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The Knowledge  
Management Gap in  
Australian Public  
Transport

by

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**TITLE:** The Knowledge Management Gap In Australian Public Transport

**ABSTRACT:** The development and sharing of knowledge is an essential part of any business particularly one as complex as the public transport industry. This paper suggests there are problems in the way knowledge is developed and shared within the Australian public transport industry. It shows that knowledge sharing is limited due to the lack of centralised coordination and distribution of information. It also highlights weakness with how knowledge is developed. Most knowledge development is restricted to state based, mainly government, operators and their consultants. Knowledge development and sharing is very limited for these groups who emphasise shorter term operating issues and commercial objectives. The paper shows how other Australian industries such as Austroads have a coordinated program of knowledge development and sharing. It also shows how the Australian public transport industry is lagging behind the rest of the world in this area. The implications for the Australian public transport industry are identified and a model for addressing the problem suggested.

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*“There is only one good, knowledge, and one evil, ignorance.” Socrates*

*“New knowledge is the most valuable commodity on earth. The more truth we have to work with, the richer we become”. Kurt Vonnegut*

*“Knowledge is a comfortable and necessary retreat and shelter for us in advanced age, and if we do not plant it while young, it will give us no shade when we grow old.” Phillip Chesterfield*

*“The more extensive a man's knowledge of what has been done, the greater will be his power of knowing what to do. Benjamin Disraeli*

## **1. Introduction**

This paper describes a problem with the organisation of public transport in Australia. It concerns the way that knowledge regarding how best to develop, operate and manage public transport systems is managed. It focuses on how this knowledge is developed and how it is shared within the Australian public transport industry.

The paper is structured as follows:

- Public Transport – The Need for Knowledge
- Knowledge Sharing in Public Transport
- Knowledge Development in Public Transport
- Knowledge Management in Other Australian Industries
- Overseas Models
- The Results of Knowledge Management Gap
- Addressing the Knowledge Management Gap

## **2. Public Transport – The Need for Knowledge**

Running a successful public transport service is a complex business:

- Technology – even the humble bus is a substantially more complex vehicle than the private car. Rail systems include some of the largest and most complex machinery and associated infrastructure in the world. These systems must be designed, developed, procured, operated and fully maintained.
- Organisation – public transport is one of the largest employers in Australia. Human resource management is a major challenge to both the industry and the government who support it.
- Operations – transit operators in Australia must coordinate the staff, vehicles, infrastructure and their customers over many thousands of vehicle trips per day in widespread geographies in often 24 hour or continuous time frames. This is often in adverse operating conditions such as congested roads.
- Social Policy – public transport needs to be aware of the emerging needs of its customers and the wider value which governments and society place on specific aspects of their service.

- Planning – the public constantly desire better services and higher service levels. How to plan and develop public transport systems is now a major issue of debate in the Australian community. Yet there is little consensus within the industry on these issues with views tending to fall into modal groups (bus, light rail and heavy rail)
- Finance – The larger public transport operations are billion dollar businesses. They entail the management of some of Australia’s largest and most valuable collections of urban real estate, the coordination of substantial capital and recurrent funding and liaison with numerous commercial and government agencies

Knowledge is of significant value in meeting these challenges. However the way public transport knowledge is developed and shared within Australia has a number of key weaknesses.

### 3. Knowledge Sharing in Public Transport

Table 1 shows the key agencies involved in public transport which are associated with **knowledge sharing**.

As can be seen while each has some role to play in relation to industry knowledge none have a central knowledge sharing role:

- Industry advocacy groups focus on national government and political issues affecting the industry. The UITP does play a knowledge management role internationally but has little local content.
- The Federal Government agencies are not directly concerned with urban public transport although they play a successful role in developing and sharing knowledge in other fields of transport.
- State Government and transport operators are very much focussed on providing services rather than knowledge development and dissemination
- Some teaching courses are provided in public transport in Academia but these are few and far between. The major academic activities are in delivering industry accreditation courses and on research focussed on new knowledge development.
- Professional associations and journals are focused on either professional development of which public transport is a small part or on wider professional interests. Many of the professional journals are provided for rail and bus enthusiasts i.e. ‘trainspotters’ or ‘gunzels’.

Perhaps the most effective knowledge sharing activities in Australia at the moment are the conferences held by the industry advocacy groups, both professional associations and academia. While some of these focus on public transport specifically, none can be considered a coordinated program of knowledge development and sharing. Rather they present papers offered by industry on current issues usually on an ad-hoc basis. Many don’t even provide papers so ‘knowledge capture’ is limited to that retained in the memories of conference participants.

**Table 1 : Australian Agencies Involved in Public Transport Knowledge Sharing**

Agency	Key Focus	Knowledge Sharing Activities
<b>Industry Advocacy Group</b>		
UITP <sup>1</sup>	<ul style="list-style-type: none"> <li>• International advocate organisation for mass transit systems</li> <li>• 56 full members in Australia from all transit modes</li> </ul>	<ul style="list-style-type: none"> <li>• Performs some knowledge sharing via its web site. But this based in Europe with little activities in Australia</li> <li>• No Australian Publications</li> <li>• Some knowledge development but this based mainly overseas</li> </ul>
Australasian Railway Association	<ul style="list-style-type: none"> <li>• ARA is the political voice for the rail sector in Australia and New Zealand.</li> <li>• Dominated by the rail freight sector – some passenger service</li> </ul>	<ul style="list-style-type: none"> <li>• Little real knowledge sharing</li> <li>• No industry practice publications</li> <li>• Little research</li> </ul>
Bus Industry Confederation	<ul style="list-style-type: none"> <li>• Promotes the long term sustainability of bus and coach transport in Australia</li> </ul>	<ul style="list-style-type: none"> <li>• Main knowledge activities are to do with legislative impacts on the industry</li> <li>• Few industry practice publications</li> <li>• Little research</li> </ul>
<b>Federal Government</b>		
Bureau of Transport and Regional Economics	<ul style="list-style-type: none"> <li>• Information and analysis provider on the economic factors influencing the transport sector and regional Australia</li> </ul>	<ul style="list-style-type: none"> <li>• Little urban focus and even less on urban public transport</li> <li>• Excellent knowledge dissemination via its web site and library</li> </ul>
Australian Transport Council/ SCOT	<ul style="list-style-type: none"> <li>• provide advice on the co-ordination and integration of all transport and road policy issues and matters at a national level</li> </ul>	<ul style="list-style-type: none"> <li>• No specific work on urban public transport (except safety)</li> <li>• Some knowledge distribution but not on public transport</li> <li>• Does support research activities but not in public transport</li> </ul>
<b>State Government/Operators</b>		
State Government Departments	<ul style="list-style-type: none"> <li>• Governing and regulating public transport services</li> <li>• Balancing funding support for services with other needs</li> </ul>	<ul style="list-style-type: none"> <li>• Does carry out/fund research/ knowledge development</li> <li>• Has no direct role to share knowledge</li> <li>• Some knowledge areas are politically sensitive and hence not published</li> </ul>
Transport Operators	<ul style="list-style-type: none"> <li>• Delivering an effective public transport service within financial/operational constraints</li> </ul>	<ul style="list-style-type: none"> <li>• Is not a knowledge sharing organisation</li> <li>• Very occasionally sponsors research but rarely publishes this</li> </ul>
<b>Academia</b>		
Universities/ Colleges	<ul style="list-style-type: none"> <li>• Provide education for students</li> <li>• Some industry courses provided</li> </ul>	<ul style="list-style-type: none"> <li>• Some industry short courses provided</li> <li>• Major teaching effort is in industry accreditation.</li> <li>• Publications are 'new knowledge' research</li> </ul>
<b>Professional Associations</b>		
e.g. Engineers Australia, AITPM/CILT	<ul style="list-style-type: none"> <li>• Advocacy groups for the promotion of professional development</li> <li>• Some national conferences</li> </ul>	<ul style="list-style-type: none"> <li>• Not focussed on knowledge development or sharing in public transport</li> <li>• National conferences e.g. ATRF have little public transport</li> </ul>
<b>Professional Journals</b>		
e.g. Transit Australia	<ul style="list-style-type: none"> <li>• Industry news media</li> </ul>	<ul style="list-style-type: none"> <li>• Not focussed on knowledge, mainly news and current events</li> </ul>

Note: <sup>1</sup>Union Internationale des Transports Publics or the International Association of Public Transport

#### 4. Knowledge Development in Public Transport

There are also a number of problems associated with **knowledge development** in the public transport industry (Table 2):

- Industry advocacy groups and the Federal Government do not get involved in any substantial knowledge development roles in urban public transport in Australia. Advocacy groups are focussed on the promotion of their industry at the national level. Whilst the Federal Government has experienced personnel and resources in this area, their remit does not cover urban public transport.
- Most knowledge development occurs at the State Government level where either Government agencies or the operators themselves undertake or commission research (usually from consultancies). A major concern is that this research is rarely published or even shared with other agencies. Some of this lack of sharing comes from a desire to limit potentially negative comments on the results of the research being undertaken. However a major reason for not sharing and publishing research is the cost and effort involved in doing this.
- Most research in public transport is undertaken by experienced commercial consultancies. It is a requirement of all consultancy contracts that the sharing and publication of any findings is at the discretion of the client. Consultants may also be inclined to limit the sharing of knowledge since it is the very commodity they sell. It is good business common sense to limit the sharing of knowledge when it represents the very competitive advantage which makes your business succeed.
- Academia is very much focussed on research in developing new knowledge. This is necessarily theoretical and somewhat remote from day to day public transport operations.

**Table 2 : Australian Agencies Involved in Public Transport Knowledge Development**

Agency	Key Focus	Knowledge Development Activities
<b>Industry Advocacy Groups</b>		
UITP/ ARA/ BIC	<ul style="list-style-type: none"> <li>• Industry political voice</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge development is rare. Mainly concerns research to support advocacy</li> </ul>
<b>Federal Government</b>		
BTRE/ ATC / SCOT	<ul style="list-style-type: none"> <li>• Non urban areas</li> </ul>	<ul style="list-style-type: none"> <li>• Excellent research capabilities but none in urban public transport</li> </ul>
<b>State Government/ Operators</b>		
State Government Departments/ Transport Operators	<ul style="list-style-type: none"> <li>• Local applied research concerning existing operations</li> </ul>	<ul style="list-style-type: none"> <li>• Much research commissioned but rarely published or shared</li> <li>• Much 're-active' research concerning current problems. Less 'pro-active' research</li> <li>• Research undertaken within departments and also via consultancies</li> <li>• Commercial operators have concerns that knowledge sharing is risking their intellectual capital</li> </ul>
<b>Consultancies</b>		
Range of provided in each state	<ul style="list-style-type: none"> <li>• Contract research as specified by state government/ operator clients</li> </ul>	<ul style="list-style-type: none"> <li>• High quality researchers</li> <li>• Research is limited to the interests of clients</li> <li>• Most knowledge sharing is only permitted via client permission and can be for the purposes of commercial promotion of experience</li> <li>• Many consultants concerns that knowledge sharing would erode their competitive advantage</li> </ul>
<b>Academia</b>		
Universities and Colleges	<ul style="list-style-type: none"> <li>• 'New Knowledge' Research</li> </ul>	<ul style="list-style-type: none"> <li>• New knowledge research is often theoretical and remote from issues of direct industry value</li> </ul>

## 5. Knowledge Management in Other Australian Industries

A rather poignant and perhaps ironic example of an Australian industry which deploys a successful knowledge development and sharing program is Austroads. Austroads is the association of Australian and New Zealand road transport and traffic authorities. Its members include all the state and territory road traffic authorities, the Commonwealth Department of Transport and Regional Services, the Australian Local Government Association, and Transit New Zealand.

Austroads also has three observer organisations who attend Austroads council meetings two of which are research bodies:

- ARRBS Transport Research (ARRBS TR)
- Bureau of Transport and Regional Economics (BTRE)
- National Transport Commission (NTC)

Austroads aims to be the Australasian leader in providing high quality information and advice and fostering research in the road sector. It has a comprehensive research and development program. Research is divided into 6 key areas (Figure 1) each of which is managed by a committee of experienced practitioners and a full time research manager. Research priorities are identified by the committee and projects commissioned and managed.

In 2003 some 35 national guides were produced by Austroads. Each describe best practices in road development, management and planning. Between July 2002 and June 2003 almost 11,000 downloads were made of freely available best practice reports from the Austroads Website. Over 160 titles are now available in electronic format.

At least some of the industry guides produced by Austroads cover planning for on-road public transport. It is perhaps a bitter irony that while Australian public transport agencies seek to free our cities from the problems of the private car, it is the national association of road authorities that provide the only comprehensive guide to good practices in public transport.



**Figure 1 : Austroads Research Program Areas**

## 6. Overseas Models

Coordinated public transport knowledge development and sharing programs are common internationally (Table 3). Indeed Australia stands out as perhaps the only western developed country lacking an effective program in this area. A major reason for this is that lack of interest in urban public transport at a national level. Even New Zealand has a coordinated program of research funded by Transfund New Zealand.

The worlds most progressive public transport knowledge development and sharing program is the Transit Cooperative Research Program (TCRP). The program was established in 1992 to provide a continuing program of applied research on public transport issues. It is sponsored by the US Federal Transit Administration (FTA) and administered jointly with the FTA, the American Public Transport Association and the Transport Research Board ( a part of the National Academy of Sciences).

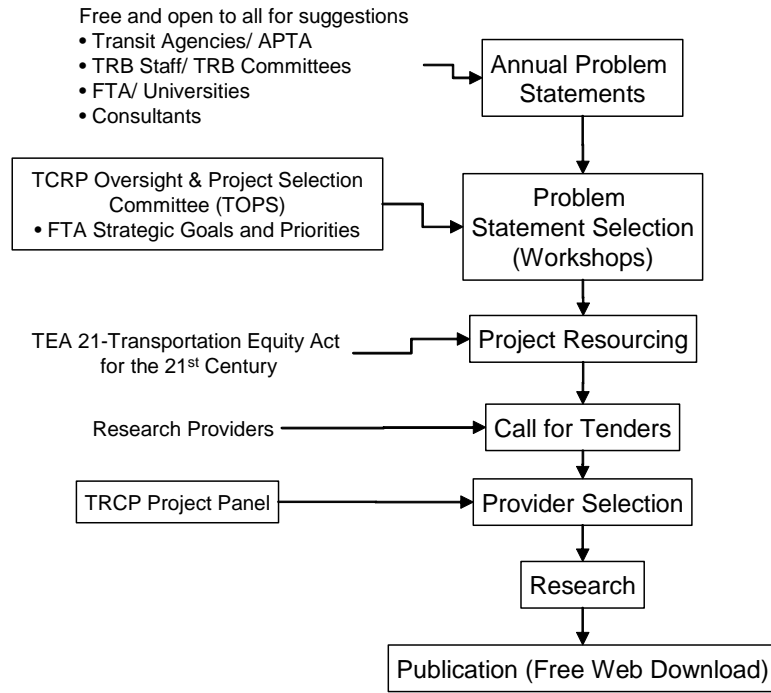
**Table 3 : International Examples of Public Transport Knowledge Development and Sharing Programs**

Country	Program	Activities
United States	Transit Cooperative Research Program	<ul style="list-style-type: none"> <li>• Research program developed around 6 program areas and 9 problem areas</li> <li>• Heavy industry participation in research problem statement development</li> <li>• Free web based document distribution. 166 project reports and 60 industry practice synthesis</li> </ul>
Canada	Canadian Urban Transit Association – Strategic Transit Research Program	<ul style="list-style-type: none"> <li>• Research program covering priority research areas for the Canadian industry</li> <li>• CUTA also provides industry training around industry practices</li> </ul>
United Kingdom	Department for Transport, DETR Integrated Transport Research Strategy	<ul style="list-style-type: none"> <li>• Major research program covering urban public transport. Includes numerous projects involving urban public transport</li> </ul>
European Community	Europa - Transport Research Knowledge Centre	<ul style="list-style-type: none"> <li>• General research program covering all aspects of passenger and freight transport.</li> <li>• Includes a number of research programs in urban public transport.</li> </ul>
New Zealand	Transfund NZ Research program	<ul style="list-style-type: none"> <li>• Open call for research area ideas each year</li> <li>• Funding of research projects in the urban public transport area</li> <li>• Widespread publication of these projects</li> </ul>

TCRP has a budget of \$US8.2M (2003) to run the program and finance public transport research. It follows a well defined research process which aims to maximise the participation of experienced industry practitioners in the development of project areas and in supervising research outcomes. Figure 2 shows the key elements of the process followed.

Problem statements are canvassed annually as potential research projects under the program. These are reviewed by an oversight committee including key industry representatives. A final series of projects are developed and resourced under the TCRP program funded by the federal government. The research itself is outsourced however it is again managed with industry involvement through a research program panel.

All research is published and freely available through the TCRP web site. To date some 166 project reports have been produced including 60 industry synthesis reports. These summarise current practices in the industry to highlight both common and unique approaches in a given problem area.



**Figure 2 : The Transit Cooperative Research Program Process**

The TCRP is organised around 6 program areas and 9 keys research fields or problem areas. These are illustrated in Figure 3 along side the strategic goals and priorities of the program in 2003.

<p><b>Program Areas</b></p> <ol style="list-style-type: none"> <li>1. Safety and Security</li> <li>2. Equipment and Infrastructure</li> <li>3. Fleet Operations</li> <li>4. Specialized Transit Services</li> <li>5. Planning and Policy</li> <li>6. Professional Capacity Building</li> </ol>	<b>TCRP Problem Areas</b>		
<p><b>Strategic Goals and Policy Initiatives</b></p> <ol style="list-style-type: none"> <li>1. Security Readiness</li> <li>2. Ridership</li> <li>3. Project Planning and Oversight</li> <li>4. Workforce Development</li> </ol>	<p><b>A Operations</b></p> <ol style="list-style-type: none"> <li>11. Scheduling</li> <li>12. Vehicle Operations</li> <li>13. Control Systems</li> <li>14. Fare Collection</li> <li>15. User Information Systems</li> <li>16. Safety and Security</li> </ol>	<p><b>B Service Configuration</b></p> <ol style="list-style-type: none"> <li>21. System Planning</li> <li>22. Specialized Service Planning</li> <li>23. Service Performance</li> <li>24. Marketing</li> </ol>	<p><b>C Vehicle Equi Engineering</b></p> <ol style="list-style-type: none"> <li>21. Buses</li> <li>22. Vans</li> <li>23. Heavy Rail Cars</li> <li>24. Commuter Rail Vcls</li> <li>25. Light Rail Cars</li> <li>26. People Movers</li> <li>27. Vehicle Components</li> </ol>
<p><b>Strategic Priorities</b></p> <ol style="list-style-type: none"> <li>1. Customer first</li> <li>2. Transit in a technologically advanced society</li> <li>3. Continuously improve transit</li> <li>4. Flourish the multi-modal system</li> <li>5. Revitalize transit organizations</li> </ol>	<p><b>D Fixed Facility Engineering</b></p> <ol style="list-style-type: none"> <li>41. Buildings</li> <li>42. Rail Operating Facilities</li> <li>43. Passenger Stops and Terminals</li> <li>44. Bus Stop Facilities</li> </ol>	<p><b>E Maintenance</b></p> <ol style="list-style-type: none"> <li>51. Vehicle Servicing</li> <li>52. Vcl. Inspectn &amp; Maint.</li> <li>53. Vcl Corrective Repairs</li> <li>54. Overhaul &amp; Rebuilding</li> <li>55. Non-Vcl Maintenance</li> <li>56. Maintenance Management</li> </ol>	<p><b>F Human Resources</b></p> <ol style="list-style-type: none"> <li>61. Recruitment</li> <li>62. Training</li> <li>63. Employee Reviews</li> <li>64. Job Classification</li> <li>65. Salary Administration</li> <li>66. Labor Relations</li> <li>67. Performance Imprvemnt</li> </ol>
	<p><b>G Administration</b></p> <ol style="list-style-type: none"> <li>71. Financial Management</li> <li>72. Procurement &amp; Inventory Control</li> <li>73. Risk Management</li> <li>74. Law</li> <li>75. Management Info Systems</li> <li>76. Transit Organizations</li> </ol>	<p><b>H Policy and Planning</b></p> <ol style="list-style-type: none"> <li>81. Policy Analysis</li> <li>82. Planning</li> <li>83. Economics</li> <li>84. Environmental Analysis</li> </ol>	<p><b>J Special Projects</b></p> <ol style="list-style-type: none"> <li>91. Areas not covered</li> </ol>

**Figure 3 : Research Fields Covered in The Transit Cooperative Research Program**

TCRP is also supported by national conferences such as that organised by the Transportation Research Board (this is probably the largest conference involving public transport in the world). The conference is managed alongside an industry committee program which is coordinated with TCRP problem areas and research programs.

There is widespread support for TCRP amongst North American public transport operators and planners. Indeed the outputs of the program are an excellent source for public transport providers worldwide. However the focus of TCRP is uniquely American and many of its findings are of no or little relevance to Australian circumstances and conditions. It is however interesting to consider what the benefits of such a program might be in Australia. Or conversely, to consider the disbenefits of limited knowledge development and sharing currently experienced in Australia.

## 7. The Results of The Knowledge Management Gap

The gap in knowledge management in Australian public transport results in the following problems:

- **Research Duplication** – Since knowledge of research activities remains within the states and territories, it follows that research projects are often undertaken in the same area by different jurisdictions. This is a most unfortunate outcome since it is wasteful of resources in a resource restricted industry.
- **The Limiting of Research Benefits** – Another implication is that authorities which fund useful research do not permit other jurisdictions to share the benefits of that research. Again a most unfortunate outcome.
- **An Emphasis on Re-Active Rather Than Pro-Active Research** – Most current research is undertaken by Government and/or operators who are also service providers. These agencies are under great day to day pressures to meet tactical operational objectives. It follows that much of the research undertaken by these agencies is ‘re-active’ to day to day problems rather than being ‘pro-active’ in seeking longer term strategic solutions or looking ‘outside the box’ to solve problems.
- **Increasing the Learning Curve for New Industry Professionals** – Without a database of industry knowledge, new professionals joining and developing within the industry must develop their own intellectual capital. This is wasteful and endangers the quality and scope of the knowledge that is understood.
- **Knowledge Retention Risks and High Staff Turnover.** A particularly common feature of the many public transport industry reform’s over the last few decades has been the high level of staff retirements and redundancies. This is a major concern with experienced staff. Without a coordinated program of knowledge capture and sharing there is a real danger that industry knowledge is lost forever. This is a concern particularly relevant to a society with an aging population profile.
- **A Barrier to Meeting The Industries Potential** – By not identifying, capturing and sharing industry knowledge we are not making the most of what the industry can achieve.

## **8. Addressing the Knowledge Management Gap**

There is a need for coordination of public transport knowledge capture, knowledge development, and knowledge sharing at a National level in Australia. An ideal model to address this need would be one based on the Transit Cooperative Research Program in the United States. This model incorporates Federal Government sponsorship of the research management agencies and also of a coordinated program of projects. Any model aimed at addressing this need should seek active involvement of the industry to identify research priorities and to adjudicate the value of the knowledge developed.

In theory a number of existing Federal government agencies could administer such a program. However none would be considered experts in the area of urban public transport. The Urban Public Transport Group under the Standing Committee on Transport is another potential place for such a program. However it would require applied research management resources to undertake this task.

The costs of the Knowledge Management Gap are difficult to assess but are clearly substantial. The management of Australia's public transport systems are lagging behind world best practice because of the lack of coordination of our knowledge and experience assets.

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