INNOVATION IN TRANSPORT AND LOGISTICS IN NSW:

WHERE THE RUBBER HITS THE ROAD

MESSAGE FROM THE PREMIER

This innovation statement—a key part of our 'Open for Business' strategy—marks a new direction for NSW.

The NSW Government is determined to focus its efforts on those industries that are most important to the State economy.

*We will concentrate on the sectors where we have a clear comparative advantage such as **logistics**, resources and finance.*

These are the sectors with the greatest potential for innovation–driven growth, provided we carefully target our investment where it will produce the best returns.

(NSW Government Innovation Plan 2006)

WE ARE THE INNOVATION

Innovation in Transport and Logistics (T&L) can be described at several levels. The most abstract and difficult level to comprehend is the fact that the entire sector itself is an innovation in the NSW economy of the 21st Century.

It is true that societies have been moving goods and passengers around for thousands of years. Notions of transport and logistics have been refined and automated over the centuries. There are still those today who cannot see an emergent industry sector – they continue to see mere refinements to well established systems.

However, the development of digital information flows, Information and Communications Technologies (ICT), and the pervasiveness of the Internet within the commercial environment in the last thirty years have allowed industry to manage much more complex intermodal and supply chain operations. Time constraints, geographical barriers and cultural borders have all fallen to the ubiquitous nature of the Web.

It is the creation of a virtual T&L sector based on information and knowledge exchange on a global basis, which has transformed the world of freight and passengers. E-commerce and E-trade via web based systems has opened up the world economy to more productive, efficient and effective operations. It is a quantum leap from the past thousand years of transport constrained by mode and by physical means.

T&L now combines and integrates transport modes – road, rail, air, maritime; as well as aspects of warehousing, distribution and operations management. It is an emerging idea whose time has come. Whether or not it is called supply chain, T&L or any other rubric it is a new form of doing business. It is pervasive, innovative and here to stay.

Many countries in the world economy now understand this. They are moving rapidly to facilitate the integration of T&L systems at the national, regional and local level. Unfortunately, the T&L sector in NSW remains fragmented, traditional, diverse and driven by immediate operational needs and thin profit margins. Integration seems unlikely for the present.

WE ARE EITHER PART OF THE SOLUTION OR WE ARE PART OF THE PROBLEM

In NSW there are in excess of 200,000 people working the T&L sector, and it contributes somewhere between 10% and 15% to economic activity in the State. The people work in 80,000+ organisations, and the vast majority of these organisations employ less than 5 people.

The majority of industry players are self focused, driven by daily customer needs, predatory in business and territorial by mode. Ask a railway person if they see themselves as part of the T&L industry. Ask a road operator if they appreciate the complexity of the supply chain, and ask a shipping company if they see themselves as an integrated sector in the NSW economy. The answers will be along the lines of “my industry, my mode and my business”.

There is a substantial challenge to get the stakeholders in the sector to see themselves as part of a wider supply chain set of economic activities. Many even refuse to admit they are part of something called “an industry”. They only perceive competitors and government – both to be resisted at all cost!

The Australian Logistics Council (ALC) was asked in 2007 by the Australian Government to develop a new national logistics strategy. The response from industry in NSW has been illuminating. Some industry players see a national strategy as irrelevant because they believe that the key economic and industry decisions (including innovation matters) are in their view determined overseas by large corporate players. The NSW economy must react to their decisions. Proactive national (or State) strategic plans are a waste of time. Innovation in T&L is something that other people do and then we adopt it.

While there are those who believe that all of this is a natural process and things will turn out OK, given time; there are those who believe that we are fast running out of time. Unless and until we acknowledge the critical importance of T&L as the lifeblood of the economy we will hold back all of the economy. At 15% of NSW GDP the T&L sector in bigger than mining, agriculture and tourism. We must have the same sense of urgency attached to T&L as an innovative part of the 21st Century economy as we apply to these other sectors.

In this context the NSW T&L industry must focus on repositioning itself in the eyes of the community. A new industry is emerging with new requirements. It has new dynamics, new technologies, and new purpose. The sooner we leave behind the “modal fundamentalists” the sooner we can get on with the job of maximising productivity via the new T&L paradigm.

BUSINESS <u>NOT</u> AS USUAL

> *Evidence based approach to supporting innovation.*
>
> *As with the approach the Government is taking in its State Plan and other key government decision making, there is recognition that involvement and intervention in key sectors should be undertaken only after acquiring deep knowledge of the role that innovation plays in how the sector operates.*
>
> *Innovative firms rely on three forms of support that are of particular importance: access to science and technology, access to capital, and high quality information and knowledge infrastructure.*
>
> *Analysis of the sectors that the government is focusing on will assess the degree to which these factors are present.*
>
> *(NSW Government Innovation Plan 2006)*

Innovation in T&L is focused around three business issues: **product, process and organisation**. These are the three dimensions of innovation at the operational level of industry. They define and direct our attention towards key aspects of innovation in industry:

PRODUCT

- Speed (time is now critical) – long delays are no longer tolerated in the 21st Century economy. Turnaround time becomes competitive advantage at the company, regional and national levels

- Individual deliveries (to customer or store) - "the last mile". This requires attention to detail and quality of relationships between suppliers, clients and customers.

- Capacity to deliver anywhere in the world – globalisation. NSW T&L is part of an international community like never before. Imports and exports of freight, provision of services 24/7 anywhere on the planet – this is new reality.

PROCESS

- Intermodal usage e.g. new mixes of fast and slow modes, mobile storage, and their management. There are grain companies using containers to move bulk cargo, and the capacity of a business to break down and build up consignments on an as needs basis is now commonplace

- Automation e.g. automated freight carriers, digital monitoring of freight, programmable freight systems – the ability of industry to take the human component out of the process and thus allow greater accuracy, movement and standardised outcomes

- Integrated Transport Systems – the crossing over of modes so that maritime, aviation, rail and road are a seamless set of interconnections in an industry with minimum wait times, sensible distribution of freight and maximum speed of transfer

- ICT more generally integrated into operations e.g. RFID has become symbol of the way in which ICT can become part of the daily process of T&L. Embedded technologies range from security and tracking devices, greater use of GPS and on board checking systems (e.g. digital tachometers) and systems control

- Occupational Health and Safety has been an often talked about and sometimes ignored aspects of innovation in T&L. There are many opportunities at the individual and organisation level to promote new and different ways of protecting the health and lives of those who work in T&L and the communities through which they move.

ORGANISATION

- Integrated networks to improve productivity are beginning to emerge as a topic for consideration in organisations development in T&L. while some sees these as “soft” topics for innovation; they are in reality the “hard” topics to challenge and change. Preconceived ideas about the best way to organise work and processes abound in the T&L sector in NSW. Integration of freight networks poses threats and opportunities to many industry players. Some of these threats are commercial and some are non-commercial – all relate to the status quo and the concentrated nature of ownership in the T&L sector. Integration on whose terms?

- Skills at all levels of the firm are dominant themes in 2007 in NSW. It is caught up in a national concern about skills shortages and issues of attraction, recruitment and retention of people in the industry. Innovation in this context has been demonstrated in a range of programmes started in the past few years by groups such as the Transport and Logistics Centre (TALC) in Sydney, various Commonwealth Government programmes (Group Training Australia, the Australian Apprenticeship Programme) and multiple State Government initiatives (NSW TAFE and NSW DET generally). At the enterprise level, some companies have demonstrated innovative schemes to attract and retain skills, while their various industry associations have started to analysis the problems and offer some suggestions (Australian Railways Association, Australian Trucking Association)

THE BIGGER PICTURE

Innovation in T&L seeks to address specific challenges in the wider community:

- Environmental regulation is likely to be a major issue for T&L in the coming decade, and there is the opportunity for industry to take the lead in innovative programmes to guide and influence the nature of the regulatory regime that will emerge
- Urban congestion is continuing problem in Sydney and will become more acute over the coming decade. There is an emergent discipline of "city logistics" worldwide that offers ideas about optimal ways of moving freight and passengers with congested urban areas. It is a combination of transport engineering, organisation, economics and public policy and will require maximum effort to cross academic and policy boundaries to arrive at a common understanding of the potential to improve the T&L outcomes
- Inadequate infrastructure within and between major destinations is a continuing issue in NSW. There have been many government pronouncements in this area over the past few years, but the basic problem remains – an innovative solution is needed to overcome the simple proposition that the State Governments are largely responsible for provision of T&L hard infrastructure (ports, railways, roads, terminals) and the Commonwealth Government has the funds to do it. Who sets the priorities, and using what criteria?
- Energy costs are a sleeping giant in the T&L industry. There seems to be only one way for energy costs (fuel, electricity) to go in the coming decade. There needs to be a concerted effort by industry and government to address this issue, as it has the potential by itself to determine the commercial future of the T&L sector in NSW.
- E-Logistics as perceived by some companies is a movement beyond 3PL to 4PL technologies. NSW companies are caught in a global movement to create alliances of "best of breed" supply chain companies

Thus the three levels if innovation in T&L: industry, business and community are being redefined through a shift in the dynamics of the T&L industry from supplier-dominated to client-dominated, especially in the retail consumer trade; the growing importance of time and its relationships to distance, the rise of e-commerce and associated e-logistics (e.g. B2B and B2C deliveries).

START YOUR ENGINES

In order to explore the practical and industry oriented aspects of these issues, the Transport and Logistics Centre (TALC) in partnership with the Australian Logistics Council (ALC) convened a workshop in 2005 in NSW and the following points emerged. They give a clear line of sight for innovation strategies to promote the T&L industry in NSW:

1. Innovation is usually considered to be most effective industry development tool when major groups of players in an industry work together to develop new products and ways of doing and organizing operations.
2. All major industries nowadays are highly regulated and the T&L sector is no exception, especially in the areas of OH&S and environmental matters. Some areas of the regulatory framework directly concerns practices in the industry

itself while in others the issues addressed derive from the interactions on the activities of the industry with major aspects of its operating context. The latter aspects are especially important when the operations take place in crowded arenas.

3. Several areas where innovation is needed if the industry is to operate more effectively in the future and took note of current pre-occupations in the field in the European Union and the OECD.
4. These include the broad areas of mobility of people and goods, infrastructure and integration, modal and inter-modal transport management (EU) while the OECD Transport centre is focusing effort on investigation of problems related to infrastructure (investment, planning, development and regulation, economic impact), traffic congestion in cities, road safety, the contribution of different kinds of transport to sustainable mobility and sustainable society, and the interactions between transport efficiency to international trade and regional development among other socio-economic issues.
5. The research and innovation agenda pursued by these important international bodies indicates further where NSW should be looking in constructing a State research and innovation agenda for the T&L industry.
6. In NSW, currently important areas of concern are issues such as technological change (e.g. new fuels, environmental technologies, new physical transportation 'engines'), organisational re-design (e.g. supply chain integration, client relationship management, skills) and responses to policy issues such as environment, infrastructure and what is known overseas as 'city logistics'. Addressing these issues may well require input from the social and management sciences as well as from the natural and engineering sciences.
7. The first approach shows the importance of considering the differing innovation-related capacities, performance and activities of players outside the industry as normally understood but who are suppliers to different segments of the industry. These suppliers include firms concerned with service activities such as environmental clean-up, equipment sale and repair, fuel provision and infrastructure building.
8. Also heavily involved in the industry's well-being are product/service providers in fields such as IT systems, toll technologies and intelligent transport systems. Innovation capacity and activity in all of these affect the good functioning of the T&L industry and attention needs to be paid by the industry to trends in these areas.
9. The second approach involves estimating the interactions and particularly knowledge flows between slightly different players. These are: the industry producers (T&L firms), the users of T&L services, the researchers and other public sector training players who assist the industry and the regulators (largely government but also standards bodies and industry associations) who set the framework rules of the game.
10. Information flows in the T&L industry were far from ideal and did not involve equal flows between all players
11. 'Users' described use high priority requirements as:

- Cost reduction. Costs to consider include elements reducing risk, improving cash flow and reducing inventory. This must be achieved without compromising safety;
- Lock in of suppliers and customers (which could be translated as reliability, long term contacting instead of spot contracting, development of partnership relationships);
- 'Suppliers to grow with clients', both in domestic and international markets.

12. The research suggested related to four major areas of activity:
    - information flows;
    - RFID and bar coding;
    - training as linked to recognizing and satisfying customer needs;
    - the refocusing of 'corridor' research into 'network' research.

13. A T&L Cooperative Research Centre (CRC) is proposed; to be supported by customers both in relation to funding and to defining the research agenda, as the main vehicle for undertaking the suggested research
14. The research proposed is essentially social and management science-focused. This part of a Government innovation agenda for the T&L industry requires:

- one or more programs of work relating to organisation innovation in the industry;
- a program of work bringing together organisational theorists and engineers working on new technologies for the industry currently under development around the world, notably, for example, intelligent transport systems and automated freight transport;
- a program of work examining existing and potential networks of relationships between different 'levels' of the supply chain and ways to improve their management and especially raising the capacity to build joint long term linkages between sets of clients and suppliers. Levels of *trust* between players are not high enough; which limits innovation capacity within the whole chain.
- Research to ascertain ways in which major clients may be persuaded to think less about the immediate benefits of use of proprietary software systems and more about the operational efficiencies that could be gained, and the associated financial benefits, of using a common system, perhaps set through the development with input from all players of an appropriate international standard.
- This in turn could be linked to research on information flows between groups of players and supply chain partners as a way of leveraging capacity all along the chain
- This fits within the scope set in the NSW Innovation plan:

> *Government intervention should aim to complement, not substitute for or compete with activities of private companies.*
>
> *This innovation approach is based on working in partnership with industry to identify what is the best role for government, where the market is unlikely to produce the best result. This may typically include a positive regulatory approach, and providing the right foundations through appropriate education, infrastructure, and access to applicable technologies.*
>
> *(NSW Government Innovation Plan 2006)*

15. Suggestions for priority actions for innovation and the associated research are specific and involve both engineering and physical sciences and the social and management disciplines. These concern:

- *Vehicle designs:*
    - vehicles for deliveries in metropolitan areas and wanted designs that further improved on flexibility of delivery and delivered better OH&S outcomes within transport and distribution in urban areas;
    - long haul vehicles which need improved fuel efficiency and flexibility in relation to different types of loads;
    - long and short haul vehicles that are adapted to the requirements of inter-modal activities and facilitate road-rail-port exchanges;
- *Track technologies.* The aim would be to create and implement standards for labeling from order-to-cash through all links in the chain. This would overcome current problems where many systems 'stop at the farm gate';
- *In-cab technologies.* Research would focus on:
    - issues concerning relationships between T&L firms and their sub-contactors
    - enabling the creation of a communication gateway standard for the industry
- *Broad scheduling and planning tools.* These are needed to enable the coordination of pick-ups and deliveries across multiple companies (shippers and receivers) and logistics provider firms. The research could include examination of the feasibility of universal dock scheduling reservation systems;
- *Intelligent/integrated transport systems.* These are needed to improve flows through key infrastructure bottlenecks, notably ports and other inter-modal terminals;
- *Industry awareness of the commercial imperatives driving innovation.* R&D agencies (and governments) to find ways of increasing industry awareness of the commercial imperatives faced and their role in driving innovation. They should also research and provide 'change management

roadmaps' to provide incentives for improvements among logistics service providers and their customers. This was seen to especially involve a focus on achieving better commercial outcomes through collaboration along the chain

16. Some of these suggestions, notably these relating to improved vehicle design, would need international collaboration, especially for linking design, which could be done here, and construction of the new vehicles which may need production facilities located elsewhere. It may also be that such innovative designs are already on the drawing board or under development or trial elsewhere in the world since most developed countries face similar T&L issues
17. Some overseas research centres may be developing relevant in-cab technologies to perform the tasks mentioned here. T&L management researchers may also be working on at least some of the related management issues
18. The international literature indicates that coordination technologies of the kind suggested already exist in some European countries at least and have been or are being trialed
19. The creation of a mechanism for more effectively scanning the international environment for innovations/ research underway, being trialed or in operation in major centres of T&L activity elsewhere in the world. This scanning should include the development of cutting edge areas of research as these crucially affect the operations of the T&L industry here. In particular, the difficulties associated with T&L operations in congested urban areas was referred to in the international literature suggests that an emerging area of research, known as City Logistics, should be one of the first foci of the proposed international scanning. There does not seem to be any centre of research in NSW which is currently researching this important area
20. The creation of an effective way or ways to *diffuse* new knowledge throughout the industry, whether the new ideas come from international scanning or local best practice which is not being rapidly emulated by players, especially smaller players
21. Tax incentives better adapted to the nature of a service industry to encourage more research, especially in relation to ICT
22. The development at national level of T&L-specific technology strategies rather than the industry having to rely on the generic approaches currently operating which are not well adapted to the industry's specific needs. These should be supported by an 'impact' or 'triple bottom line' statement as the strategies are considered
23. Raise the T&L profile in capital cities and the regions and, associated with that, the development of a 'Backing the T&L industry' package of actions which would include the technology strategies and R&D incentives mentioned above.
24. Further, the 'Backing the T&L Industry' package must be developed as a framework for coordinated strategies and policies devised by the States and

federal authorities as well as the industry bodies, such as Freight Councils, concerned.

25. The package would also be the focus for joint activities between relevant State government departments and their federal counterparts – notably DOTARS, DEST, DITR and DOCITA – which are currently largely working separately.
26. Finally, OH&S issues in the industry are urgent and the regulations in place need the development of performance measures and coordination across authorities. Progress on these common concerns could be an initial focus for the proposed framework package.
27. There are too many independent, uncoordinated activities of both public sector researchers within CSIRO, universities, relevant CRCs and State and federal governments and those of the large corporate organisations in the industry. The only significant connections are personal, not institutional ones, so no coherent agenda is being developed.
28. There are no systematic mechanisms for sharing information either about what is needed for the industry or about what is available in terms both of research programs and the location of skilled R&D personnel capabilities. Private R&D is not shared and does not reach smaller players.
29. Establishment of an NSW ‘EUREKA’ (an EU program) model program would be of great assistance, where government R&D funds are linked to collaborative research between players in both public and private sectors;
30. The creation of a central (representative) ‘voice’ for the industry in devising and implementing a national innovation and research agenda. The suggestion focused on the need for the industry to convene an NSW Research (and Innovation) Forum (RIF) for T&L and the mechanisms for taking the action needed to improve rates of innovation in the industry and hence the sector’s competitiveness.
31. The NSW T&L RIF would intervene and select research/innovation priorities for funding;
32. The T&L RIF would bring together key players in the T&L R&D arena, both researchers themselves and their clients in the industry on a regular basis. This could be done several times a year to oversee progress and add new ideas;
33. The creation of *ad hoc* consortia of researchers and clients to carry out R&D on themes selected by the T&L RIF (see further comment on this below). These themes should include input from both the engineering and physical sciences and the social and management sciences
34. The T&L RIF (through a sub-group) could also act as an interim mechanism for scanning the most important areas of the international research and industry environment and diffusing information as widely as possible to the industry, to the industry’s key clients and to government
35. It is important to consider the creation of research consortia that cross university and other institutional boundaries. This is because of the issue of the ‘silos’ but more importantly because in NSW individual research centres do not have the scale needed for most research projects.

36. Moreover, centres are geographically widely scattered, do not have efficient information-sharing mechanisms and are located in organizations that are focused on competition for funds rather than collaboration. Finally, each centre contains only one or two researchers relevant to any given area of work and these people need to have a framework for collaboration. This applies even *within* universities, as institutional arrangements locate researchers in different Faculties and other divisions such as Schools which then compete for funds.

37. This kind of competition is likely to be exacerbated by at least some of the changes proposed to national university research funding mechanisms. *Ad hoc* theme-focused research teams, linking social and other relevant sciences, have been found to work well in the UK and are obligatory in Europe for EU funded research.

38. At a later stage, the industry may want to consider the creation of a common research-funding organization along the lines of AMIRA, the agency long ago established by the mining industry It is also very important to ensure that researchers undertaking T&L RIF research develop close international links with major research groups in Europe, the US and Asia so they can better keep up with cutting edge work and then diffuse that information here but also so they can develop a comparative view which will enable then to judge better what is or is not appropriate for introduction or development in the T&L industry in NSW.

39. There are excellent individual academics/researchers in NSW who can contribute both to the idea of a T&L innovation strategy and to the RIF – they work in various Universities and government agencies, and some are semi-retired, but with international reputations in the field. They could all come together to do the work.

CONCLUSION

The recognition by the NSW Government of the central nature and importance of the T&L industry in NSW provides industry with a once-in-a-generation opportunity to gain traction in the area of innovation for the benefit of all concerned. We have a chance to really put some rubber on the road under the umbrella of the NSW Innovation Plan. The ideas expressed by industry in this paper provide a set of practical yet far reaching programmes to lift the productivity of the T&L sector to new heights.

Dr. Daryll Hull
Managing Director
Transport and Logistics Centre (TALC)
9 September 2007