such as providing feedback on driving behaviour and its impact on emissions.
	Optimised managed motorway solutions, including ramp metering, LUMS, signal timing	
	Demonstration of ITS capabilities to deliver new pricing schemes	
	Support for freight enhancement solutions including portals for co-operative logistics	
	Next generation rail signalling (cab based)	

Table 4: Projects

Centres of Excellence		
Safety	**Mobility**	**Environment**
• Identify Centres of Excellence and map their potential contribution to the execution or evolution of the ITS Strategy • Map Strategic initiatives (including R&D and Pilot Projects) to Centres of Excellence		

Table 5: Centres of Excellence

Potential public policy development initiatives		
Safety	**Mobility**	**Environment**
• Establish a plan for the education of the community on application of ITS and benefits which service their needs • Establish a distributed national centre of transport excellence to encourage co-operation in the deployment of best-practice ITS		
Raise awareness of ITS amongst security and emergency agencies to integrate ITS in their response protocol.	Leverage the public infrastructure as a source of comprehensive data about the transport network, demands and performance	Foster the development of engine and vehicle technology aimed at reducing environmental impacts
National integration of all operators emergency plans leading to integration of the disaster recovery and business continuity services	Adopt where possible international standards for network level instrumentation and data exchange	Engage and support motorists with ownership and responsibility, for example – rewards & incentives
Government vehicle, taxis, and bus fleets fitted with safety/ITS devices to accelerate adoption	Mandate rollout of international standards, platforms, infrastructure to install co-operative mobility.	
Evaluating, adopting and mandating standards to improve vehicle safety e.g. Electronic Stability Control, Lane Departure Warning, safe following and auto braking and other advanced schemes	Implement regulatory legislation for creation of basic transport data sets, including mandatory reporting. (eg, public transport)	

Table 6: Policy

ACTIVATING THE STRATEGY

ITSA is a joint industry and government association, which has limited resources to undertake the actual development of ITS projects within the strategy framework outlined in the previous section. However, it can be a key driver in fostering the high level of cooperation required across industry, government, transport operators and research organisations to pursue fulfilment of the strategy.

To provide a focus for development and governance of the components of the strategic framework, ITSA is proposing the establishment of the Cooperative Mobility Initiative, a core ITS Program under the leadership of a dedicated Program Director responsible to the Board of ITS Australia.

Cooperative Mobility Initiative

ITSA proposes a new program called the "Cooperative Mobility Initiative" to be coordinated by ITSA. As previously outlined, Cooperative Mobility incorporates the technology solutions which are necessary to implement the National ITS Strategy and include vehicle-to-vehicle and vehicle-to-infrastructure communications as well as the wide potential range of related applications for improvement of safety, mobility and environmental performance.

The program would have a dedicated Program Director and link ITS strategy development to three existing initiatives:

- Austroads working group on Cooperative ITS
- National Transport Commission's (NTC) working group on National In-vehicle Telematics Strategy for the Road Freight Sector; and
- Transport Certification Australia's involvement in ISO TC 204 working group 7 on Architecture for collaborative Telematics applications for heavy vehicles.

ITSA proposes that funding for this important program be sought in two parts: one through direct project grants, if possible, and the other through secondment of resources from the agencies involved in the above-listed projects and other organisations central to the Cooperative Mobility Initiative.

The Cooperative Mobility Initiative deliverables would be the architecture, roadmap and project components, as previously defined in Tables 3 and 4. These include:

- Recommendation of a National ITS Architecture to be adopted drawing on what is already being developed in Europe, Japan and the USA
- Development of a Road Map of the ITS applications to be developed and deployed over the next 10 years

- Establishment and maintenance of a universal database for the gathering and sharing of transport performance information
- Establishment and maintenance of a database of current ITS expertise, research and capability (including human resources)
- Evaluation of the contribution of ITS initiatives to the attainment/enhancement of government and private sector transport objectives.

The proposed project management organisation structure is shown in Figure 2, in which an ultimate reporting responsibility to the Standing Committee on Transport is proposed.

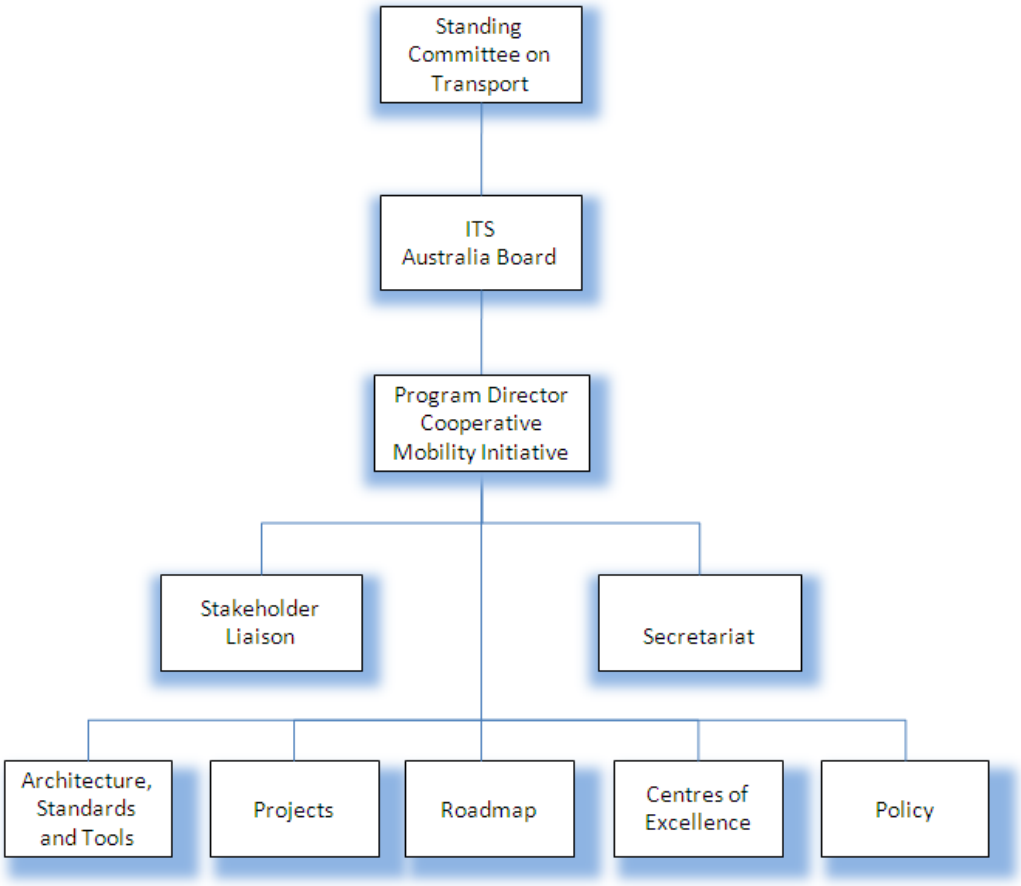

Figure 2 - Cooperative Mobility Initiative Project Management Organisation

A more detailed Program Management Plan is being developed with clear roles and responsibilities and a budget forecast for the first 5 years. Figure 3 provides an overview of the planned process.

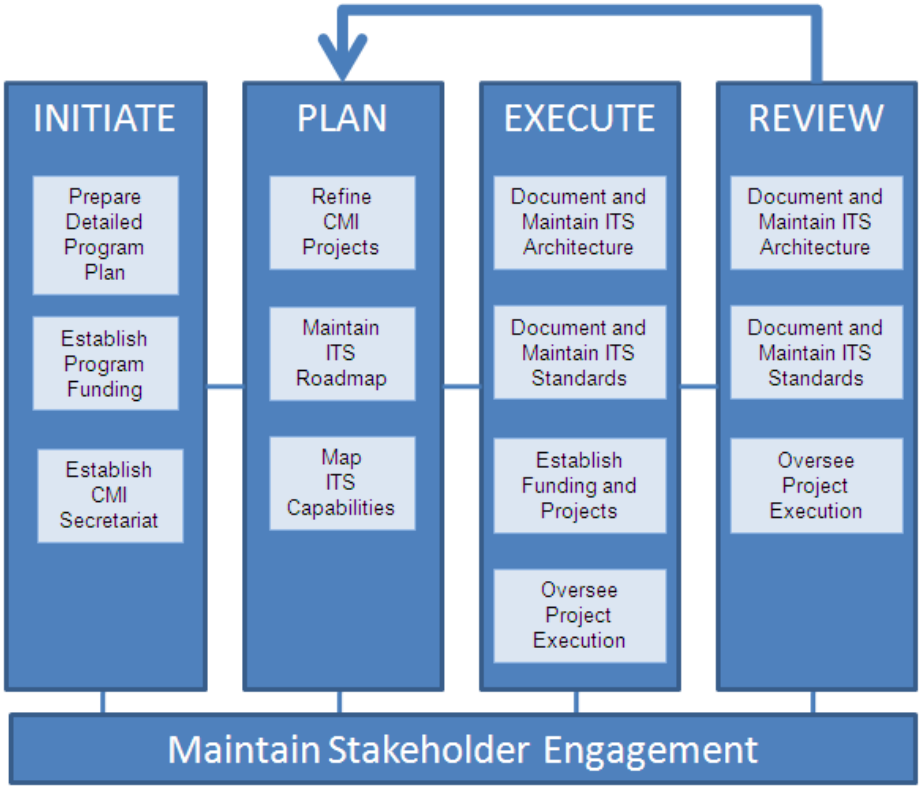

Figure 3 - Cooperative Mobility Initiative Process

Initial tasks for the CMI program are:

- Establish and maintain a database of current ITS expertise, research and capability (including human resources) relevant to the Cooperative Mobility Program
- Establish a universal database for the gathering and sharing of transport performance information pertaining to key application areas of CMI
- Develop the technical and solutions architecture framework to at least cover CMI components, and
- Establish the CMI Centre of Excellence.

The Cooperative Mobility Centre of Excellence

Table 5 has listed the requirements for ITS Centres of Excellence in the generic case. They are seen to be a collaboration of government, industry, and academia that represents the collective skills and capabilities in particular areas of ITS development.

The Cooperative Mobility Initiative provides the opportunity to test the concept in this more targeted domain.

Proposed Role of Government

Drawing on the collective views from the ITS Summit, it is clear that Government plays a critical role in supporting the Cooperative Mobility Initiative Program in actioning the National ITS Strategy. In particular, it is proposed that Government departments:

- Provide guidance on potential funding sources for the CMI Program and its strategic initiatives
- Provide seconded funded resources to the program, on approval of the detailed CMI Program Plan
- Provide guidance on the application of ITS solutions through a clear policy framework that sets objectives, performance levels and delivery timeframes for transport systems
- Facilitate and encourage deployment of ITS policy and initiatives in accordance with the ITS Strategy
- Use its position as a major procurer of transport solution, to guide investment in ITS
- Set clear standards with industry for ITS applications
- Provide policy support to the CMI Program that reflects learning from international policy experience
- Work in partnership with industry, transport operators, research organisations and ITSA, to achieve delivery of the National Strategy
- Foster research and innovation consistent with the National Strategy
- Operate systems and provide services to industry and the community.

The initiatives summarised previously in Table 5 are specific opportunities derived from the Summit for Government to consider across these areas.

Industry

The role of industry in ITS is to:

- Develop, customise, deliver and operate systems, products and services to meet the needs of transport operators, governments and individual consumers.
- Establish commercial markets
- Research future ITS products and innovations consistent with the ITS vision

- Join with Government, transport operators, ITSA and other industry groups in the exploration and adoption of an ITS architecture and road-map for development, drawing on the best of international directions and experience

- Develop and adopt open interfaces, shared platforms and interoperability to meet customers and Government's expectations in respect to standards and services.

CONCLUSION

This National ITS Strategy has been generated from the highly collaborative Australian ITS Summit. It is an important step forward in capitalising on the power of advanced ITS solutions for this country. The value of achieving improved **safety**, **mobility** and **environmental** outcomes has never been higher as the nation comes to terms with the reality of a bounded physical infrastructure.

The Cooperative Mobility Initiative is an important starting point in realising this National ITS Strategy.