

SMART DEMO 2005

Adelaide, South Australia, 29th & 30th September 2005

Event Synopsis Regarding Safety-Critical ITS Issues

1. Background of this Smart Demo Event

Development of Intelligent Transport Systems (ITS) technologies accelerates and ITS applications, either in the form of intelligent off-board infrastructure or as in-vehicle features, are widely deployed in the most developed economies of North America, Europe and East Asia. Although Australia is generally lagging in ITS Deployment behind leading OECD countries [1], such systems are lately also becoming a factor in the Australian transport environment.

Knowledge about these systems across all sectors of the Australian community, including the various levels of government, educational and research institutions and economic enterprises, remains unsatisfactory, given the many potential benefits these systems can bring to all potential stakeholders [1]. ITS Australia aims to foster the development and deployment of Intelligent Transport Systems in Australia; hence, the organisation perceives it as a primary task to inform and educate all sectors of the Australian community about the potential benefits of such technologies. Building on overseas experiences, ITS Australia therefore has organised and conducted this inaugural Smart Demo 2005 event to demonstrate what is currently possible and to facilitate public perception regarding current developments.

2. Format

The Smart Demo 2005 Event took place on 29th and 30th September in Adelaide's Victoria Park and utilised some of the infrastructure provided by facilities already established for the Clipsal 500 Adelaide V8 Supercar Championship event. This Smart Demo 2005 event had two major components:

- About 30 different companies took the opportunity to exhibit their products, services and expertise to all participants. Many exhibitors offered live demonstrations, some involving active participation of those interested;
- A conference revolving around the Smart Demo theme was held simultaneously, involving more than 30 speakers informing about current status and future, adoption, deployment, research and projects in the field of ITS.

The event was highly successful, attracting more than 300 experts from Australia and abroad to review and discuss ITS issues. In hindsight, it became apparent that full participation in the conference did not really leave enough opportunity for everyone to appreciate fully all the facets of exhibits and associated demonstrations. ITS Australia will build on the successes of this inaugural event to tweak the format for the next Smart Demo scheduled for early 2007, to provide even better insight regarding the intricacies of ITS products, services and capabilities.

3. Purpose of this Event Analysis

Monitoring recent events regarding transport issues, the following topics are recurring themes:

- Transport safety;
- Mobility vs. Congestion;
- Emissions and fuel consumption;
- Sustainability issues (noise, general resource consumption, amenity etc.);
- Transport security (crime, disasters, terror).

The most distressing of these problem areas is transport safety. Brent Stafford, ITS Australia Executive Director, told conference participants that "*about 2000 people were killed every year through terrorism, but 3300 people were killed daily on the world's roads*". Whereas

inhibitions to mobility caused by increased traffic volumes and congestion are resulting in huge economic losses, Russell Shields, Chair, Ygomi LCC, startled conference participants with the revelation that in the USA, “*more than 30% of total welfare cost and more than 25% of all hospital cost*” are a direct result from road transport incidents – this is on top of fatalities and injuries, which cause suffering and economic loss in themselves to families, individuals and the community. Australian Governments on all levels are recognising that the effect of current, conventional measures to combat the road toll is diminishing with increased perfection. Lauchlan McIntosh, Smart Demo 2005 Organising Committee Chair and Australian Automobile Association Executive Director told the audience, “*that each day five people will be killed and another 60 seriously injured in road accidents*” on Australian roads alone, and that this was no longer acceptable. Clearly, a new quantum leap is required in this area, and ITS Australia has recognised that many ITS applications could provide tools enabling such a quantum leap to occur. Whilst ITS can positively contribute in all problem areas identified above, ITS Australia is concentrating with this analysis on the most urgent problem area of transport safety. Purpose of the analysis is therefore to highlight safety-critical ITS issues or related impediments, that may be addressed in some way to help reducing the road toll and increasing overall transport safety.

4. Methodology of the Analysis

The event and both its components, the exhibition with its demos and the conference sessions, provided a considerable amount of data. These data, present in the form of conference notes, notes taken during the course of the exhibitions from conversations with exhibitor representatives and demonstrations, as well as handout materials from participating companies, were subjected to a general analytical procedure. This procedure sought to extract patterns of expert knowledge, perceptions, feelings and sentiments expressed, not only in the text, but also between the lines where possible. The research technique used for this assessment was essentially a qualitative survey of the primary and secondary data gathered throughout Smart Demo 2005.

5. Analysis Results

5.1. Smart Demo 2005 – Critical Issues Analysis (Sessions)

A spreadsheet summary of the sessions’ analysis can be found in Attachment 10.1.

Significantly, the most important finding from this part of the analysis is that about a third of all these expert speakers (11 in total) felt an urgent need for a paradigm shift towards use of new ITS technologies. Many different perspectives could serve as reasons why this paradigm shift should occur:

- With the availability of new technology, the acceptance of transport risks is changing;
- Transport needs to be safe, secure and sustainable;
- Transport Safety is a quality of life issue;
- Incident response should be replaced by proactive incident avoidance;
- There should be a move from programs to performance-based outputs;
- The current pursuit of scattered ITS projects should be replaced by work at integrated regional smart systems programs;
- Fragmented responsibility for the multimodal transport system needs to shift towards its seamless management;
- Government monopolies in many areas concerning transport should be abandoned in favour of public / private cooperation;
- Dumb vehicles should be developed further, so that integration of smart vehicles & smart infrastructure become possible;
- Amenity (pollution, noise etc.) needs to be addressed;
- Sustainability in terms of resource consumption and the impact of transport activities needs to gain greater consideration.

These are issues that reflect the problem areas already identified in Section 3, and the majority of them deals with transport safety concerns.

Nearly as important as the general need for a paradigm shift towards the implementation of ITS technologies were the next two issues, which ranked equally amongst the speakers (10 in each case), namely:

- The strong sentiment that a close, cooperative public-private partnership was still lacking in Australia, but was needed to remove existing barriers and impediments;
- Recognition of an equally urgent need to advance international harmonisation (Incl. ADRs) and standardisation, and – in tune with international practise – to progress development in Australia towards device- & system-agnostic capabilities (interoperability) and agreed handover standards (emergency services, TMC location coding, geospatial location data etc.)

About one fifth of the presenters (6 in each case) saw problems in:

- Lack of policy vision - National approach needed - Australian governments need to remove institutional barriers, harmonise responsibilities and speed up policy measures like:
 - Implementing purchase incentives for fleets, consumers;
 - Adopting a code of practise, e.g. like EU;
 - Coordinating the overall approach with activities internationally.
- The lack of user awareness of systems and their inherent benefits; in this context, the proliferation of acronyms was also perceived as a problem.

Five of the speakers

- Admonished the unacceptably long phase between development and introduction of safety-relevant innovation (inertia, TTT – things take time), and stressed the need to advance deployment e.g. of communication infrastructure / protocols;
- Insisted that steady progress was required on user understanding of systems and their inherent benefits.

In each case, four speakers saw

- urgency in priority introduction of ESP as part of crash mitigation and avoidance, also with pedestrians;
- A lack of research coordination, both in terms of national and international research cooperation.

Three amongst the presenters found that

- Driving needed to be better controlled, leading to a certain need for automation (platooning, or dual mode vehicles and mobility service providers as intermediate steps);
- Stakeholders needed to embrace convergence trends or trends to cooperative systems (like e.g. Bosch sensing vehicle surround, Japan industry inter-vehicle communications, cruise-assist Hwy System);
- ITS capability was needed to influence human behaviour / slogan “time dilation”;
- The horizontal integration of the supply chain particularly with respect to industry cooperation vs. proprietary interests, and the generation of appropriate service level agreements (SLAs) was problematic;
- Steady progress was required on system cost;
- As well as liability issues.

Seven further problem areas were mentioned by only a couple of delegates, and there were six problem issues that were just mentioned once.

5.2. Smart Demo 2005 – Critical Issues Analysis (Demos)

Attachment 10.2 contains a spreadsheet summary of the analysis concerned with comments and impressions collected during the exhibition, and the associated demonstrations.

Smart Demo 2005 comprised a wide variety of participating exhibitors with vastly divergent technologies. Not all of these technologies were relevant to transport safety in an ITS context, hence they were not considered in this analysis. Further, some of the technologies displayed were concerned with the entrenched paradigm of road and/or roadside infrastructure; such applications are already widely pursued by governments and their instrumentalities. These applications are not focused on addressing transport safety issues through intelligent vehicle interaction with the surrounding environment, which is where the real potential lies [2]. Road and roadside infrastructure exhibits were thus also not further considered for this analysis.

Regardless of these exclusions, the author found it difficult to comprehensively review all the remaining relevant exhibitions and demonstrations (as mentioned in Section 2). The review conducted yielded the following:

5.2.1. Transport – Safety Relevant Technologies Displayed / Demonstrated

Company	Technology Displayed	Transport Safety Relevance
Bosch	ESP	High – ADAS, diffusing potentially unstable driving manoeuvres
Holden & Seeing Machines	<ul style="list-style-type: none"> Current Telematics-equipped High Series Holden vehicle; AT Signature Vehicle; DSS (camera-based Driver State Sensor). 	<ul style="list-style-type: none"> Medium – Telematics (SOS / ACN); High – Telematics (near dynamic navigation, plus various alerts); High – ADAS, non-intrusive fatigue / distraction monitoring (experimental).
Intelematics	TSH & Services	Medium – Telematics (SOS / ACN)
Sensis	Whereis® Navigator	Medium – Telematics (DVD-based wireless navigation solution)
SA Government	Alcohol Ignition Interlock	High – ADAS
Siemens VDO	<ul style="list-style-type: none"> Pedal Interface II Navigation 	<ul style="list-style-type: none"> Low/medium (ADAS) Medium – Telematics (DVD-based wireless navigation solution)
QLD Government, UQ & QUT	Multimodal ITS Strategy	Potentially High – Strategy proposal only
National Wireless	ISA – Intelligent Speed Adaptation	High – Telematics-enabled ADAS
Speed Mate	Speed Mate	Potentially high – Stand-alone system relying on roadside transmitters and in-vehicle receivers. Marketing strategy via schools.
OmniSTAR	<ul style="list-style-type: none"> OmniTRACK TransTRACK 	High – Telematics, monitoring also in remote locations
Saferoads	HAR – Highway Advisory Radio	Potentially high – Locally based communication capability
NICTA	Smart Cars Project	High – ADAS obstacle detection &

Company	Technology Displayed	Transport Safety Relevance
		recognition (experimental)
Sentinel GEO Systems	Road Angel	High – GPS geo-coded, information on speed zones etc., telematics-enabled.
Traffic Intelligence	<ul style="list-style-type: none"> FVD - Floating Vehicle Data DriveCam NavTrak 	High – An array of largely telematics-based applications enabling e.g. dynamic navigation and monitoring, also in remote locations
SAT-TRAK24	SAT-TRAK24	High – Telematics, monitoring also in remote locations
SLEEP DIAGNOSTICS (OPTALERT)	<ul style="list-style-type: none"> Ausedrive™ Optalert™ DSS (driving glasses-based Driver State Sensor) 	High – ADAS, non-intrusive fatigue / distraction monitoring (experimental).
TAC	TAC SafeCar - ISA (& other ADAS)	High – Telematics-enabled ADAS
Citroën	REACT	Potentially High – Strategy proposal only
Datalink	1. Minitrak & 2. Maxitrak with HMIs: <ul style="list-style-type: none"> VoiceTrak® PDA MegaTrak® JobTrak® AlertTrak® 	High – Telematics, monitoring also in remote locations
Sm@rtTRANS	<ul style="list-style-type: none"> Satellite Navigation e-Route Mobile Data e-PoD 	High – Telematics, monitoring also in remote locations, plus DVD-based wireless navigation solution)

Table 1: Smart Demo 2005 - Technologies

5.2.2. Comments / Opinions Received During Exhibitions / Demonstrations

Though not as many, the comments and opinions received when talking to exhibitors largely reflected those already noted during the conference sessions.

The majority of these comments appeared to fall into the domain of governance / legislation / regulation or standardisation:

- The state-based infrastructure inhibits uniform access to data in a national telecommunications environment, which is seen as a significant barrier. In particular, the removal of obstacles to public - private cooperation in terms of public data provision is perceived as urgent;
- The advancement of relevant development and the implementation of safety-relevant ITS tools is seen to require renewed emphasis on a concerted effort of business (manufacturers), governments and the community (consumers, particularly fleet buyers);
- Government regulation / policies (or their nature or lack of, respectively) is seen as deficient. This is e.g. evident in the lack of agreed standards at key interface points (e.g. emergency services handover, TMC location coding for digital traffic info or geospatial data). More international cooperation was sought in this context as well;
- The priority introduction of ESP is thought to require a major governmental or regulatory initiative (comparable to the recent agreement regarding Ethanol between the OEMs and the Federal Government);

- Similarly, there appears to be a case for initially partial, later full automation of the driving process due to current control deficiencies in road transport, again likely to require a major governmental or regulatory initiative;

Commercial issues were also prominent in responses gathered:

- The problem most mentioned was lack of funds;
- The horizontal integration of the supply chain (or, expressed differently, the formation of fair, functioning and profitable strategic alliances) was also mentioned;
- Further, the scale and fragmentation of the Australian new vehicle market;
- Finally, CRM.

The third array of issues was consumer-related:

- Most prominently, user awareness or consumer appreciation was identified as a problem;
- From a different perspective, attractiveness of products and services to customers was mentioned;
- Also mentioned was the HMI for many applications (ergonomics);
- Finally, it was thought that safety –relevant ITS tools should drive a change of user attitudes and behaviours.

6. Discussion

This section will discuss the findings outlined in Section 5. First, the technologies seen in the exhibits and demonstrations are assessed regarding their potential to aid in reduction of the road toll. Second, all comments received will be reviewed in context, illustrated by key points and/or quotes from relevant speeches in the conference, and against the author's background of research into product placement and service delivery relevant to transport ICT.

6.1. The Safety-Relevance of Technologies Displayed / Demonstrated

The frequency of competing displays does not necessarily indicate the relevance of technologies in terms of potential real-world road safety impact. Following is a table of displayed technologies, ranked by perceived priority of safety relevance:

Technology	Exhibitors	Freq.	Comment	Priority
ESP	Bosch	1	Electronic stability control, also known under many other synonyms, is known to prevent up to 50% of all collisions. The benefit of this proactive technology for transport safety would be very <u>high</u> .	1
SOS / ACN	Intelematics Holden	2	Incidents in road transport warranting distress calls or even automatic crash notification are all too frequent. Equipping <u>all</u> vehicles with this reactive technology could have dramatic effects on trauma and the road toll, more so if the quality of available data is further improved. <u>High</u> transport safety benefit.	2
Alcohol Ignition Interlock	SA Government	1	Drink driving is still a problem. Tamperproof technology of this kind might also have a <u>high</u> benefit for transport safety.	3
ISA	National Wireless TAC	2	Intelligent speed adaptation combines benefits of adaptive cruise control with external data, (e.g. speed zone monitoring) to moderate vehicle speed without driver involvement. The benefit	4

Technology	Exhibitors	Freq.	Comment	Priority
			of this proactive technology for transport safety could be <u>high</u> .	
DSS	Seeing Machines Optalert®	2	Driver state sensors are detecting distraction and drowsiness. According to US studies, about 1/3 of all accidents there are attributable to such driver conditions. The benefit for transport safety in Australia could be <u>high</u> .	5
SATNAV	Holden Sensis Siemens VDO Sm@rtTRANS Traffic Intelligence	5	At this stage, satellite navigation likely has <u>moderate</u> benefit for transport safety. It alleviates the need for the risky review of maps while driving, but may introduce some other (lesser) distractions. However, it does not yet include current conditions in its route recommendation (Dynamic Navigation). Once navigation becomes dynamic and thus truly proactive, its benefit to transport safety would be high, as it would also be used for routine drives and remove vehicles from high-risk traffic areas into ones with lower risk, as alternative routes are followed.	6
Speed Zone Monitoring	Sentinel Geosystems Speed Mate	2	These systems are valuable and could indicate to drivers entry into a zone where they are legally required to slow down. Without further coercing, many will not – therefore only a <u>moderate</u> benefit for transport safety is expected.	7
Obstacle Recognition	NICTA	1	The recognition of obstacles like pedestrians, other traffic participants or fixed obstacles is a proactive, still experimental technology. It is a requirement for unguided automated vehicle transport. Valuable in selected low visibility conditions today, the benefit of this proactive technology for transport safety is likely to be <u>moderate</u> .	8
Local Communication Ability	Saferoads	1	The ability to directly communicate with drivers in local precincts likely yields <u>moderate</u> benefit for transport safety.	9
Tracking / Monitoring	OmniStar Traffic Intelligence SAT-TRAK24 Datalink Sm@rtTRANS	5	These activities are a prerequisite for all telematics-based services. In a narrower sense, satellite tracking / monitoring enables SOS etc. for individuals in remote locations, which can save lives. As the incidence of remote accidents is comparatively low, these services would have an overall <u>low</u> transport safety benefit. Being a prerequisite for other services like e.g. SOS / CAN, tracking assumes a commensurately higher benefit rating.	10
Pedal Interface II	Siemens VDO	1	This ADAS interacts with cruise control and engine management of a vehicle and is designed for commercial vehicle fleet management purposes. <u>Low</u> impact regarding transport safety.	11

Table 2: Safety relevance of technologies reviewed

6.2. Synthesis – Priority Technologies vs. Responses Received

6.2.1. Priority 1 – Introduction of ESP on all new vehicles in Australia

Responses:

- Four speakers saw urgency in priority introduction of ESP as part of crash mitigation and avoidance, also with pedestrians;
- The priority introduction of ESP is thought to require a major governmental or regulatory initiative (comparable to the recent agreement regarding Ethanol between the OEMs and the Federal Government);

Statistics presented in the conference are overwhelming: Up to 50% of all accidents could be avoided, were all vehicles involved fitted with ESP. The Australian National Road Safety Strategy 2001 to 2010 aims for a reduction of road fatalities by 40%. If the statistics are right, fitment of ESP to all vehicles newly registered throughout Australia must be mandated to contribute to this objective. Australian Design Rule variation is urgently required to accelerate this outcome.

6.2.2. Priority 2 – Introduction of SOS / ACN Capability on All Vehicles in Australia

No responses were received directly related to this innovation. However, clearly fitment of this reactive technology could have a dramatic effect on trauma and the road toll. This effect would be enhanced if the quality of available data could be improved further, e.g. through crash data indicating the likely injuries of vehicle occupants, coupled with their relevant medical data like e.g. blood group or allergies. As some speakers remarked:

“Transport Safety is a quality of life issue”

or

“With the availability of new technology, the acceptance of transport risks is changing”

Indicating that reduction of trauma and the road toll is becoming a public interest issue. If this is so, then there is a case for public funding to make these services available to everyone. Currently, only purchasers of very few high-end models from three of Australia’s OEMs are able to acquire these capabilities as a standard fitment – a circumstance that is socially unacceptable.

The European REACT project referred to by one speaker is only the latest study confirming that vehicle owners are generally very reluctant to pay for telematics services, especially those related to transport safety which are perceived as ‘duty of care’ issues shared between OEMs and the public domain. The author’s own research [1] has confirmed this attitude also for Australia. Hence, a mix of measures is required to enable fitment of the device, and allocation of cost of this service in such a manner that general adoption is guaranteed.

6.2.3. Priority 3 – Fitment of Alcohol Ignition Interlocks to Offender’s Vehicles Only

In his very interesting contribution, Dr. Michael Regan (MUARC) outlined the prerequisites for the “*Mandatory Sanction Scenario*” advocated here:

- Community acceptance
- Low cost
- Tamperproof concept

Clearly, fitment of these devices to all vehicles would be going too far, as the vast majority of Australian drivers are demonstrably not likely to drive when under the influence. However, there is a sizeable minority that does – and for these cases, mandatory fitment could be considered, at least in the case of a repeat offence. Fitment cost would have to be borne by the offender. Potentially, political and regulatory measures would be indicated to facilitate introduction of this innovation.

6.2.4. Priority 4 – Facilitation of the Introduction of ISA to New Vehicles

No specific notes were taken regarding Intelligent speed adaptation, which has two technical prerequisites:

- The availability of adaptive cruise control (currently leading edge technology, i.e. a cruise control that varies speed according to environmental conditions as sensed by the vehicle without driver involvement – only in the most advanced luxury vehicles);
- The networking of this cruise control with a data source feeding location-dependent speed zone information as required, or alternatively a vehicle – based system recognising speed sign information.

The introduction of this innovation, whilst desirable, is problematic in that it conflicts with existing interests of the public purse to gain revenue via speed limit enforcement, i.e. fining the offenders who (often haplessly) have violated speed limits. A paradigm shift in relevant policy would be required to enable introduction of this road safety enhancing technology.

6.2.5. Priority 5 - Facilitation of the Introduction of DSS to Relevant Vehicle Classes

Driver State Sensor technologies currently appear to be in an advanced experimental stage. Whilst no specific comments were received regarding these technologies, two concepts were displayed:

- A camera-based system, which needs further development with respect to eyewear (optical or sunglasses);
- A system based on driving glasses fitted with appropriate sensors, necessitating the exclusive use of dedicated and personalised glasses for the purpose.

Clearly, both these concepts exhibit unique problems; however, distraction and drowsiness are major causes of accidents as reported by one presenter, and accordingly the development and introduction of such technology is of considerable public interest.

Fitment would be particularly valuable to vehicles commuting over considerable distances beyond urban areas, vehicles predominantly using country roads or those that are based in remote areas. Further, long-haul commercial vehicles would be a target class. Policy and/or regulatory considerations are indicated for this project.

6.2.6. Priority 6 - Facilitation of the Introduction of Dynamic Navigation

The next stage of development in GPS-assisted, DVD-based navigation will be the move towards full dynamic capability. This stage has been reached in several overseas markets years ago. Trials are now underway with RDS-TMC (launched during Smart Demo 2005 in Adelaide and now also in Melbourne), but the major difficulty is the non-availability of suitably rich public traffic data from all Australian conurbations. Several presenters commented on this issue:

- The strong sentiment that a close, cooperative public-private partnership was still lacking in Australia, but was needed to remove existing barriers and impediments;
- Recognition of an equally urgent need to advance international harmonisation (Incl. ADRs) and standardisation, and – in tune with international practise – to progress development in Australia towards device- & system-agnostic capabilities (interoperability) and agreed handover standards (emergency services, TMC location coding, geospatial location data etc.);
- The state-based infrastructure inhibits uniform access to data in a national telecommunications environment, which is seen as a significant barrier. In particular, the removal of obstacles to public - private cooperation in terms of public data provision is perceived as urgent;
- Government regulation / policies (or their nature or lack of, respectively) is seen as deficient. This is e.g. evident in the lack of agreed standards at key interface points (e.g. emergency services handover, TMC location coding for

digital traffic info or geospatial data). More international cooperation was sought in this context as well.

Whilst other experts reported on promising trials with FVD (floating vehicle data) or the utilisation of SCATS data to supplement other data sources, the lack of a concerted approach across legislations to furnish traffic data to agreed algorithms remains one of the main impediments withholding the benefits of this innovation from Australians. Moreover, activities in this particular area appear to be remarkably disconcerted and uncoordinated. It appears some leadership federally is required to develop a national strategy supporting the introduction of dynamic navigation, not least also in the interest of improved transport safety.

6.2.7. Priority 7 – Consideration of the Introduction of Speed Zone Monitoring

Two quite different systems designed to enable speed zone monitoring were shown:

- Sentinel Geosystems showed its 'Road Angel' development featuring telematics-enabled, GPS geo-coded information on speed zones and other relevant installations like e.g. fixed speed cameras, with a variety of different options for in-vehicle reception;
- Speed Mate, on the other hand, is an in-vehicle reception device relying on roadside transmitters to indicate speed zone requirements.

Either system could be very helpful to those wanting to respect speed limits and also to support advanced technologies such as ISA; however, as stated above, speed zone monitoring conflicts with existing interests of the public purse to gain revenue via speed limit enforcement and thus would require a paradigm shift in relevant policy.

6.2.8. Priority 8 – Advancing Research on Obstacle Recognition

This project still appears in a very experimental phase at present; however, it exhibits clear potential and deserves continued support by government and industry in the public interest.

6.3. Contextualisation of Responses

6.3.1. The Call for a Paradigm Shift towards the Use of New ITS Technologies

In Section 5.1, this was the sentiment most frequently expressed by presenters, and it resonates in the list of priorities outlined above:

- There is a clear call for legislators to rapidly become active and mandate the Introduction of ESP on all new vehicles in Australia in ADRs;
- A public interest issue was identified regarding the Introduction of SOS / ACN capability on all vehicles in Australia, and to legislate so that enhanced data could be made available in case of ACN. Above all, the mix of measures required to introduce this innovation on a broad scale would appear to necessitate significant government involvement, also in terms of reallocating funds from savings related to a reduced road toll (e.g. in the health system) to contributing to this service – a paradigm shift;
- Government initiative is also required if the fitment of alcohol ignition interlocks to offender's vehicles only is to get off the ground;
- Again, a paradigm shift will be required to get away from the current reliance on enforcement and fines for speed offences, if ISA (and also speed zone monitoring) is to be introduced on a large scale to new vehicles;
- The development and introduction of driver state sensor technology is of considerable public interest and needs to be supported by relevant policy and regulation to facilitate introduction;
- Likewise, the introduction of dynamic navigation requires a major effort in terms of policy development and coordination on behalf of road managers.

The introduction of available ITS technology could yield considerable benefits in reduction of road carnage. These calls for action are based on the comments listed in Section 5.2.2, and like these, the listing above is primarily highlighting barriers

relating to government, legislation and regulation. The predominant issue in section 5.1 is no different: Nine of the eleven listed bullet point items are related to governance, one to public-private partnership, one is predominantly commercial.

6.3.2. More Issues Relating to Governance / Legislation / Regulation or Standardisation

The issue of public-private partnership, if not governance, also ranks highly amongst the next important items listed in Section 5.1:

- The strong sentiment that a close, cooperative public-private partnership was still lacking in Australia, but was needed to remove existing barriers and impediments;
- Recognition of an equally urgent need to advance international harmonisation (Incl. ADRs) and standardisation, and – in tune with international practise – to progress development in Australia towards device- & system-agnostic capabilities (interoperability) and agreed handover standards (emergency services, TMC location coding, geospatial location data etc.);
- Lack of policy vision - National approach needed - Australian governments need to remove institutional barriers, harmonise responsibilities and speed up policy measures like:
 - Implementing purchase incentives for fleets, consumers;
 - Adopting a code of practise, e.g. like EU;
 - Coordinating the overall approach with activities internationally;
- An unacceptably long phase between development and introduction of safety-relevant technology (inertia, TTT – things take time), and stressed the need to advance deployment e.g. of communication infrastructure / protocols;
- A need for urgent regulation to compulsorily introduce ESP;
- A coordination task in terms of ITS-related research, both nationally and internationally;
- A need for driving automation, for driving to be better controlled or at least for speed control;
- An objective to enable the ITS capabilities to influence human behaviour, requiring regulatory measures;
- A problem with liability issues when applying certain ITS concepts.

6.3.3. Issues Perceived as Commercial

There were fewer items mentioned by more than one presenter that were considered commercial issues:

- The lack of user awareness of systems and their inherent benefits; in this context, the proliferation of acronyms was also perceived as a problem.
- The need for steady progress on user understanding of systems and their inherent benefits.
- The need for stakeholders to embrace convergence trends or trends to cooperative systems (like e.g. Bosch sensing vehicle surround, Japan industry inter-vehicle communications, cruise-assist Hwy System);
- The horizontal integration of the supply chain particularly with respect to industry cooperation vs. proprietary interests, and the generation of appropriate service level agreements (SLAs) was problematic;
- Steady progress was required on system cost as well as robustness and reliability;
- The lack of funds can be prohibitive.

6.3.4. Some Different Views

A minority of speakers saw things from another angle than most of their peers. Picking up the issue of user awareness, for example, the majority view expressed still is that this is lacking, that users only need to be taught the inherent benefits of systems in order to adopt them. In contrast, two of the presenters took the position that consumer resistance and community acceptance were issues, perhaps related to the business model or the marketing approach used, possibly related to usefulness or effectiveness of the products / services offered, or related to fears that some applications might be too controlling (Big Brother syndrome) and invading privacy.

Relating specifically to transport safety applications, Dr. Bill Griggs exclaimed pointedly: *“Saying to people: ‘This is good for you’ is not the way! We need to provide other reasons than safety – e.g. strike the hip pocket nerve! Safety doesn’t sell – legislation is essential. Multiple strategies are needed. ITS tools must be used to change human behaviour, taking time dilation into account”* – in other words, it will take a while to sink in with the general population.

Paul Tierney agreed: *“The focus should be to change user attitudes and behaviours”* and Dr Narida Smith stated: *“We (CSIRO) are researching in how to measure ‘unsmooth’ driving”*...

Lauchlan McIntosh put the question: *“Why do we speed if we don’t have to?”* Peter Bentley pointed to the propensity of individuals to transgress when they can get away with it and said: *“Human inconsistency requires consistent safety systems”*. Jack Mc Lean confirmed this view: *“We need a transport system that allows people to behave ‘normally’ whilst still being safe”*

In his opening speech to the conference, Peter Bentley made the observation that *“The acceptance of risks inherent in road transport is now not longer necessary”*. In view of this position, Max Lay asked: *“Why do we have such a lag in introduction of available safety innovation? The system is crying out for inclusion of these technologies”* and *“If there is enough money, everything becomes possible”*. Lauchlan McIntosh agreed: *“We can’t stay with what we’ve had. A leap of faith is required to introduce some of the new concepts like e.g. platooning”*

Mike Regan presented thoughts about implementation strategies for various ITS technologies, from simple ADAS to sophisticated mechanisms that could coerce users to change their attitudes and behaviours in road transport. He outlined four introduction scenarios and parameters to be considered in each case:

- 1) Introduction through voluntary demand
 - Need to increase awareness
 - Application must be perceived as useful
 - It must be demonstrably effective
 - It cannot be too expensive
 - Nor can it be too controlling (no big brother)
 - It must be ergonomically designed and reliable

And all these parameters must be market- and road-tested.
- 2) Introduction through voluntary fleet demand (due to the duty of care for employees, for example. Scenario benefits:
 - Rapid market penetration
 - Transfer of training
 - Improved ergonomics
 - Diffusion of technology
 - Demand stimulation
 - Greater safety benefits for new vehicles

However, obstacles to this scenario are:

 - Awareness

- Usefulness (given that these vehicles are regularly sold on)
- Achieving the necessary design integrity and reliability
- Keeping the cost down

It would be necessary to research the benefit of deployment in each case.

- 3) Introduction via mandatory sanction. Prerequisites:
 - Community acceptance
 - Cost
 - Must be tamper-proof

- 4) Mandatory fitment
 - Availability
 - Regulatory change required
 - Cost vs. benefit
 - Community support
 - Ergonomic
 - Crashworthy

Russell Shields (later supported by Yuka Gomi, who went into more technical detail regarding Russell's core issues) said that even in the USA – arguably leading in safety-and security type applications – the communications necessary for transport safety are yet to be established. In his words, the user-centric approach deployed in the USA to-date has simply not worked. Conversely, a vehicle-embedded capability is needed, the characteristics of which should be:

- Based on reliable data-only communication
- Including a software-reconfigurable radio (SRR), enabling strategies for public protection and disaster relief
- Part of a networked vehicle
- Offering large capacity, updatable in-vehicle mass storage
- Capable of very accurate positioning
- Collaborating with processing utility off-board

In Russell's words, "*Wireless data communication is the key to making safety systems work well*". This includes data pooling between vehicles – probe data from other vehicles complementing the vehicles' own resources. Mobile wireless broadband (utilising umbrella protocols like CALM) is seen as essential for emergency / public sector and also for routine applications.

7. Conclusion

This Smart Demo 2005 event brought unanimous agreement between stakeholders that the most distressing of all problem areas in the transport field is road safety, and that the time has come to act. With ITS technologies (such as the priority ones outlined in Section 6.2) readily available to be used as tools in the fight against the road toll, participants felt that the acceptance of risks inherent in road transport anywhere near current levels could no longer be tolerated.

The analysis of expert knowledge, perceptions, feelings and sentiments expressed throughout this event, viewed superficially, appears to focus overwhelmingly on government and its agencies. In reality, the situation is more complex than the frequent calls for government action on various levels indicate.

As indicated by Russell Shield's views – views he would have formed over a considerable period in working with safety-related transport ICT issues, views that may still evolve further – the current approach regarding transport safety communications in the USA (as emulated in Australia) has failed. This may implicitly also mean that leaving the deployment of ITS-related safety innovation to market forces alone is doomed for failure. Indications are that the lack of resources (funds) lamented by industry in many cases may be intrinsically linked to insecurity regarding potential commercial success of cutting-edge applications in a regulatory

environment that is largely left to market forces, rather than operating under a clear, uniform deployment strategy backed by government, also financially. Japan and Korea demonstrate what can be achieved under such circumstances. It appears that there is no way around governments – with the Federal Government in the lead – taking a leading role in setting the scene for a successful deployment of ITS-related safety initiatives. This does not mean that governments need to act themselves – they could charge organisations like ITS Australia with the responsibility, **BUT:**

- The paradigm shift called for by a sizeable fraction of the presenters must happen. It must happen in the interest of further reducing the road toll, and in the first instance this means re-appropriation of funds. Examples of an appropriate shift in resource allocation could be:
 - Channelling expected savings in health and welfare attributed to ITS-induced accident mitigation / avoidance into Transport ICT applications;
 - Transferring funds allocated to road improvements and roadside infrastructure into transport ICT infrastructure;
 - Taking a fair share of the cost of delivering selected live-saving services to all Australians, given that such services are a public interest issue and that many Australians are not willing, let alone able to pay for service provision;
 - Enabling the relevant agencies, for example ITS Australia, to do the job by ensuring sufficient resource allocation.
- Secondly, delegates were in two minds about Government involvement in developing the Australian ITS market; claiming that there was too much regulation, yet at the same time wanting more. This is interpreted to mean that there is too much regulation where it may not be required, or indeed a hindrance, whilst it is sadly lacking in other areas that absolutely need intervention. Examples for the latter, named by various presenters, are:
 - A state-based infrastructure and fragmented responsibility for the multimodal transport system, which e.g. inhibits uniform access to traffic data in a national telecommunications environment;
 - The lack of agreed standards at key interface points (e.g. emergency services handover, TMC location coding for digital traffic info or geospatial data);
 - The perceived lack of coordination and cooperation in research, standardisation and interoperability issues, be it on national or international level, demonstrated nationally e.g. by the current pursuit of scattered ITS projects rather than by work at integrated regional smart systems programs;
 - The perceived lack of policy vision and the sentiment that a national approach may be required. Accordingly, Australian governments would need to remove institutional barriers, harmonise responsibilities and speed up policy measures like:
 - Implementing purchase incentives for fleets, consumers;
 - Adopting a code of practise, e.g. like EU;
 - Coordinating the overall approach with activities internationally;
 - The holes in legislation pertaining to liability, data security, transaction security, privacy etc.;
 - The areas where concrete legislative or regulatory measures regarding technical detail of vehicles are needed, to back up the introduction of certain ICT-related safety technologies.
- Finally, the operating environment for the transport ICT industry must be transformed such that it is possible to successively replace incident response with proactive incident avoidance. For this purpose, governments must engage with industry in a suitable forum to develop a smart infrastructure that is capable of integrating with smart vehicle technology, and it must facilitate the development of such smart vehicle technology by developing appropriate policy, regulation and legislation.

As far as the transport ICT industry itself is concerned, it must respond in kind by cooperating with governments. Industry must progress development in Australia towards device- & system-agnostic capabilities (interoperability) in tune with international practise and seek to advance international harmonisation wherever possible, provided it does not compromise its own competitive position. Industry must ensure governments are informed where and in which form deployment of communication infrastructure, development of suitable protocols

and harmonisation of relevant standards is required to pave the way for the introduction of safety-critical ITS innovation. Industry must strive to embrace convergence trends or trends to cooperative systems as are globally in evidence. It is also in the interest of industry to continue working on the new paradigm of industrial cooperation within flexible networks, leading to fair, functioning and profitable strategic alliances providing seamless services to customers, which are organised through appropriate service level agreements.

As to the users, it needs to be recognised by governments and industry alike that essential life-saving innovations must be equally accessible to all Australians. As there is unequivocal evidence that many Australians are not willing, let alone able to pay for safety-related product and associated service provision, there is an obligation to structure basic services such that they appear free of charge. Based on such a 'Universal Service Obligation', industry is then able to value-add and charge appropriately to a more select clientele.

As can be seen from the short listing of potential innovations in Section 6.2, they require an array of different marketing approaches to users, which virtually covers all scenarios so beautifully presented by Dr. Michael Regan, refer section 6.3.4. This example just gives a glimpse of the complexity of service models and appropriate revenue schemes for telematics service provision explored by the author elsewhere [1].

Finally, with respect to users, sentiments outlined in Section 6.3.4 must be part of these conclusions. Safety in transport needs to be achieved by changing user attitudes and behaviours. User attitudes and behaviours, however, will not change by appeal. The strategies of enforcement used so far have been successful to a point – however, not much more can be done in this area, nothing that will achieve a further major improvement regarding the road toll. Conversely, enforcement and the dependence on associated revenue generation are emerging as a hindrance to introduction of some strategies that might be able to reduce the road toll further. Therefore, a creeping change from enforcement strategies towards coercion strategies (via the hip-pocket nerve, as suggested by one referee) appears indicated, and transport ICT provides suitable tools to enable such a change to occur. Technically, the paradigm-shift is possible – will there be concerted resolve to make it happen?

8. Recommendations

This analysis documents the confidence of those present at Smart Demo 2005 that transport ICT innovations are available or in advanced development, which are able to deliver the next quantum leap in reducing the Australian road toll. It was therefore the unanimous view that any further delay in deploying such innovations is neither justifiable nor acceptable. The author therefore would like to suggest the following recommendations:

- 1) That ITS-A secure funds sufficient to establish and run its 'Telematics Cooperative Coordination Committee' (TCCC); further, that the TCCC, once established, focus on transport safety issues as its priority #1 and that it be staffed sufficiently to carry out the tasks in recommendation 2;
- 2) That the NTCC
 - ◆ Based on the feedback from its stakeholders, be charged with the responsibility to develop the clear, uniform deployment strategy needed to achieve early and effective impact on the road toll;
 - ◆ Based on the requirements identified with evolving the deployment strategy, give (through the executive of ITS-A) advise to government regarding consequential resource-reallocation issues;
 - ◆ Based on the needs identified for deploying innovative technologies required to combat the road toll, give advice to government on policy, regulatory, legislative, standardisation and similar issues facilitating their deployment.
- 3) That the Federal Government (through the executive of ITS-A) be moved to engage with transport ICT issues according to its commitment expressed in the 'e-Transport Strategy' [3], and in line with the fact that reducing the road toll deserves much higher priority. This means in the first instance, that it establish the 'ITS Implementation Bureau' as

recommended by the Federal House of Representatives Transport and Regional Services Committee [4] a while ago. This instrumentality should then become an active participant in and the communication partner of TCCC.

- 4) That the TCCC, through feedback from and in cooperation with its stakeholders, develop interoperability strategies, protocols and standards in tune with international trends and safeguarding the position of Australia's ICT industry, designed to deploy safety-critical ITS innovations in the first instance.

9. References

[1] Schnittler, R. (2004) *'Automotive Telematics: A Social Inquiry into Consumer Aspirations'*, FISITA 2004 Barcelona, available from <http://www.fisita2004.com/programme/programme/F2004I008>

[2] Liikanen, E. (2003) *'Europe's path towards large-scale deployment of intelligent integrated road safety systems'*, Safety Forum Brussels, available from http://europa.eu.int/information_society/activities/esafety/doc/esafety_forum/el_speech.pdf

[3] Holmes, C., Jacob, L., Hyles, A. and Benjamin, S. (1999) *'e-transport - the national strategy for intelligent transport systems'* Austroads Incorporated, Publication No. AP-62/99, Sydney

[4] Neville, P., Gibbons, S., Andren, P., Mossfield, F. Haase, B., O'Byrne, M., L, S., Schultz, A., Livermore, K., Secker, P. and McArthur, S. (2002) *'Moving on intelligent transport systems'* [downloaded] <http://www.aph.gov.au/house/committee/trs/itinq/report/report.pdf> (accessed 06 January 2003)

10. Attachments

10.1. Smart Demo 2005 – Critical Issues Analysis (Sessions)

Attachment available in separate MS Excel file.

10.2. Smart Demo 2005 – Critical Issues Analysis (Demos)

Attachment available in separate MS Excel file.

REPORT ENDS

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SMART DEMO 2005 - CRITICAL ISSUES ANALYSIS (SESSIONS)

SESSION	MC, Questions	Welcome Address	Plenary Session				Executive Session 1	Executive Session 2			Executive Session 3			Executive Session 4			Executive Session 5			Closing Remarks
Presenter	Jo Pearson	Peter Bentley Karlene Maywald	Lauchlan McIntosh Juhani Jääskeläinen Max Ley Michel Parent Jack McLean Tom Phillips				Brent Stafford Richard Bishop Russell Shields	Joe Mortha Bruce Priddle Yuika Gomi Colin Jensen Peter Rindt Ken Ogden				Anthony Ockwell Mike Regan Beth Stapleton Adam Game William Griggs Andrew Kristoffy	Alex Zelinsky Phil Burke Garnini Dissanayake Craig D'Souza Liubo Vlacic Moses Obaid Vishy Karri				Ross Bensley Paul Tierney Lars Petersson Andy Raketonyräinen Phil Blake Greg Bergsma Narida Smith	Lauchlan McIntosh		
Issue	Total																			
- Acceptance of transport risks is changing - Transport needs to be safe, secure, sustainable - Quality of life issue - Move from programs to performance-based outputs - Scattered ITS projects to integrated regional smart systems programs - Incident response to proactivity - Fragmented responsibility to seamless management - Government monopoly to public / private cooperation - Dumb vehicles to integration of smart vehicles & infrastructure - Amenity (pollution, noise etc.)	11	✓	✓	✓	✓				✓	✓	✓		✓				✓		✓	
Cooperative private / public partnership required - remove barriers, e.g. traffic data provision	10	✓		✓		✓	✓	✓	✓	✓	✓									
Advance international harmonisation (Incl. ADRs), standardisation; device- & system-agnostic capabilities required (interoperability); agreed handover standards (emergency services, TMC location coding, geospatial location data etc.)	10	✓		✓		✓	✓	✓			✓	✓								
Increase user awareness of systems / benefits; proliferation of acronyms is a problem	6			✓		✓			✓		✓	✓								
Lack of policy vision - National approach needed - Australian governments need to remove institutional barriers, harmonise responsibilities and speed up policy measures like: - implement purchase incentives for fleets, consumers; - adopt a code of practise, e.g. like EU; - coordinate overall approach with activities elsewhere	6						✓	✓		✓			✓	✓						
Unacceptably long phase between development and introduction of safety-relevant technology (inertia, TTT); need to advance deployment e.g. of communication infrastructure / protocols	5			✓	✓	✓		✓	✓											
Steady progress required on user understanding	5						✓	✓				✓	✓						✓	
ESP needs priority introduction (part of crash mitigation & avoidance - also with pedestrians)	4					✓				✓									✓	
Lack of research coordination; national / International research cooperation required	4	✓		✓							✓	✓								
Poor control of vehicles by drivers vs. electronic platoon formation; intermediate steps: dual mode, mobility service providers	3			✓	✓	✓														
Steady progress required on system cost	3						✓	✓				✓	✓							
Steady progress required on liability	3						✓	✓											✓	
Stakeholders need to embrace convergence trends, trends to cooperative systems (e.g Bosch sensing vehicle surround, Japan industry inter-vehicle communications, cruise-assist Hwy System)	3						✓	✓			✓									
Need to use ITS capability to influence human behaviour / time dilation	3								✓										✓	
Horizontal integration of supply chain / industry cooperation vs. proprietary interests / generation of appropriate service level agreements (SLAs)	3										✓		✓	✓						
Lack of funds often prohibitive, significant industry investments required	2				✓		✓													
Exponential risk of crash fatality with speed increase requires speed control	2			✓		✓														
Steady progress required on robustness / reliability	2						✓					✓	✓							
Dedicated embedded safety communication capability: - Data-only communication - Benefits for all - Highest possible (automotive-grade) transmission reliability	2							✓		✓										
Problem human factors	2								✓				✓							
Prerequisites for embedded safety: - wireless data communication (ref. item 26) - software reconfigurable radio - networked vehicle - large capacity, updatable, in-vehicle mass storage - very accurate positioning - off-board processing of probe data	2									✓		✓								
Problem consumer resistance / community acceptance: - business model / marketing approach - usefulness / effectiveness - controlling / big brother / privacy	2								✓			✓								