1998

ANNUAL REPORT

A report on the 1998 activities of the Institute of Transport Studies: The Australian Key Centre in Transport Management, ITS Sydney and ITS Monash.

Established and supported under the Australian Research Council's Key Centre Program.

INSTITUTE OF TRANSPORT STUDIES

The Australian Key Centre in Transport Management

The University of Sydney and Monash University

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1. ABOUT THE KEY CENTRE

ITS: The Australian Key Centre of Teaching and Research in Transport Management was established in July 1995 as a joint venture between the University of Sydney and Monash University. ITS grew out of two existing centres – the Institute of Transport Studies within the Graduate School of Business at the University of Sydney, and the Monash Transport Group within the Department of Civil Engineering at Monash University. The Institute at Sydney and the Monash Transport Group were leading Australian centres in transport management and traffic education and research in their own right prior to the establishment of the Australian Key Centre.

The Institute of Transport Studies (ITS) has nodes at the University of Sydney and Monash University. The Director of ITS is Professor David Hensher FASSA, Professor of Management at the University of Sydney. Dr Geoff Rose is head of ITS Monash.

The Key Centre is guided by an Advisory Committee of eminent academic, industry and government representatives, chaired by Professor John Taplin, AM. Its role is to provide advice on any matters referred to it by the Key Centre Executive, as well as to initiate matters for consideration that are of interest to the Key Centre, such as the teaching and research program and opportunities for participation of industry and government. The Advisory Committee met on 16 February at Monash University to discuss various issues including recommendations for changing the structure of the Advisory Committee. From 1999, a new Committee structure is in place, comprising a central strategic Committee with 20 members and non-specific local advisory committees, each of 10 members.

ITS provides education programs at a range of levels: PhD, Masters and Graduate Diploma, Graduate Certificate, continuing education workshops, management development seminars and Certificate programs. In addition, ITS also conducts transport related research. The Institute has an extensive program of related activities including publications, participation at conferences, software development and links to other leading transport research institutes around the globe.

On 25 – 26 March, DEETYA visited ITS Sydney to carry out a mid-term review. The committee made up of Professor David Spottiswood (Curtin University of Technology), Associate Professor Margo Huxley (RMIT University), Dr Ray Brindle (ARRB Transport Research Ltd) and Ms June McKendry (Research branch - DEETYA, Secretariat), were extremely impressed with ITS's achievements and recommended continuation of DEETYA funding for the balance of the period of 6 years.

2. DIRECTOR'S REPORT

1998

1998 is a threshold year for ITS. After three years of activity as a Key Centre, the Review Panel of DEETYA visited the Sydney node in March to undertake interviews with staff from both nodes and Advisory Committee members. The achievements over the period 1995-1997 were documented in a report to DEETYA. The good news is that the Review Panel gave a very big 'tick' to the progress and contribution of ITS, supporting continuation of DEETYA funding for the next 3 years.

Each year that I prepare the Director's report, I continue to marvel at the high level of productivity of ITS. The contents of this Annual Report reinforces the important role that ITS is playing in the delivery of education programs at the graduate level and at the industry level through certificate courses such as Bus and Coach, Logistics Management, Maritime Logistics, Traffic Engineering, and Parking Management. A summary of student numbers is given below for the various programs.

Monash:

Year	MEngSc (Research)	MEngSc (Coursewk)	GradDip	Cert Parking	Cert Bus
1995	1	8	3	-	-
1996	2	10	4	-	-
1997	1	10	5	-	-
1998	1	14	8	10	100

Sydney:

Graduate Program

	GDTM			MTM			PhD		
Year	Local	Internat.	Total	Local	Internat.	Total	Local	Internat	Total
1995			30			10	-	-	-
1996	20	8	28	6	5	11	2	2	4
1997	26	5	31	8	4	12	1	2	3
1998	17	3	20	14	7	21	-	1	1

Certificate Programs

Year	CTM (bus & coach)	CCM	CLM
1995	72	197	
1996	106	430	
1997	65	273	28
1998	48	189	27

New &continuing enrolments for 1998

Semester 1, 1998

MTM					
Local			Intnl.		Total
F/T	P/T	Cont.	F/T	P/T	
1	8	12	3	1	**25**

GradDipTM					
Local			Intnl.		Total
F/T	P/T	Cont.	F/T	P/T	
6	8	7	1	1	**23***

PhD				
Local			Intnl.	
F/T	P/T	Cont.	F/T	P/T
0	0	3	1	0

Please note: 1 student updated from GradDipTM to MTM

Semester 2, 1998

MTM				
Local		Intnl.		Total
F/T	P/T	F/T	P/T	
1	4	3		**8***

GradDipTM				
Local		Intnl.		Total
F/T	P/T	F/T	P/T	
2	1	1	0	**4**

GradCertTM**			
Local		Intnl.	
F/T	P/T	F/T	P/T
0	2	0	0

***** GradCertTM was introduced during Semester 2.***

Numbers of Students enrolled in subjects

Units of Study	Course Name & Numbers											
									Other			Total Number of students in subject
	PhD	MTM	GradDipTM	GradCerTM	MCom	GradDipCom	MBA	GradDipBA	other GSB course	other Economics course	MEngSc	
TPTM6170 TRANSPORT STRATEGY	0	15	12	0	3	0	0	0	1	0	0	**31**
TPTM6130 TRANSPORT ECONOMICS AND MANAGEMENT	1	16	12	0	1	0	0	0	1	0	0	**31**
TPTM6120 TRANSPORT POLICY WORKSHOP	0	4	6	0	0	0	0	0	0	0	0	**10**
TPTM5140 TRANSPORT PLANNING METHODS	1	7	2	0	0	0	0	0	1	0	0	**11**
TPTM6190 FREIGHT OPERATIONS AND MANAGEMENT	0	10	6	2	0	0	1	0	0	0	0	**19**
TPTM6150 LOGISTICS MANAGEMENT	0	7	7	0	5	0	5	2	2	1	0	**29**
TPTM6200 MARITIME MARKETS	0	6	2	0	0	1	0	0	0	0	0	**9**
TPTM6160 TOURISM MANAGEMENT	0	6	3	0	6	0	1	0	0	0	0	**16**
TPTM6180 GEOGRAPHICAL INFORMATION SYSTEMS	1	8	7	0	1	0	2	0	0	0	0	**19**
TPTM6210 AVIATION MANAGEMENT	0	16	3	0	3	0	1	0	0	0	0	**23**
TPTM6260 MARITIME LOGISTICS	0	4	3	0	0	0	1	0	1	0	1	**10**
TPTM6270 SUPPLY CHAIN MANAGEMENT	0	6	6	0	1	0	7	0	1	0	0	**21**

ITS has been extremely successful in strengthening cooperation and delivering to industry and the community highly trained transport managers. A 1997 survey of the Sydney Graduates confirmed the success of the program.

A particularly successful aspect of ITS is the integration of its research and teaching. Much of the case study material for teaching is derived from an active research program. A particularly important activity has been the establishment in Sydney of the GIS laboratory with eight powerful computers and a server, a plotter and a scanner to undertake advanced land use - transport and environment planning. Monash has developed the LAND package used in many subjects e.g. Transport & Regional Development. Graduate students have used the laboratory in graduate courses that utilise GIS systems in planning bus routes, rail networks and efficient survey data collection. These courses are intensive and provide the only program where one can learn to use GIS in a transport context (using TRANSCAD). A successful short course was also run in the laboratory with lectures by Dr Tu Ton (funded by DEETYA) and Visiting Prof Ken Dueker (a pioneer from the USA in design of GIS-T systems). Monash use TRANSCAD in Transport Network Analysis.

Each year ITS, like any evolving dynamic organisation, welcomes new staff and farewells past members. 1998 is no exception. At Monash, Associate Professor Bill Young was promoted to a Chair in Civil Engineering. As a consequence, Professor Young has relocated to become Head of the Department of Civil Engineering, relinquishing his position as Head of the Monash node of ITS. I personally appreciate Bill's efforts over the last 3 years. Dr Geoff Rose is currently Head of the Monash node, effective from July 1. Associate Professor Paul Hooper has decided to move into consultancy and completed his time at ITS at the end of 1998. Paul has been a valued colleague and a principal contributor to ITS, beginning with the establishment of ITS in Sydney in 1991 and through to the establishment of the Key Centre. I wish him well in his new career.

Visitors to ITS are many, from around the world. We encourage visitors, especially those on sabbatical or undertaking research in a Doctoral program at an overseas University. This interchange stimulates the ongoing research and teaching programs. The 1998 contributions of visitors from Sweden, Canada, USA, the United Kingdom, Germany, The Netherlands, Singapore, France and Switzerland have been appreciated. Details of such visits are set out in this Annual Report.

ITS is well positioned as the next Millenium approaches. One of the most exciting initiatives is the introduction at the Sydney node of a graduate degree program in logistics management (the Graduate Certificate, Graduate Diploma and Masters of logistics Management), complementing the successful transport management program. This new major is planned to commence in 1999. Associate Professor Ann Brewer has been appointed as Director of this program.

On all fronts, ITS in Monash and Sydney is active. I thank all of my colleagues for their continuing support.

David A. Hensher

Director

3. MEETING OBJECTIVES

Objectives

The primary object of the Institute is to undertake graduate teaching, management development programs, grant and contract research and development in the field of transport studies.

The work of the Institute also has the following objectives:

- To provide a focus for University work in areas of transport and logistics management and to establish an environment attractive to those committed to excellence in graduate transport and logistics programs and research;
- To collaborate with key players having an interest in transport and logistics studies and its applications;
- To offer specialised training courses, workshops, short courses and seminars on topics of interest in the area of transport and logistics management; and
- To seed the development of innovative ideas in transport and logistics policy and professional practice in Australia, in which the Institute of Transport Studies plays a role.

Achieving objectives

These objectives are achieved by:

- Developing and offering graduate transport and logistics programs, certificate, management development programs and short courses at both ITS Sydney and ITS Monash;
- Bringing high quality transport and logistics management programs to people outside Sydney and Melbourne as well as widening the offerings of courses in Melbourne and Sydney through access to courses provided by both ITS Monash and ITS Sydney;
- Contributing to Australia's growing participation in the Asia Pacific region in a leadership role in transport and logistics management;
- Widening the range of courses available for middle level professional managers in critical areas of transport and logistics not currently served;
- Equipping managers in all disciplines (e.g. engineering, economics, planning), the small business sector and local government to succeed in the face of technological, economic and institutional change;
- Building on the recognised need for stronger links between education of technical specialists and managers in transport and logistics;
- Undertaking research to develop state-of-the-art management practices and technical processes;
- Transferring the knowledge developed through research to client groups through the Institute's publications, workshops, conferences, seminars, and by participation in networks of transport and logistics managers and engineers; and
- Conducting activities that are directly or indirectly related to the attainment of the above objectives.

Objectives and performance measures

The following table summarises performance measures to show how the Key Centre is meeting the objectives outlined in its application. More detail is provided in specific sections throughout the annual report.

Objective	Performance measure
Australian transport management expertise highly regarded	• Requests for working papers • Requests for involvement in research and consultancy projects • Strong enrolments in all levels of education programs from PhD, Graduate program, Certificate programs and short courses • Requests for speaking at a large number of venues • Editorial positions held by staff on leading international journals
Programs outside Melbourne/Sydney	• Pilot of CTM (Bus and Coach) in Victoria • Introduction of Education Program in Parking throughout Australia • Introduction of Certificates of Bus and Coach Management for Western Australia • Delivery of courses in Massey University's Graduate Diploma in Transport Planning • Commence design of flexible learning program for Sydney Graduate courses
Contribute leadership in Asia Pacific	• Participation in Asia Pacific Conferences • Aviation and Maritime research for Asia Pacific countries • Supervision of PhD students in India and Singapore
Courses in critical areas for middle managers and small business	• Certificates of Logistics Management/Supply Chain Management and Freight Management piloted • Short courses and workshops to meet specific needs • Graduate transport management programs revised for 1998 to reflect industry needs • Design of new graduate degrees in Logistics Management • Introduction of Transport Management major in MCom (Sydney) • Introduction of Combined MTM/MCom degree
Link transport engineering and management education	• Short courses and workshops integrating engineering and management
State of the art research	• Many research projects for range of government and private clients • Publications in leading journals • new PhD commencements in 1998, ITS Sydney • new PhD commencements in 1998, ITS Monash
Transfer of research to transport community	• Through publications including working papers, conferences, journals and books such as *Operating a Bus and Coach Business*, *Roads and the Community* and *Traffic Engineering and Management* • Books completed on *(i) Practice of Transport Management and (ii) Stated Choice Methods* • Through presentations and attendance at conferences and seminars • ITS Sydney convened the 20th Conference of Australian Institutes of Transport Research and co-hosted the 1998 Australasian Transport Research Forum

4. THE ITS TEAM

ITS Sydney

Academic and research staff

David Hensher, BCom(Hons) PhD, FASSA FCIT FAITPM CompIEAust MAPA
Professor of Management
Director, Institute of Transport Studies (Sydney)

A Fellow of the Academy of Social Sciences in Australia, Immediate Past President of the International Association of Travel Behaviour Research and Vice-Chair of the International Scientific Committee of the World Conference of Transport Research, David has published extensively (over 200 papers) in the leading international transport journals and key journals in economics as well as six books. He has completed books in 1998 on Stated Choice Methods (with Jordan Louviere and Joffre Swait) and a book on *The Practice of Transport Management* with Ann Brewer.

Major areas of teaching and research are transport economics, transport strategy, transport policy, sustainable transport, productivity measurement, discrete choice methods, stated choice experiments, privatisation and deregulation. David has advised numerous government and private sector organisations on matters related to transportation.

In 1998, David was appointed by the NSW Government to be on the Peer Review Committee for the Strategic Transport Plan for NSW.

Paul Hooper, BEc(Hons) MTransEc PhD, FCIT
Associate Professor in Transport Management and Deputy Director (until 31 December)

Paul is a recognised specialist in aviation and tourism policy and its implications for the transport sector. Paul has far ranging experience in the transport industry, with major projects spanning all modes of transport. He specialises in the transport-tourism interface and in aviation policy and management, and is a member of APEC Transport Taskforce.

Ann Brewer, BA MCom(Hons) PhD, MCIT
Associate Professor in Transport Management, Director, Industry Programs and Director, Graduate Program in Logistics Management

A specialist in organisational behaviour, human resource management, Ann has experience in a number of industries, with major projects on current issues such as teleworking, generational issues in business, value chain management, educational needs of adult learners, all of which are pertinent to transport and logistics management. Ann has published numerous papers and four books. Ann is co-author (with David Hensher) of *Operating a Bus and Coach Business*, completed in 1997 and *The Practice of Transport Management*, completed in 1998.

Tu Ton, BEng MEngSc PhD
Senior Research Fellow

Tu has skills in traffic and transport engineering; EIA of transport infrastructure; and traffic and transport computer modelling using artificial intelligence technology including object-oriented programming, artificial neural networks and knowledge based expert systems. In 1997 Tu established the ITS Sydney Geographical Information System (GIS) Laboratory to provide technological support for ITS, Land Use-Transport-Environment Model System. Tu is leading an ITS team developing a new strategic transport planning decision support system – ITS's

Transport and Environment Strategy Impact Simulator (TRESIS). In 1998, Tu edited a book on *GIS Applications in Transportation.*

Seu Cheng, BA MA (Econ) (University of Manitoba, Canada)
Lecturer (until 24 July)

Seu joined ITS from April to July 1998. She is currently on leave from the Bureau of Transport and Communication Economics at the Federal Department of Transport and Regional Development in Canberra. Prior to joining the Bureau as a senior research officer, she worked as a financial analyst in a private consultancy company in Malaysia and as a lecturer at the Department of Economics at the University of Negara Brunei Darussalam, Brunei.

She is completing her PhD degree in Transport Management at the Institute of Transport Studies at the University of Sydney. Her PhD research focuses on freight transport and logistics.

Jenny King, BBuild (Hons) MTM *Sydney*
Senior Research Analyst

Jenny coordinates a research program in ITS. Jenny has skills in survey design, data collection and analysis, and desktop publishing. She is currently involved in managing ITS's International Benchmarking Program in Bus and Coach as well as a number of research and consultancy projects, such as the M2 Marketing study, parking strategies for the CBD, and the ABCA Fact sheet.

Jackie Fitzgerald, BSc (Hons)
Research Analyst (until February)

Jackie joined ITS in February 1997. Her position was partially funded by an ARC (Institutional) grant for the Telecommuting and Travel Behaviour research. She assisted in various research tasks for this project.

Kirk Bendall, BBus., MTM *Sydney*
Research Analyst

Kirk joined ITS in November 1997 after completion of the Master of Transport Management at The University of Sydney. His fields of interest include intelligent transportation systems and standardization and advanced traveller information systems (ATIS). He is currently involved in the ongoing development of the Transport and Environment Strategy Impact Simulator (with Tu Ton), particularly in the conversion of the model to object-orientated architecture, improving user interface and enhancing its functionality. This model predicts the effects of policies studied on travel behaviour and greenhouse gas emissions. Kirk is also a consumer representative on the Standards Committee for Information Technology 23 which is involved in Standards Development for Transport Information Control Systems.

Carlos Funes, BE
Research Analyst

Carlos joined ITS in March 1998. He is currently developing a user interface for the Transport and Environmental Strategy Impact Simulator (with Tu Ton and David Hensher). His interests lie in transport engineering and Visual C++ Object-Oriented computer programming. In 1997 Carlos completed his Bachelor of Engineering, majoring in Traffic and Transport Engineering, at Monash University. He was awarded the Scholars Award for Victoria at the 1997 Australian Institute of Transport Planning and Management Conference in Melbourne and the Best Undergraduate Paper at the 19th Conference of Australian Institutes of Transport Research, also held in Melbourne in 1997.

Denis Jeulicher, MA
Research Analyst (until 11 September)

Denis joined ITS in March 1998. Denis came to ITS well prepared for her current position. Originally a media analyst, Denis graduated from the University of Munich in Germany with a Masters Degree in Communications in 1994.

Cam Ngo, BEngSc (Vietnam) MEng (USA) MEngSc PhD
Research Analyst

Cam joined ITS in September 1998. He is currently involved in the ongoing development of the Transport and Environment Strategy Impact Simulator (with Tu Ton). Cam has skills in highway, traffic and transport engineering and local area traffic management. His interests lie in artificial intelligence and knowledge-based expert systems.

Michelle Coulson, BA MTM *Sydney,* MCIT, CTM
Course Co-ordinator, Industry Programs

Michelle joined ITS in January 1998. She commenced work in the bus industry as a trainee at John J Hill Bus Service prior to commencing employment with the Busways Group of Companies. Michelle was more recently employed as the Operations Manager (Sydney Region) with Busways. Michelle's tertiary qualifications include a Bachelor of Arts from The University of Wollongong and a Master of Transport Management from The University of Sydney.

Stephen Leonard
Computer Systems Officer (part-time)

Stephen maintains the computer network including the ITS-Sydney homepage, provides computing technical support and performs other computer-related jobs as required. He also has skills in development of databases and the troubleshooting and repair of anything with a power plug.

Full-time PhD students

Chackrit Duangphastra, MTM *Sydney*

Chackrit is a scholar from Thailand. He holds a Bachelor degree in Business Administration from Chulalongkorn University, Thailand and a Master of Transport Management from the University of Sydney. Before joining the PhD program at ITS, he worked for the Ministry of Transport and Communications and taught at Chulalongkorn University. His PhD research is on the effect of trade liberalisation in ASEAN on airline networks.

Baojin Wang, MEng

A registered engineer in civil engineering, Baojin has experience in highway and transport engineering. He has consulted on 26 engineering projects and has skills in project management. His PhD research is on the development of risk taking modeling framework for road safety.

Administrative staff

Julie McKone
Personal Executive Assistant

Bruno Sirianni, BIT&C
Administration Associate/Finance Coordinator

Vanessa O'Riain, B.B.S. M.B.S.
Administrative Associate - Industry Programs (until January)

Sally Xexenis, BA
Graduate Programs Coordinator (until April)

Pam Collier
Senior Projects Officer (casual from June to July)

Adjunct faculty

Andrew Dixon-Hughes, MTM *Sydney*
Managing Director, AustCom Solutions

Andrew joined ITS in July 1998, as a Adjunct Freight Management specialist and taught freight operations and technology management in our graduate course. Andrew a former ITS student, is also Joint Chair of the ITS Alumni Association.

Trevor Heaver, BA (Oxon), MA, PhD (Indiana)
UPS Foundation Professor of Transportation &
Director of the Centre of Transportation Studies

Trevor is Professor Emeritus, University of British Columbia and was recently Francqui Chair Professor, University of Antwerp. He visited ITS Sydney from September to November, as Visiting Professor in Maritime. During his visit Professor Heaver was lecturer for maritime markets & maritime logistics in our graduate & certificate program courses. Professor Heaver has authored several books and numerous articles on transportation and logistics with an emphasis on maritime economics. He is President of the International Association of Maritime Economists and a past Chairman of the World Conference on Transport Research.

Andrew Kerr, MBA DBA
Managing Director, Griffin Corporate Services

Andrew specialises in strategic business planning operations management and logistics. He has previously held line and staff appointments with Australian Army supply units and senior management positions with large public companies. Andrew teaches logistics management in our graduate and certificate programs.

Alastair Stone, MSc, DEng
Visiting Fellow
Managing Director, Pacific Infrastructure Corporation

Alastair has over thirty years experience in banking, economics and engineering. He has successfully initiated, implemented and participated in major projects and infrastructure deals. He has also advised various international and domestic agencies and governments; including the Asian Development Bank, World Bank, Jakarta Municipal Government, Shanghai Municipal Government, and several Australian State Governments, on private sector participation policies and strategies. His career has covered all facets of urban affairs including senior positions with the World Bank, Lend Lease and Merill Lynch. Alastair teaches in the area of joint ventures in public infrastructure projects.

Rodney Swan, BSc (Hons) Mtech
Visiting Fellow

Managing Director, BGP Pty Ltd

Rodney is one of Australia's leading strategists in competitive bidding for public and private sector service projects, with a number of successful infrastructure projects to his credit. He is highly experienced in the financial and operational requirements of projects, with expert knowledge of opportunities in the transport, health and environment sectors. Rodney teaches in the graduate program in infrastructure planning and outsourcing.

David Walters, BA *Alberta*, MSc *Bradford*, PhD *Cranfield*
Professorial Fellow in Marketing

David is Professorial Fellow at Macquarie University, School of Economics and Financial Studies. David has published a number of books and articles in the field of distribution and logistics management. He is a member of the review committee for the European Journal of Marketing. His current research interests are concerned with interfac between marketing and finance, and marketing and operations management. David currently teaches supply chain management in our graduate & certificate program courses.

In addition, Professor Tony Richardson of RMIT contributed annually to our graduate program.

Dr Tu Ton and Julie McKone are funded by the Key Centre.

ITS Monash

William Young, BE GradDipMgt MSc PhD, FIEAust FCIT CPEng
Professor (40% at ITS)
Head, ITS Monash (until 30th June)

Bill is a recognised specialist in parking and transport land use interaction. His research interests also cover infrastructure management and computer systems. He is presently the President of the Institute of Transportation Engineers and until the beginning of February was Director of Civil and Computing program at Monash University's, Caulfield Campus. In February, Bill was promoted to a Chair in Civil Engineering. As a consequence he has relocated to become Head of Department of Civil Engineering, relinquishing his position as Head of the Monash node of ITS. However, he will continue to contribute to ITS Monash in both the lecturing and research activities. Bill was on his OSP for the second half of 1998, from 1st July.

Geoff Rose, BEng MSc PhD, MIEAust CPeng
Senior Lecturer (40% at ITS) (until 30th June)
Head, ITS Monash (from 1st July)

Geoff's professional interests cover environmental impacts and sustainable travel, non-motorised transport and the application of advanced technology to the surface transport system. His experience spans government, consulting and academia. He is currently involved in an NRMA initiated travel awareness campaign aimed at reducing air quality problems caused by motor vehicles and is a member of research projects focused on aspects of intelligent transport systems. Geoff is currently Head of the Monash node of ITS.

Samantha Taylor, BE MEngSc (Hons), GradIEAust MITE
Lecturer (100% ITS)

Samantha has a keen interest in a variety of transportation areas and has over 20 publications including those in the areas of traffic engineering, porous pavements, life-cycle costing, transport policy and her specialty of urban goods movement. She is currently international

secretary of the World Conference on Transportation Research, Special Interest Group in urban goods movement (WCTR SIG UGM), and is also Chair of The Institution of Engineers, Transport Branch (Victoria). Samantha is joint editor with Professor Ken Ogden of the textbook Traffic Engineering and Management (1996), successor to the extremely popular Traffic Engineering Practice (1989).

Peter Daly, BE (Hons), GradIEAust MITE Assoc. Fellow ACRS PEng
Lecturer (30% at ITS)

Peter is a civil engineer who has specialised in road safety, road engineering and transport modelling. He is currently completing his PhD on activity based transport demand models. Peter's interests include road safety and the environmental aspects of transport. He recently taught in an AUSAID sponsored road safety course in Thailand, and directed the Accident Investigation and Prevention Workshop at Monash in July.

Andrew Haines, BSc
Technical Support

Andrew provides technical support in the computing and systems area.

Brenda O'Keefe
Administrative Manager

Adjunct positions

Professor Ken Ogden,
Manager (Public Policy), RACV

Ken has over 29 years of experience in Transport and public policy. He is Group Manager (Public Policy) in the Royal Automobile Club of Victoria, where he has responsibility for the Club's advocacy activities and research in such areas as road and vehicle safety, traffic engineering, transport planning and policy and traffic safety education.

Samantha Taylor is funded by the Key Centre.

PhD students

Peter Daly, Brett Lemas, Olle Norojono, Darryn Paterson and Fotios Spiridonis.

5. RESEARCH AND POLICY

New in 1998

Evaluating the Impact of Alternative Pricing and Curfew Strategies on the Demand for Casual Parking in the Sydney CBD (ITS Sydney)

For Secure Parking, a major supplier of parking in Sydney, designed a stated choice experiment and administered it to individuals parking in the CBD as well as accessing the CBD by public transport. The experiment was defined as a combination of parking tariffs, curfew hours and location. Direct and cross price and curfew elasticities were identified.

Forecasting the Demand for a Transit Way between Liverpool and Parramatta and on to Rouse Hill in Sydney (ITS Sydney)

For the NSW Roads and Traffic Authority, ITS undertook a pre-feasibility evaluation of the potential patronage and revenue from the introduction of a dedicated transitway. Applied a joint departure time and mode choice model estimated on revealed and stated preference data, capable of handling the new alternative 'busway' system.

Evaluation of the Attorney General's Draft Regulator Impact Statement on Accessable Transport (ITS Sydney)

For the Australian Bus and Coach Association (ABCA), ITS reviewed the cost and revenue estimates associated with the requirements for full compliance by the bus sector with the Disability Discrimination Act. Specific issue is the additional costs and possible revenue associated with compliance over the time frame permitted.

Survey of Current and Potential Users of the M2 Hills Motorway (ITS Sydney)

ITS was commissioned by Tollaust Pty. Ltd. and The Hills Motorway Ltd. to undertake a field study to identify the profile of current and potential users of the M2 Hills Motorway. The information collected will be used (1) in identifying where the M2 has been successful in attracting users and the gaps in the catchment area in terms of origin-destination, (2) in establishing the origin-destination profile of existing car and heavy vehicle users as a basis of calculating typical cost savings in respect of travel time and vehicle operating costs, (3) in specific calculations for heavy vehicles of the potential savings in costs additional to travel time and vehicle operating costs, and (4) as inputs into the development of marketing material for both the car and heavy vehicle segments.

TRESIS (ITS Sydney)

ITS is developing an urban passenger transport model system called TRESIS – Transport and Environmental Strategy Impact Simulator. The model system is a combined set of models for representing travel, location and vehicle decisions of individuals and households to reflect the growing interest in the environment. The urban passenger transport system contributes to the achievement of broader goals of urban management and the performance of urban areas. It also supports the evaluation of an expansive set of identified policy instruments. The system differentiates and evaluates both aspatial and spatial strategies via Geographical Information Systems (GIS) and system linkage, as well as urban versus spillover impacts beyond the urban area. It emphasizes the system-wide impacts of particular policies as well. The project team

members are David Hensher, Tu Ton (project coordinator), Carlos Funes, Kirk Bendall, and Jeroen Verdam and Cam Ngo. The system prototype is expected to be in operation in 1999.

Greenhouse Challenge for Australian Bus and Coach Industry (ITS Sydney)

The Greenhouse Challenge Unit (GCU) engaged the Institute of Transport Studies to undertake a scoping study to assess the benefits and opportunities for the Australian Bus and Coach Sector from participation in an energy and waste management project under the Greenhouse Challenge program.

The GCU sought information on:

- the operational characteristics of the prime sub-sectors of the bus and coach industry,
- the key stakeholders in the bus and coach industry; their functions and influence,
- identification sub-sectors having common energy and waste generation characteristics such as chassis manufacturers, body builders, fuel suppliers, end-use suppliers of bus and coach services,
- identification of any previous energy/waste management programs in the industry,
- identification of the major cost of production components of the industry;
- an assessment of industry outlook and the attitudes of company management and staff to environmental issues, external non-regulatory influences and corporate cultural change,
- and identification of 'key result areas' for potential energy and waste management in the industry to reduce greenhouse gas emissions and waste through better management of resources.

Public Transport Passenger Information Systems and Infrastructure (ITS Sydney)

The Passenger Transport Board, South Australia has engaged the Institute of Transport Studies to undertake a literature review to identify and assess the benefits and opportunities for Passenger Information Systems. The project commenced on 26 October 1998 with a completion date of November 6, 1998.

Objectives of Research Paper

The research explored three related objectives:

1. To deepen understanding of how and in what areas information systems (end-use information in channel-delivered systems) as well as infrastructure such as ticketing systems, bus stops, shelters, signage are utilised in urban passenger transport
2. To examine the extent Australian agencies and private operators are developing, practising and utilising marketing information
3. To understand the importance and value of marketing communication in enhancing patronage

Further Study Needs Project (ITS Sydney)

A study investigating the future study needs of both local and international students.

Transport Case Studies (ITS Sydney)

Through an annual funding of $5000 from the NSW Section of the Chartered Institute of Transport, ITS is developing a series of transport case studies. For 1998, there will be a series of case studies in Logistics Management prepared by Trevor Heaver and Ann Brewer.

Introduction of electronic data interchange (EDI) (ITS Sydney)

The Chartered Institute of Transport (CIT) is an independent, non-political organisation made up of members who predominantly work in the diverse fields of transport. Members have an interest in, and commitment to, the economic and social development of transport. In addition, the CIT acts as a forum for reasoned discussion and research into transport issues, considering contemporary problems and possible solutions and imparting the results to a wider audience. This paper is presented by the CIT International Council with the aim of contributing to and improving the state of international knowledge concerning the use and application of Electronic Data Interchange (EDI) in transport. The Council believes that EDI is a powerful change agent that has far-reaching implications for the transport sector, but it also is a necessary response to the economic challenges of the 1990's. The paper was written by Paul Hooper to explain those challenges and to describe how EDI is being used to improve the flow of information and to enable businesses and nations to maintain their competitiveness. The focus of the paper is global while emphasising the relevance of EDI for emerging national economies. The International Council intends to distribute this report world-wide amongst its membership, to Trade Ministers of all English-speaking developing countries, to UNCTAD, and to trade-related organisations such as APEC.

Modelling Road Safety Trends and Predicting Road Fatalities in Australia (ITS Sydney)

Using data on road fatalities, registered motor vehicles and population from 1925 to 1997, two time series models for road safety have been developed to predict road fatalities in Australia for 2001 and beyond. We investigate the empirical validity of Smeed's Law as an explanation of road accident trends in Australia. The relationships among traffic hazard, personal hazard and population are found inadequate. To improve on the explanatory power of Smeed's empirical model, we explore the role of additional factors such as compulsory wearing of seat belts, road improvements and vehicle safety enhancements.

Computer Modelling in Transport Planning: An Investigation of the Current Issues and the Potential of Component Object Model (COM) Approach (ITS Sydney)

Among fast growing computing technologies in recent years, object-oriented concept and component object model (COM) have continued to demonstrate their capability in laying fundamental layers for significant computing framework such as Microsoft Windows System. The use of such tools in implementing models of land-use/transport and environment system opens up an opportunity to consider the extent to which a component object model framework can be constructed, re-used and customised to flexibly represent more complex models in a more resource effective way.

Development of a Decision Support System for a Vehicle Replacement Program (ITS Sydney)

The development of a decision support system to provide transport operators with a capability to identify the order of vehicle replacement under a set of pre-specified constraints. The vehicle replacement system (VRS) as a computer software application simulates an operators cost minimization replacement program over a number of years subject to ultra-low-floor bus compliance targets, average vehicle age constraints, and budget constraints.

Implementation of Road Safety Audit in Local Government (ITS Monash)

This research is conducted by Peter Daly, examines the level & quality of Road Safety Audit in local government in Australia and New Zealand. The research examines issues relevant to local government and assesses barriers and incentives to the uptake of Road Safety Audit.

Urban Level of Service (ITS Monash)

This project looks at the drivers perception of the level of service of various road types. It investigates the influence of road pricing in this perception.

Motorsport Safety (ITS Monash)

This research is undertaken by Peter Daly and Ben Chapman and examines the safety advances in motorsport due to improved track design, vehicle improvements and driver personal protection and emergency response procedures.

Continuing from 1997

Speedrail (ITS Sydney)

In November 1997, ITS together with SKM Economics undertook new primary data collection to re-estimate the set of behavioural travel choice models used in forecasting the demand for Speedrail. This project was completed in February 1998. Ongoing advice to the Speedrail consortium continued throughout the year.

ITS International Bus and Coach Performance Benchmarking Program (ITS Sydney)

This is an on-going program launched by the Institute of Transport Studies in November 1995. There were 7 subscriptions received for the year 1997/98.

School bus routing (ITS Sydney)

This is an on-going project, and is related to a school bus routing project which was examined for Blue Ribbon Coaches in 1997. To identify school bus routing a spatial modelling, database and network optimisation capability built in existing TRANSCAD GIS is used to implement a decision support system for a real world school bus routing program. For any given pattern of student residential location and any proposed bus routes and associated bus stops, the system can calculate two important outputs:

i) Demand Level – 2 categories of demand can be calculated: the total and school specific. With the total demand level, a total number of students waiting at a particular bus stop are calculated regardless what schools students enrolled in. With the school-specific demand, the system can identify school-specific students waiting at a particular bus stop.

ii) Bus Routes – by using vehicle routing module available from GIS, the bus routes can then be calculated for a set of depots (represented by schools) and a set of pickup and delivery points (represented by bus stops with associated demand level).

Freight modal choice in Indonesia using disaggregate choice modelling (ITS Monash)

This is an on going project, and is related to the growth in Indonesia resulting in a large growth in freight demand. The project is undertaken by Olle Norojono, Samantha Taylor and Bill Young, and examines modal choice factors for freight movement on the Indonesian island of Java.

Measurement of driver behaviour and vehicle kinematics using an instrumented vehicle (ITS Monash)

This research is on going and is undertaken by Peter Daly it aims to examine on road vehicle kinematics and driver characteristics which may contribute to the development of a measure of traffic flow quality, improved road design, road and environment safety.

Trip chaining behaviour and activity location choice (ITS Monash)

This is an on going project and undertaken by Peter Daly where trip chaining is examined to determine trade-offs between quality of access to activity locations and their perceived importance by different segments of the population.

Modelling demand and parking management (ITS Monash)

This research is on going and is undertaken by Peter Daly and Bill Young and models urban travel on a city-wide scale using activity modelling approaches.

Residents' perceptions of road based traffic noise (ITS Monash)

This is an on going project and is undertaken by Peter Daly in examining residents' qualitative perceptions of road-based noise and evaluating linkages between disturbance from road-based noise and house type and proximity to noise source, bedroom location, road speed limit variation, traffic composition, weather and resident activity patterns.

Hazardous road locations (ITS Monash)

This is research is on going and is undertaken by Peter Daly. The research involves an analysis of mass accident data on a statewide, route, and road segment level to identify causal factors and the development of possible countermeasures.

Pedestrian safety, Monash University Clayton Campus (ITS Monash)

This is an on going project and is undertaken by Geoff Rose and Peter Daly. The project examines issues related to pedestrian safety in a mixed landuse environment. Issues such as pedestrian movement patterns, integration of the pedestrian cyclist plans with road infrastructure development are studied.

Other projects

Other projects included:

- David Hensher provided advice to Macquarie Bank on the traffic forecasts for the Eastern Distributor EIS (12 February).

6. EDUCATION

ITS Sydney

The Education program at ITS Sydney includes:

- PhD program;

- Masters by Research Program
- Graduate transport & logistics management program;
- Certificate programs; and
- Executive short courses.

ITS offers a fully articulated set of programs in transport and logistics management education, as shown below. Note that articulation between programs is not automatic. The Graduate Certificate of Transport Management approved by the Board of Graduate Studies in 1997, commenced in July. This completes the full range of graduate program offerings. An MPhil (Transport & Logistics Management) is now available as a research degree.

PhD program

Students in the PhD program at ITS (at the end of 1998) include:

Full-time

Chackrit Duangphastra (1997): Airport competition and choice in South East Asia

Baojin Wang (1998): Development of risk taking modeling framework for road safety

Seu Cheng (1992): Interactive agency choices in domestic freight movements

Part-time

Ron Fisher (1997): The Future of the Bus & Coach Industry in Australia.

Graduate transport management program

The transport management program includes the Master of Transport Management (8 courses), the Graduate Diploma in Transport Management (5 courses) and the Graduate Certificate of Transport Management (3 courses). There are currently over 85 students in the program. 12 students graduated in June and 15 in October.

34? new Masters students and over 27? new Graduate Diploma and 2 Graduate Certificate students enrolled in 1998. An orientation evening to welcome all graduate students to the Transport Management Program was held on 6 March.

Courses

ITS taught the following transport and logistics management courses in 1998:

Semester 1

- Transport Policy Workshop
- Transport Economics and Management
- Transport Planning Methods
- Tourism Management
- Logistics Management

Semester 2

- Transport Strategy
- Aviation Economics & Management
- Freight Operations and Technology Management
- Maritime Markets
- Maritime Logistics
- Geographical Information Systems for Planning and Marketing
- Supply Chain Management

Student awards

Paul Freudensprung received the Institute of Transport Studies prize for excellence in full-time study in the MTM program. Daniel Morgia received the Chartered Institute of Transport Ken Hillyar award for best Year 1 student in the MTM program and Sinchon Mu and Mirjana Panich received the Chartered Institute of Transport Sir Hudson Fysh award for best Year 2 student in the MTM program. Collin Hwang received the Australian Institute of Traffic Planning and Management prize for best student in the Graduate Diploma program.

The Industry Logistics Prize was awarded to Paul Clark.

The awards were presented at the Institute of Transport Studies annual presentation dinner on 20 November 1998 attended by students, alumni students, staff and supporters of the Institute.

Paul Freudensprung receiving the ITS Prize for Academic Excellence for a full-time student in Transport Management from Mr Jock Murray, Director General of NSW Department of Transport at the ITS Annual Presentation Dinner.

Conference of Australian Institutes of Transport Research (CAITR) Awards

ITS Sydney hosted the 20th Conference of Australian Institutes of Transport Research on 14 & 15 December, held at Sancta Sophia College, The University of Sydney. The conference was aimed specifically at transport researchers and recent students studying PhD, Masters and Undergraduates by Research, where they had the chance to present work in progress and receive constructive feedback and improve presentation skills. Prizes were awarded to students in the following categories: Prize for best undergraduate student paper & best postgraduate research student paper.

The CAITR Student Award for best undergraduate student paper was awarded to Rahaf Almghawech & Georgina Beattie for their paper on 'The Economic Impact of a Highway Bypass' and to Michelle Mee for her paper on 'Who's using Sydney Light Rail and Why?'. The Rodney Vaughan Memorial Prize for best postgraduate research student paper was awarded to Kyoung-Sik Kim.

The Rail Access Corporation of NSW Scholarship

Julie Dryden who was awarded the *Women in Transport Management Scholarship* funded by Rail Access Corporation commenced the Master of Transport Management program in March 1998. This is a full scholarship for a woman to undertake the Master of Transport Management program. It covers all tuition fees and paid work during University holidays with the Rail Access Corporation. The scholarship was designed and developed by Ann Brewer with Rail Access Corporation in 1997 and again in 1998. The 1998 scholarship was advertised in the Sydney Morning Herald, Australian Financial Review & Australian newspapers in May 1998, and was awarded to Abir Derbas, who will be commencing in the Master of Transport Management in 1999.

Certificate programs

Certificate of Transport Management (Bus/Coach)

The CTM was established in conjunction with the Bus and Coach Association (NSW) to provide managerial training for the bus and coach industry. It is the only program to meet the accreditation requirements under the NSW 1990 Passenger Transport Act.

In 1998 ITS conducted 1 CTM course, 1 one-day Update Program and 1 one-day Computer Program with 48, 45 and 25 students in each of the courses, respectively. Despite these intakes, at the end of 1998 there was an extensive waiting list for the CTM.

Certificate of Coach Management

The Certificate of Coach Management (CCM) is specifically designed for coach operators accredited for long distance and tourist vehicle services (including overnight charter work).

In 1998, over 180 students completed the 4 day program. Due to demand, there were 4 CCM intakes in 1998.

Certificates of Logistics Management, Freight Management and Supply Chain Management

This new management program first introduced in 1997 meets the needs of professionals involved in logistics, maritime, supply chain management, retail and freight transportation management. The program structure was revised in 1998 with the introduction of two new courses Certificate of Maritime Logistics and Certificate of Retailing Logistics. The program includes three core modules:

- Logistics Management A
- Logistics Management B
- Logistics Management C (i) & (ii)

The additional modules for the Certificate of Logistic Management are:

- Management of Order Fulfilment Processes A
- Management of Order Fulfilment Processes B

The additional modules for the Certificate of Freight Transport Management are:

- Freight Management A
- Freight Management B

The additional module for the Certificate of Supply Chain Management is:

- Supply Chain Management

The additional module for the Certificate of Maritime Logistics is:

- Maritime Logistics

The additional module for the Certificate of Retailing Logistics is:

- Retail Management

There is also an option to complete an additional specialist module – Distribution Management.

The program had an intake of 27 students in 1998. Most of the students in the program are undertaking two or more certificates.

Student awards

In November, the CTM, CCM and CLM Certificate Presentation Dinner was held in conjunction with the Institute of Transport Studies end-of-year dinner.

The Bus & Coach Industrial Associations'- BCA Prize for the best student in the Certificate of Transport Management program, worth $250 in 1998, was awarded to Craig Webster.

Short Courses and Workshops

Stated Preference Methods

On 22-23 January, David Hensher and Jordan Louviere ran a 2 day short course on Stated Preference Methods for the Centre of Health Economics Research at the University of Sydney.

Stated Choice Methods

On 2-6 February, David Hensher and Jordan Louviere ran a workshop on Stated Choice Methods and Applications at the University of Western Australia.

Travel Survey Methods

On 6 April, Professor Tony Richardson from the Transport Research Centre, RMIT University ran a one-day workshop on Travel Survey Methods at ITS Sydney. It was attended by 20 participants.

Teleworking, Telecommuting and Transport – A Lunchtime Seminar

A lunchtime seminar on "Teleworking, Telecommuting and Transport" was held on 31 July at ITS Sydney. ITS invited consultants, transport planners and human resource managers to learn more about European developments and find some assistance in establishing flexible work practices within their own organisation. The seminar organised by Ann Brewer was very successful with 13 participants in attendance. It was presented by two European experts in the field of telecommuting and telework - Maarten Botterman from the European Commission and Dr Paul Jackson from Burnel University, UK.

Distance Education

CTM (Bus and Coach) and CCM (Coach) Western Australia

ITS introduced a distance education format for CTM and CCM in Western Australia with the full support of the Department of Transport (Western Australia) and Bus and Coach Association (Western Australia). The program was piloted in April in Perth with an intake of 31 students. Another program was conducted in October with an intake of 74 students.

The introduction of these distance education programs for the bus and coach industry will ensure a major move to national accreditation. This is particularly significant since it is essential that operators who study in one State have their qualification recognised by all States in which they might operate (this being essential for coach operations and operators who provide other services across State borders).

The bus and coach programs provide operators with:

- A relevant education and training package in competency based format
- Effective assessment
- Practical delivery to cater for regional, rural or remote operators
- National recognition and portability of qualifications between States and Territories
- Identification of opportunities for continuously improving operator skills
- Affordability

The successful completion of these programs leading to a recognised qualification such as a Certificate of Transport Management (CTM) in bus and coach and CCM is an important recognition of achievement. The predominant qualification will be a CCM. There is unlikely to be more than 2 intakes for the CTM.

ITS Monash

The education program at ITS Monash includes:

- PhD program;
- Master of Engineering Science by research;
- Master of Engineering Science by coursework and minor thesis;
- Graduate Diploma in Transport and Traffic; and
- Short courses and workshops.

PhD program

?? graduated in 1998 with their theses titled ??

Students engaged in PhD research at ITS Monash (at the end of 1998) included:

Peter Daly: Modelling transport demand and parking management

Brett Lemas: A decision support system for pavement design

Olle Norojono: Freight movement in Indonesia

Fotios Spiridonis: Equilibrium modelling of location choice

Master of Engineering Science by research

?? has graduated after successfully completing his MEngSc (research) program on ??.

In 1998, ??, commenced the Master of Engineering Science by Research with his project on ???.

Master of Engineering Science by coursework

In 1998, ?? students commenced the Masters by coursework program and ?? students commenced the Graduate Diploma in Transport and Traffic Engineering, while ?? student graduated in the Graduate Diploma program. There are currently a total of ?? students enrolled in the Masters by coursework program and ?? students in the Graduate Diploma in Transport and Traffic Engineering program.

Courses

Subjects taught by ITS Monash staff included:

Semester 1

- Road Safety
- Transport Technology Assessment
- Project Management for Engineers

Semester 2

- Transport Policy
- Transport Network Models

Student awards

The following prizes were awarded to students:

- CMPS and F prize in Highway Engineering to ??
- Richardson prize in Transport to ??
- VicRoads postgraduate award to ??
- Turnbull and Fenner prize to ??

Short Courses and Workshops

Traffic Engineering and Management Workshop

Samantha Taylor directed the intensive 2 day workshop on Traffic Engineering and Management, held in Melbourne on 23 and 24 November 1998. As for previous years, the workshop involved practitioners from industry who will be lecturing on the fundamentals of traffic engineering, new developments in the field, and the common traps practitioners can sometimes find themselves in.

Distance Education

Transport Management Course in Bus and Coach Operations

Twenty students participated in the pilot of the Victorian Transport Management Course in Bus and Coach Operations, undertaken in second semester, 1998. The program will be available by distance education and is expected to be introduced in early 1999, pending Victorian Government parliamentary authorisation.

There are two streams of the course available to operators. One course is for small operators with five or fewer buses operating school services and school charter only. The larger course is for all operators who engage in charter or route services or who have more than five vehicles. The larger course comprises four subjects:

- Introduction to Bus and Coach Operations: legislation, safety and maintenance
- Marketing and Planning
- Financial Management
- Human Resource Management

Education Program in Parking Management

Bill Young continued development on the distance education program in parking management for the Parking Association of Australia. The program involves four subjects covering Introduction to parking, Parking management, Parking design & policy, and Parking technology & information collection.

Distance Learning Course for Master of Engineering Science, Monash University

Bill Young developed a Traffic Systems course, for the degree - Master of Engineering Science. Traffic Systems will be a part of the distance learning course at Monash University.

7. PUBLICATIONS

Staff disseminate research and policy work through a wide range of publications from books, journal articles, conference proceedings, working papers and project reports.

Books and book chapters

David Hensher and Ann Brewer's book *The Practice of Transport Management* was completed in 1998.

David Hensher, Jordan Louviere and Jofre Swait's book *Stated Choice Methods and Analysis with Applications in Marketing, Transportation and Environmental Valuation* was completed in 1998 (in press).

- Brewer, A. and Hensher, D.A. (1998) Flexible work and travel behaviour: a research framework, in Jackson, P. and van der Wielen, Jos M. (eds) *International Perspectives on Telework: From Telecommuting to the Virtual Organisation*, Routledge, London, 215-232.
- Dia, H. and Rose, G. (in press) The impact of data quantity on the performance of neural network freeway incident detection models in Reggiani, A., Himanen, V. and Nijkamp, P. (eds) *Neural Nets in Transport*, Elsevier, UK, xx-xx.
- Hensher, D.A. (1998) Extending valuation to controlled value functions and non-uniform scaling with generalised unobserved variances (invited paper presented at the International Conference on the Theoretical Foundations of Travel Choice Models, Stockholm), in Garling, T., Laitila, T. and Westin, K. (eds) *Theoretical Foundations of Travel Choice Modeling*, Pergamon, Oxford, 75-102.
- Hensher, D.A. (1998) The timing of change for automobile transactions: A competing risk multispell specification, in Ortuzar, J., Hensher, D.A. and Jara-Diaz, S. (eds) *Travel Behaviour Research: Updating the State of Play*, Pergamon Press, Oxford, 487-506 (an earlier version presented at 7th International Conference on Travel Behaviour, Santiago, Chile, June 13-16, 1994).
- Hensher, D.A. and Golob, T. (forthcoming) Telecommunications-Travel Interactions, in Mahmassani, H. (ed.) *Traveller Behaviour Research*, Pergamon Press, Elsevier Science, Oxford, xx-xx.

Journal articles

- Brewer, A.M. (1998) Work design, flexible work arrangements and travel behaviour: Policy implications, *Journal of Transport Policy, 5, 93-101*.
- Brewer, A.M. and Hensher, D.A. (1998) Strategic intent and incentives in a voluntary organisation: The case of the Board of Airlines Australia, *Journal of Air Transport Management, 4, 87-97*.
- Brewer, A.M. and Hensher, D.A. (1998) The importance of organisational commitment in managing organisational change in the bus industry in Australia, *Transportation Research E, 34 (2), 117-130*.
- Golob, T.F. and Hensher, D.A. (1998) Greenhouse gas emissions and the Australian commuter attitudes and behaviour concerning abatement policies and personal involvement, *Transportation Research 3D (1), 1-18.*
- Gu, K. and Young, W. (1998) Verifying and validating a land use-transport-environment model, *Transportation Planning and Technology,* Gillingwater, D. (Ed.), Gordon & Breach Science Publishers, 21(3), 181-202.
- Hensher, D.A. (1998) Intercity rail services: Nested logit stated choice analysis of pricing options, *Journal of Advanced Transportation, 32 (2), 130-151*.

- Hensher, D.A. (1998) Establishing a fare elasticity regime for urban passenger transport: Non-concession commuters, *Journal of Transport Economics and Policy, 32 (2), 221-246*.
- Hensher, D.A. and Beesley, M.E. (1998) Markets, government and environmental policy issues for public transit (invited position paper prepared for the 5th International Conference on Competition and Ownership in Land Passenger Transport, Leeds, UK, May 1997), *Journal of Public Transport*, 4 (1), 81-99.
- Hensher, D.A. and King, J. (1998) Establishing a fare elasticity regime for urban passenger transport: Concession and non-concession market segments by trip length, *Journal of Transportation and Statistics*, 1 (1), 43-61.
- Hensher, D.A. and Potter, S. (1998) Competition and Ownership in Land Passenger Transport: the wider policy issues, *Transport Reviews*, 18 (4), 342-347.
- Hooper, P. (1997) Liberalising airline competition in India, *Journal of Air Transport*, 3 (3), 115-123.
- Hooper, P. and Hensher, D.A. (1997) An application of the total factor productivity approach to measuring the performance of airports, *Transportation Research E*, 33 (4), 249-260.
- Le, H. and Young, W. (1998) Modelling shopping centre traffic movement (1): Model validation, *Transport Planning and Technology*, Gillingwater, D. (Ed.)., Gordon & Breach Science Publishers, 21 (3), 203-233.
- Le, H. and Young, W. (1998) Modelling shopping centre traffic movement (2): Model validation, *Transport Planning and Technology*, Gillingwater, D. (Ed.)., Gordon & Breach Science Publishers, 21, 309-321.
- Smith, N. and Hensher, D.A. (1998) The Future of Exclusive Busways: the Brazilian Experience, *Transport Reviews*, 18 (2), 131-152.
- Taylor, S.Y. and Ogden, K. (1998) The utilisation of commercial vehicles in urban areas. *Transport Logistics*, 1 (4), 265-278.

Conference proceedings

- Brewer, A. (1998) Road rage: what, who, when, where and how?, *Papers of The Australasian Transport Research Forum* 22, Sydney, September, 489-507.
- Brewer, A. and Hensher, D.A. (1998) (under editorial consideration) Distributed Work and Travel Behaviour: The Dynamics of Interactive Agency Choices Between Employers and Employees, *8th IATBR Conference on Travel Behaviour Research*, Austin, Texas.
- Daly, P. and Francis, T. and Morgan, C. (1998) Implementation of road safety audit in Local Government: Australia and New Zealand experience, *Road Safety: Research, Policing and Education Conference*, Wellington, New Zealand, November.
- Daly, P., Morgan, C. and Jordan, P. (1998) Is local government addressing the implementation issues in road safety audit?, *Proceedings of the 19th ARRB Transport Research Conference*, Sydney, December, xxx-xxx.
- Hensher, D.A. and Golob, T.F. (1998) Searching for policy priorities in the formulation of a freight transport strategy: An analysis of freight industry attitudes towards policy initiatives, *Papers of The Australasian Transport Research Forum* 22, Sydney, September, 1-17.
- Hooper, P., Cain, R. and Berg, P. (1998) Forecasting aircraft movements – an unavoidable case of uncertainty, *Proceedings of The Australasian Transport Research Forum 22*, Sydney, September, 587-603.
- Lemas, B. and Young, W. (1998) (under review) A Knowledge based Integration of Conceptual and Detailed Design of Road Pavements, *Proceedings of the 19th ARRB Conference*, Sydney, December (CDRom).
- Louviere, J., Hansen, D. and Hensher, D.A. (1998) Select, *Papers of The Australasian Transport Research Forum* 22, Sydney, September, 1-17.
- Taylor, S.Y., Green, J. and Richardson, A. (1998) Applying vehicle tracking and palmtop technology to urban freight surveys, *Papers of The Australasian Transport Research Forum 22*, Sydney, September, 541-554.
- Taylor, S. Y. and Young, W. (1998) Continuing education for transport managers, Engineering Managers Education Conference, Melbourne, 30 April – 1 May, 203-207.

- Ton, T. (1998) Computer modelling in transport planning: an investigation of current issues and potential of component object model (COM) approach, *Papers of The Australasian Transport Research Forum 22*, Sydney, September, 363-380 (nominated as best paper).
- Young, W. and Daly, P. (1998) (in press) Level of Service of Urban Roads, *Proceedings of the International Conference on Transportation into the next Millennium*, Singapore, September, xxx-xxx.

ITS Working Papers

All Working Papers may be purchased from ITS.

ITS-WP-98-1 *Distributed Work and Travel Behaviour: The Dynamics of Interactive Agency Choices between Employers and Employees* (Ann Brewer and David Hensher)

Abstract This paper develops a framework within which multiple agents make discrete choices in respect of a common objective – the determination of participation in distributed work, especially the opportunities and constraints associated with telecommuting. Ideas in discrete choice theory and game theory are combined to define a set of choice experiments in which employees and employers interact in arriving at a choice path in a distributed work context. A stated choice experiment with offers and feedback, known as an interactive agency choice experiment (IACE), is empirically investigated in the context of telecommuting options with an exploratory sample of employees and employers in Sydney, Australia. The approach highlights the role of information and negotiation in breaking down the barriers to more flexible work activity, to deliver potential benefits to the transport system such as reduced traffic congestion and environmental sustainability. The paper identifies the types of incentives that an employee/er has to offer the employer/employee in securing effective telecommuting.

ITS-WP-98-2 *Measuring Total Factor Productivity of Airports – An Index Number Approach* (Paul Hooper and David Hensher)

Abstract There is an increasing trend towards corporatisation and privatisation of airports in an effort to improve performance. However, the normal financial reporting requirements associated with these forms of organisation are not sufficient indicators of performance of airports since profitability can be more a function of the exercise of market power than a sign of productive efficiency. Also, there are concerns that efforts to regulate the prices charged by airports can result in under-investment and declining service standards. This makes it important to monitor the cost efficiency, cost effectiveness and service effectiveness of airports. There is a growing literature on these topics, but so far there has been little attempt to apply the concepts of total factor productivity to the airport sector. We use a non-parametric index number method to illustrate how such a global measure can be used to investigate the role of disaggregated performance measures that often are very useful to managers and to those monitoring airport operations.

ITS-WP-98-3 *A Comparison of Elasticities Derived from Multinomial Logit, Nest Logit and Heteroscedastic Extreme Value SP-RP Discrete Choice Models* (David Hensher and Jordan Louviere)

Abstract Developments in the estimation of discrete choice models which relax elements of the independence of irrevelant alternatives (IIA) property of the multinomial logit model (MNL) provide opportunities to explore the richer behavioural sensitivity of a choice model to changes in the levels of attributes influencing choice. Surprisingly, the literature offers limited evidence on the variation in sensitivity (ie elasticity) as we move from an MNL model based on revealed preference (RP) data, to MNL based on stated preference (SP) data, to combined RP-SP data estimated sequentially and jointly with partial relaxation of the differential sequentially and jointly with partial relaxation of the differential variance in the unobserved effects by the 'nested logit' method, and then as free variance across all RP and SP alternatives by heteroscedastic extreme value (HEV) estimation. This paper draws on a data set collected in 6 Australian capital cities in 1994 to estimate a series of

commuter mode choice models in the presence and absence of two 'new' alternatives (light rail and busways systems), to derive matrices of direct and cross point elasticities for travel cost and travel time. The evidence suggests that constraining the variance of the unobserved effects to varying degrees tends to over-estimate the elasticities sufficiently to distort the real behavioural sensitivity of specific attributes influencing choice. Furthermore, we seriously question the usefulness of studies which rely solely on SP data.

ITS-WP-98-4 *Interacting Agents and Discrete Choices in Logistics Outsourcing: A Conceptual Framework* (David Hensher and Garland Chow)

Abstract This paper develops a framework within which multiple agents make discrete choices in respect of a common objective – namely the delivery of a consignment from its origin to its final destination. Ideas from game theory and discrete choice are combined to define a set of choice experiments in which agents (e.g. shippers and freight forwarders) interact in arriving at a choice outcome. Forward and backward linking stated choice experiments provide a capability to evaluate sequential-move and 'one-shot' simultaneous move negotiation regimes. We propose an empirical framework in which a controlled experiment is implemented on a sample of freight forwarders and shippers moving specific consignments to an international or domestic destination. We concentrate on the contract environment where negotiation, deals, repeat business are the trend in agent choices in logistic chains, in contrast to open-market competitive decision making.

ITS-WP-98-5 *A Comparison of the Predictive Potential of Artificial Neural Networks and Nested Logit Models for Commuter Mode Choice* (David Hensher and Tu Ton)

Abstract Understanding and predicting traveller behaviour remains a complex activity. The set of tools in common use by practitioners and many of the tools used by researchers appear in many ways to exhibit complexity; yet often this richness of detail is in methods of estimation rather than in representation of how individuals actually evaluate alternatives and make decisions on a set of interrelated travel choices. Discrete choice methods championed by the multinomial logit model and its variants such as nested logit, heteroskedastic extreme value, and multinomial probit have added substantial behavioural richness into statistical specification and estimation (Hensher et al forthcoming), seeking to accommodate the role of both observed and unobserved influences on travel choices. The search for behavioural and analytical enhancement continues. Research in the field of artificial intelligence systems has been exploring the use of neural networks (eg Faghri and Hua 1991, Yang et al 1993) as a framework within which many traffic and transport problems can be studied. The main motivation for using neural networks could be due to some fascinating properties that neural networks possess. They are parallelism, the capacity to learn, allowing for the use of distributed memory and capacity for generalisation. Following these characteristics, one of the promises from neural networks is that they can tackle the problem of forecasting and modelling which is very common in travel demand modelling. The use of such tools in studying individual traveller behaviour opens up an opportunity to consider the extent to which there are representation frameworks which complement and/or replace existing analytical approaches.

This paper explores the merits of neural networks as part of a revised framework within which to explore the processes of traveller decision making, and how discrete choice methods might be integrated within such a framework

to acknowledge the important role that the latter tools have played in the last 25 years in the development of better practice in travel demand modelling.

ITS-WP-98-6 *Private Sector Financing of Urban Services* (Alastair Stone)

Abstract This paper is about bridging the gap between demand for urban services and available private sector financial resources. Unfortunately experience has shown that the relatively few successful approaches to building this bridge, such as BOOT schemes, have not provided a model that can be easily replicated. The problem is more deep seated and fundamental, and so this paper takes a look at some of these fundamentals and seeks to identify issues and proposes policies and institutional arrangements that will help bridge the gap.

ITS-WP-98-7 *The Use of Object-Oriented Programming Approach in Representing Traffic Noise at the Network Level* (Tu Ton)

Abstract Existing road traffic noise models for a single noise receiver are developed with reasonably accurate estimating capability. If these traffic noise models can be incorporated into a network model then the resulting system would be a useful decision support system in transport planning. The key issue in developing a road traffic noise model at the network level is how to structure the basic traffic noise models in such a way that they can be flexibly re-used to construct more complex cases with many noise sources, noise receivers and noise barriers. This paper reports on the use of an object-oriented programming approach to address the identified issue.

ITS-WP-98-8 *The Imbalance between Car and Public Transport Use in Urban Australia: Why does it exist?* (David Hensher)

Abstract Public transport in urban Australia is dominated by the automobile. As we approach the end of the 20th century, there is much renewed interest in revitalising urban public transport as one way of combating the increasing levels of traffic congestion and deterioration in air quality and global warming. This paper takes stock of the situation in Australia, identifying the challenges which the urban public transport sector face in redressing the imbalance between car and public transport market share. Particular emphasis is given to the role of buses and busways in contrast to rail, and strategies to reduce the attractiveness of the car.

ITS-WP-98-9 *Work Design, Flexible Work Arrangements and Travel Behaviour: Policy Implications* (Ann Brewer)

Abstract This paper examines the assumptions of work design and its impact on how work is conceived and designed, the important linkages to travel behaviour to and from work and subsequent impacts on traffic mix in urban areas. These issues have not been substantively addressed by management or government and are forming a barrier to FWA. The focus of this paper is to look at the broader framework of work design in the context of the emergence of distributed work, diffusion of communications technology, and their influence on introducing *real* flexibility into work and its potential impact on travel behaviour. Specifically the study investigates the extent to which place, distance and time, the limiting dimensions in travel behaviour, serve as a major barrier to flexible work design and work scheduling. Flexible work arrangements will only become a reality by developing acceptable employment policies both at government and corporate levels. The paper concludes by analysing two policy options.

ITS-WP-98-10 *Strategic Alliances Among International Airlines and Their Implications for Organisational Change (*Paul Hooper and Ann Brewer)

Abstract Globalisation is an inevitable path for many types of organisations as they strive to attain and defend competitive advantage and strategic alliances are a necessary part of this process. Cooperative behaviour and simultaneous competition in several continental markets is not a new phenomenon in aviation, but the current popularity of alliances among the major carriers has been interpreted as a form of globalisation. A common assumption is that these alliances present ways for the airlines to circumvent the restrictions present in the regulatory framework. This paper argues that globalisation, as it is more widely understood in modern management, involves much more than the development of an all-encompassing network. Exploitation of the benefits of globalisation requires a change in thinking about the relationships within and between organisations. Strategic alliances have many advantages over mergers and acquisitions in this context. The paper argues that most of the current airline alliances are "hollow organisation", but that genuine strategic alliances are likely to be formed in more competitive conditions. These genuine strategic alliances can deliver benefits to the industry and its customers, but policy makers must recognise the growing complexity of new forms of organisation in the airline industry.

ITS-WP-98-11 *Work Design for Flexible Work Scheduling: Barriers and Gender Implications* (Brewer)

Abstract: This paper investigates the assumptions underlying three important dimensions of work design, place, distance and time, and their significant linkages to flexible work scheduling and travel behaviour. Work design, defined as the interrelationship of work tasks, workers and workplace routines, moderates the relationship between distributed work, flexible work scheduling and travel behaviour. Models of work design based on conventional views of place, distance and time are restrictive in supporting the potential of flexible work scheduling. Work practices that assume work is conducted only in the workplace (place), during standard work time (time) in the proximity of co-workers and managers (distance) do not, in the main, support flexible work scheduling. This paper considers the broader framework of organisational change and work design from the employer perspective in the context of distributed work and diffusion of communications technology, and its influence on flexible work scheduling.

ITS-WP-98-12 *Aviation Policy in South East Asia: Alliances, "Open Skies" Bilaterals and Regional Airline Markets* (Paul Hooper and Chackrit Duangphastra)

Abstract This paper investigates the assumptions underlying three important dimensions of work design, place, distance and time, and their significant linkages to flexible work scheduling and travel behaviour. Work design, defined as the interrelationship of work tasks, workers and workplace routines, moderates the relationship between distributed work, flexible work scheduling and travel behaviour. Models of work design based on conventional views of place, distance and time are restrictive in supporting the potential of flexible work scheduling. Work practices that assume work is conducted only in the workplace (place), during standard work time (time) in the proximity of co-workers and managers (distance) do not, in the main, support flexible work scheduling. This paper considers the broader framework of organisational change and work design from the employer perspective in the context of distributed work and diffusion of communications technology, and its influence on flexible work scheduling.

ITS-WP-98-13 *Searching for Policy Priorities in the Formulation of a Freight Transport Strategy: An Analysis of Freight Industry Attitudes Towards Policy Initiatives* (Hensher & Golob)

Abstract: An efficient and effective freight transport strategy can be aided by early professional contributions from key stakeholders. One broad group who have historically been given limited opportunity to influence the drafting of a freight strategy, at least in Australia, are commercial road users and shippers who manufacture and distribute goods. Utilising a data set collected in Australia in 1996 from a sample of organisations involved directly and indirectly in road freight transportation, views were sought on road infrastructure changes, new road infrastructure, non-road infrastructure needs, and transport policies. An optimal scaling approach using non-linear canonical correlation is implemented to search for structural relationships between the underlying policy and infrastructure dimensions and the various industry categories. This framework provides a very powerful mechanism for identifying policy priorities supported or otherwise by stakeholder classes.

ITS-WP-98-14 *Road Rage: What, Who, When, Where and How?* (Brewer)

Abstract: Road rage is a form of aggressive behaviour by drivers on roadways. The paper addresses two questions: firstly, to what extent is road rage related to driver perceptions, characteristics and background? Secondly, how do drivers exhibit road rage? Recent media speculation implies that some drivers are more susceptible to road rage than others. For example, one commercial study indicated that women are increasingly the perpetrators of road rage. Although research of this kind makes good media headlines, there has been little serious scientific attention on this phenomenon. While the potential impacts of road rage are unknown, its major implication for road safety for drivers and others using roadways is apparent. Careful investigation into road rage may provide greater insight into the contributing factors of specific types of road accidents eg. culpable driving. It may also lead to the development of enhanced coping strategies for professional drivers. The focus of this paper is on firstly, the motivating and activating context of road rage and secondly, a theoretical perspective on roadway aggression and the diffusion of this form of travel behaviour.

ITS-WP-98-15 *Needs Assessment for Major Transport Infrastructure Investment* (Hensher)

Abstract: Transportation infrastructure projects, like any investment, are ultimately accepted or rejected on a number of risk criteria. A most notable one is the revenue stream from the users of the facility. If the investment is to be justified on both commercial and social criteria, the risk is especially high; if there is an element of community social obligation (backed up by subsidy), then the revenue risk is of a different nature and typically much lower.

The primary focus of this paper is on the continuing challenge of establishing ways to increase the reliability of traffic forecasts as a primary input in the forecast of revenue and the continuing role of in-depth attitudinal/opinion surveys with stakeholders to establish the needs agenda. The secondary focus is on promoting the case for a richer strategic system-wide approach to forecasting traffic demand for projects which has the capability of ranking specific infrastructure projects against alternative ways of improving the performance of the transport system in urban areas.

ITS-WP-98-16 *Environmental Responsiveness in the Bus and Coach Supply Chain: The Case of Greenhouse Gas Emission Production Through Improved Energy and Waste Practices* (Brewer)

Abstract: A strategic concern of governments and industry in Australia has been the extent of environmental responsiveness of companies to their natural environment. Protecting the environment involves reconciling environmental issues and values with economic interests and business responsibilities. The rise in greenhouse gas emissions, primarily due to the burning of fossil fuels and de-forestation, is attributed to global warming (Mills 1998). Evidence of increasing human impacts on the environment includes mounting levels of greenhouse gases in the atmosphere, accumulation of wastes and pollution of ground and surface water, which are the focus of the current study. A key question emerges as to which industries are environmentally more responsible than others and is raised specifically in this paper in terms of the transport task's contribution to greenhouse gas emissions. The aim of this paper is to identify and understand environmental responsiveness within the bus and coach sector of the transport industry, a major contributor to the passenger transport task. The bus and coach sector is defined in the full context of supply chain management, that is the integration of business processes from end user to initial manufacturers and suppliers of vehicles and fuel through to the providers of services and information for the benefit and value of customers. A project, investigating the perceptions that bus and coach operators have about environmental opportunities and associated risks, was conducted. Twenty-six key stakeholders were invited to participate in either a survey or case study designed to ascertain energy and waste management practices. Environmental responsiveness occurs in areas that seem to have the greatest potential impact not only in terms of the environment but also business's bottom line. While operators initiated waste and energy management programs so as to be socially responsible, they continued them because they discovered their cost-effectiveness to the business. A number of specific actions are warranted based on the study's findings.

ITS-WP-98-17 *Computer Modelling In Transport Planning: An Investigation Of The Current Issues And The Potential Of Component Object Model (COM) Approach* (Ton)

Abstract: The past twenty years has been the period of rapid technological change and there is no question that computing technology has been enthusiastically adopted by transport professional and has brought about new concepts such as Intelligent Transport Systems (ITS). However, this has not necessarily shown itself in software quality growth - especially from a transport modelling viewpoint. There has been a gap between the conceptualisation of a model and its implementation since 1960s. Transport software developers have been equipped with more powerful computer hardware and software than before. However, the increasing complexity of land-use/transport and environment system together with the constraint of limited resources allocated to the development task of transport modelling are putting pressure on the transport modelling task. Among fast growing computing technologies in recent years, object-oriented concept and component object model (COM) have continued to demonstrate their capability in laying fundamental layers for significant computing framework such as Microsoft Windows System. The use of such tools in implementing models of land-use/transport and environment system opens up an opportunity to consider the extent to which a component object model framework can be constructed, re-used and customised to flexibly represent more complex models in a more resource effective way. This paper

investigates the capability of the object-oriented concept as a candidate for structuring a COM framework for implementing models of land-use, transport and environmental impact system.

ITS-WP-98-18 *Forecasting Aircraft Movements: An Unavoidable Case of Uncertainty* (Hooper, Cain & Berg)

Abstract: Forecasting long-term aircraft movements for airport and air traffic control master planning has become more challenging in an era of deregulation and privatised airports. The demand for air travel has become more responsive to changes in prices and to income levels and assumptions about changes in these factors introduce a key source of error into forecasts. Further problems arise in working from passengers to aircraft movement forecasts. The need to incorporate judgements about the types of aircraft likely to become used over a 20 to 30 year horizon indicates the importance of understanding the long-term factors influencing airline competition. The paper considers a well-documented and thorough study undertaken 20 years ago to identify the sources of errors. We argue that a key area of improvement is in the combination of qualitative information about the future and statistical analyses of past trends. Furthermore, there is value in shifting the emphasis from prediction to management of uncertainty. Scenario methods are proposed as a form of participatory forecasting that allows managers and planners to learn how to deal with uncertainty and how to concentrate scarce forecasting resources on areas with the greatest payoffs.

ITS-WP-98-19 *Travel Demand Management and its Application at Australian University Campuses* (Rose & Hynes)

Abstract: This paper provides an example of how TDM could be applied in Australia with particular reference to university campuses. After considering the different characteristics of Australian university campuses in general, three Melbourne campuses were chosen as representative case studies. These consisted of a inner city campus (University of Melbourne), a inner suburban campus (Swinburne University) and an outer suburban campus (Monash University). Structured interviews were carried out with student and staff representatives involved with transport on campus. The interviews revealed a lack of consideration given to transport as an issue (as opposed to parking) at the three campuses. A subsequent survey was conducted of university administration representatives from campuses around Australia. That larger survey confirmed that Australian university campuses do not have any defined policies or decision making processes focused on campus transport issues.

A model campus TDM program is developed based on the review of the available literature and the information on university travel characteristics collected from the three detailed case studies. Although the program is simple, it provides a basis on which individual campuses can establish a TDM program and then develop it further to complement their specific conditions.

ITS-WP-98-20 *Delays at Freeway Roadworks: Safety and Road User Cost Considerations* (Rose & Paterson)

Abstract: Freeway incidents are events which result in a temporary reduction in the capacity of the facility. Intelligent transport systems developments are primarily concerned with 'random' freeway incidents such as breakdowns, crashes, spilled loads etc. In contrast, relatively less attention has been given to 'planned' incidents such as maintenance activities. As part of a study aimed at predicting the delays associated with freeway incidents, this paper deals with issues associated with delays at major roadworks.

A variety of data was collected as part of a case study of a major maintenance project on Melbourne's M1 motorway. Vehicle delays were measured using a timed number plate survey. During periods of heavy delay, a number of vehicles were observed to execute illegal turns to avoid the traffic delays at the roadworks. There is evidence of a relationship between the occurrence of this behaviour and the corresponding level of delay at the roadworks. Road user delay costs were also estimated as part of the study. The potential role of an analytic delay model in maintenance planning is explored.

ITS-WP-98-21 *Is Local Government Addressing the Implementation Issues in Road Safety Audit?* (Daly, Morgan & Jordan)

Abstract: This paper examines some of the issues facing local government in the implementation of the road safety audit process. RSA's have been accepted and implemented by state road authorities in Australia but there remains a question mark over their acceptance by local government. Local government implementation is essential if the benefits of RSA are to be maximised. Little research has been done into RSA in Victorian municipalities, and it is this area that this paper examines. Much of the literature currently available suggests that RSA's have great potential to provide benefits both in terms of safety and reduced whole-of-life costs. However, there is a perception amongst many that there is a lack of enthusiasm for RSA amongst local government in Australia. This paper examines the degree and effectiveness of RSA implementation by examining some of the issues of concern. It presents the results of a pilot study of RSA in local government authorities throughout Victoria and makes a number of recommendations to improve the implementation rate and effectiveness of road safety audit in local government.

ITS-WP-98-22 *Implementation of Road Safety Audit* (Daly, Francis & Morgan)

Abstract: Road Safety Audit is an important tool in the design and management of safe road networks. Australia and New Zealand pioneered the use of road safety audit in South East Asia and have been refining it since the early 1990's. Road safety audit is mandatory in State Road Authorities in Australia and on 20% of State Highway projects in New Zealand. Local government is strongly encouraged to adopt and implement road safety audit procedures in both countries, however it is not compulsory. The degree and effectiveness of road safety audit implementation at this level has not been formally researched until recently. This paper reports the results of a Transfund New Zealand survey of the uptake of safety audit by local authorities in NZ and the Monash University survey of the implementation of road safety audit in Victorian local government. The structural aspects of local government are outlined and the important issues faced by both regions highlighted. The survey methodology is outlined and similarities/differences in the two studies are discussed. The paper makes a number of recommendations that may

assist local government to improve effective implementation of road safety audit.

ITS-WP-98-23 *Applying Vehicle Tracking and Palmtop Technology to Urban Freight Surveys* (Taylor, Green & Richardson)

Abstract: Following the success of the Victorian Activity & Travel Survey (VATS) of household travel, the Transport Research Centre (TRC) initiated a Freight Activity & Commercial Travel Survey (FACTS) to provide a much needed database of freight-related information for the Melbourne metropolitan area. The objective is to provide detailed, accurate and current data on freight travel and commercial activities in metropolitan Melbourne. FACTS aims to be an ongoing survey collecting information on travel, loading and unloading activities, the vehicle and some basic information on the driver.

The survey design requires that information on vehicle location be collected using a Global Positioning System (GPS) receiver, with GPS differential correction to increase accuracy to within 5m. This (GPS) tracking data will be linked to a Geographic Information System (GIS) package to allow vehicles to be geographically viewed as they move around the road network, and to enable mapping of the vehicle location with the underlying road network database. The GPS receiver will be linked to a palmtop computer housed in a portable Data Capture Unit (DCU) located within the vehicle cabin. A touch-screen on this palmtop will be used to obtain information from the driver about the loading and unloading stops.

ITS-WP-98-24 *The Reality of Survey Results: An Urban Goods Movement Case Study* (Taylor & Ogden)

Abstract: Results from a commercial vehicle survey undertaken in Sydney, Australia show relative standard errors varying from 5% to 33%. When looking at similar survey data from around the world, very few explicitly state the accuracy of final results, which can be misleading to users. When errors are not quoted, many users assume the sampling error is so small it is not worthy of concern. However, in practical transport and traffic problems, there are very few situations where this is the case. In order to compare published results it is essential to know the sampling error so that conclusions can be drawn with confidence. This also enables scope for an evolving improvement in accuracy when variables with larger errors can be identified.

Accuracy depends a lot on the survey methodology, response rate and rigour of the subsequent statistical analysis. And it also depends on the sample size and variability of the subject. This paper briefly describes the greater Sydney (Australia) commercial vehicle survey, it discusses the statistical analyses and highlights some important issues to consider in future surveys.

ITS-WP-98-25 *An Overview of Intelligent Transport Systems Research at the Institute of Transport Studies at Monash University* (Rose)

Abstract: The Institute of Transport Studies was established in 1995 as a joint venture between Monash University and the University of Sydney. This paper provides an overview of current research at ITS (Monash) which is concerned with Intelligent Transport Systems. The main areas of research in that field relate to Advanced Traffic Management Systems (ATMS) and Advanced Traveller Information Systems (ATIS). A number of specific projects are reviewed including the prediction of incident induced delays on freeways, improving the delivery of roadside assistance services, travel time prediction

for freeways, traveller advisory telephone systems and financing models for ATIS systems.

ITS-WP-98-26 *"Quality of Life", Road Pricing and the "Level of Service" of Urban Roads* (Young & Daly)

Abstract: This paper addresses the definition of the "level of service" of urban roads in the context of developments in road pricing. It investigates the measurement of the "level of service", technological developments in road tolling, drivers acceptance of road pricing, and the impacts of road pricing on the "quality of life" of urban areas.

ITS-WP-98-27 *Privatisation and Management Education in the Transport Industry* (Taylor & Young)

Abstract: This paper reviews the development of a number of education programs for the transport industry. The need for these programs was created by the privatisation of government activities. The programs were developed in a distance education format to enable staff with a high workload to do the program during their "free" time.

Project reports

ITS International Bus and Coach Performance Benchmarking Program 1996/97: Summary of Results, Report for members of the ITS International Bus and Coach Performance Benchmarking Program 1996/97 (King and Hensher).

Electronic Data Interchange, Report for the International Council of the Chartered Institute of Transport, London (Hooper).

Cost of Compliance of Private Sector Buses with the Standards as Set out in the Regulatory Impact Statement on Draft Disability Standards for Accessible Transport: An Assessment, Report prepared for the Australian Bus & Coach Association (Hensher).

Public Transport Passenger Information Systems and Infrastructure, Report for The Passenger Transport Board, South Australia (Brewer).

The Planning of Sydney Airport for the Olympic Games 2000, prepared by ITS Visiting Researcher Nicolas Gauthier.

Scoping Study, Greenhouse Gas Emissions – Bus and Coach Sector, Report for the Greenhouse Challenge Unit, Canberra (Brewer, Hensher, King & Coulson)

M2 Hills Motorway User Study, Report for the Hills Motorway Ltd, Sydney, (Hensher & King).

Accepted for publication or Forthcoming

- Brewer, A.M. and Hensher, D.A. (1998) Distributed work and travel behaviour: The dynamics of interactive agency choices between employers and employees, *Transportation*.
- Brewer, A.M. and Hooper, P. (forthcoming) Strategic alliances among international airlines and their implications for organisation change, *Proceedings of 8th WCTR, Antwerp, July 1998*, Pergamon Press, Oxford.
- Daniels, R. and Hensher, D.A. (forthcoming) Valuation of environmental impacts of transportation projects: the challenge of self-interest proximity, Special issue of *Journal of Transport Economics and Policy, Small,K. (Editor)*.

- Dia, H. and Rose, G. (forthcoming) Development and evaluation of neural network freeway incident detection models using field data, Special issue of *Transportation Research Part C 'Applications of Neural Networks in Transport', Dougherty, M. (Guest Editor)*.
- Dia, H. and Rose, G. (forthcoming) A dynamic decision threshold neural network incident detection model, Special issue of the *Journal of Computer-Aided Civil and Infrastructure Engineering 'Advanced Computer Technologies in Transportation Engineering'*.
- Hensher, D.A. (1998) The balance between car and public transport use in urban areas: What can we do about it? (presented at the 1998 National Conference of the Australian Bus and Coach Association, Cairns, April), *Transport Policy*, 204-227.
- Hensher, D.A. (forthcoming) Understanding travel behaviour, (invited occasional address, The University of Oxford, Hertford College, July 1998), in Preston, J. (ed) Whither Transport Studies, Avebury Press, UK.
- Hensher, D.A., Louviere, J. and Swait, J. (forthcoming) Combining sources of preference data, *Journal of Econometrics*.
- Hensher, D.A. and Chow, G. (forthcoming) Interacting agents and discrete choices in logistics outsourcing: a conceptual framework, *Proceedings of 8th WCTR, Antwerp, July 1998*, Pergamon Press, Oxford.
- Hensher, D.A. and Louviere, J.J. (forthcoming) A comparison of elasticities derived from multinomial logit, nested logit and heteroscedastic extreme value SP-RP discrete choice models, *Proceedings of 8th WCTR, Antwerp, July 1998*, Pergamon Press, Oxford.
- Hensher, D.A. and Golob, T.F. (forthcoming) Searching for policy priorities in the formulation of a freight transport strategy: An analysis of freight industry attitudes towards policy initiatives, *Transportation Research E*.
- Hooper, P. (forthcoming) Airline Competition and Deregulation in Developed and Developing Country Contexts – Australia and India, *Journal of Transport Geography*.
- Hooper, P. and Findlay, C. (forthcoming) Developments in Australia's aviation policies and current concerns, *Journal of Air Transport Management.*
- Hooper, P. (forthcoming) Book Review of "Winning Airlines: Productivity and Cost Competitiveness of the World's Major Airlines" by Tae Hoon Oum and Chunyan Yu, *Transportation Research E.*
- King, J. and Hensher, D.A. (forthcoming) How are urban bus fleets performing in reducing greenhouse gas emissions? The Australian experience, *Road and Transport Research*.
- Louviere, J.J., Hensher, D.A. and Swait, J. (forthcoming) Conjoint methods in the broader context of preference elicitation methods, invited chapter for Hermann, A., Huber, F. and Gustafsson, A. (eds) *Conjoint Analysis, Prentice Hall*, Europe.
- Ogden, K., Russell, E.W., Taylor, S.Y. and Cox, J.B. (forthcoming) Refocusing Transport Reform *Business Council of Australia.*
- Taplin, J.H.E., Hensher, D.A. and Smith, B. (forthcoming) Imposing symmetry on a complete matrix of commuter travel elasticities, *Transportation Research B.*
- Taylor, S.Y. and Ogden, K. (forthcoming) How productive are commercial vehicles?, *Journal of Transport Logistics*.
- Ton, T. and Hensher, D.A. (forthcoming) A predictive assessment of neural networks and discrete choice methods, *Proceedings of 8th WCTR, Antwerp, July 1998*, Pergamon Press, Oxford.
- Waters. W.G. and Hensher, D.A. (forthcoming) Evolution and Revolution: the changing focus of regulation of the World's railways.

8. PARTICIPATION

Conferences chaired

- Chair, Conference session on The Success of Contracting, Australian Bus and Coach Conference, Cairns, 27 April (Hensher)
- Chair, Conference session on Airport Access and Terminal Operations, World Conference on Transport Research Society, Antwerp, Belgium, 12-17 July (Hooper)
- Chair, Conference session on Urban Goods Movement, World Conference on Transport Research Society, Antwerp, Belgium, 12-17 July (Taylor)
- Chair of 3 Conference sessions on Traveller Behaviour and Measurement, World Conference on Transport Research Society, Antwerp, Belgium, 12-17 July (Hensher).
- Vice-Chair of Topic Themes, for Scientific Committee meeting of the World Conference on Transport Research Society, Antwerp, Belgium, 12-17 July (Hensher).
- Chair, Conference session on International Experiences of Airline Deregulation, Air Transport Research Group Conference, Dublin, Ireland, 21 July (Hooper)
- Chair, Conference session on Infrastructure Evaluation, 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October, (Hensher)
- Chair, Conference session on Road Pricing, 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October, (Hooper)
- Chair, Conference session on Travel Demand, 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October, (Brewer)
- Chair, Conference session on Community Consultation, 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October, (Brewer)
- Chaired 20th Conference of Australian Institutes of Transport Research (CAITR), Sydney, 14-15 December (Brewer)
- Session Chair at the 20th Conference of Australian Institutes of Transport Research (CAITR), Sydney, 14-15 December (Brewer, Hensher, Taplin & Ton)

Unpublished conference and seminar presentations

- Invited paper, Transportation and Economic Development, The Third Asia-Pacific R&D Management Seminar, Japan International Science and Technology Exchange Center (JISTEC), Manila, Philippines, 16 - 18 February (Hooper)
- The Use of Object-Oriented Programming Approach in Representing Traffic Noise at the Network Level, Second Regional Symposium on Infrastructure Planning in Civil Engineering, Manila, Philippines, 20 - 21 February (Ton)
- Balancing cities infrastructure to maximise quality of life, presented at the First International Conference in Quality of Life in Cities, Issues and Perspectives, Singapore, 4-6 March (Young)
- Invited paper, The imbalance between car and public transport use in urban Australia: why does it exist?, Australian Bus and Coach Conference, Cairns, 26 - 29 April (Hensher)
- Invited paper, Green and socially responsible contracts: The way of the future, Australian Bus and Coach Conference, Cairns, 26 - 29 April (Hensher)
- Open skies, open clubs and open regionalism. Some new Issues for Asia Pacific Economic Cooperation, Measuring Impediments to Trade in Services Workshop, Productivity Commission, Canberra, 3 April to 1 May (Hooper; co-authoring with Andrew Elek, Christopher Findlay and Tony Warren)
- Interactive Agency Choice Experiments, Seminar Presentation at Department of Econometrics, The University of Sydney, 22 May (Hensher)
- Invited occassional address, Understanding travel behaviour: some appealing research directions, Hertford College, The University of Oxford, 1 July (sponsored by Royal Automobile Club and hosted by the Transport Studies Unit of The University of Oxford (Working Paper: TSU Ref 868) (Hensher)

- Strategic Alliances among International Airlines and their Implications for Organisational Change, 8th World Conference on Transport Research, Antwerp, Belgium, 12 -17 July (Brewer and Hooper)
- A Comparison of Elasticities Derived from Multinomial Logit, Nested Logit and Heteroscedastic Extreme Value SP-RP Discrete Choice Models, 8th World Conference on Transport Research, Antwerp, Belgium, 12 - 17 July (Hensher and Louviere)
- Interacting Agents and Discrete Choices in Logistics Outsourcing: A Conceptual Framework, 8th World Conference on Transport Research, Antwerp, Belgium, 12 -17 July (Hensher and Chow)
- Aviation Policy in the Asia Pacific Region Alliances, "Open Skies" Bilaterals and Regional Airline Markets, 8th World Conference on Transport Research, Antwerp, Belgium, 12 -17 July (Hooper and Duangphastra)
- A Predictive Assessment of Neural Networks and Discrete Choice Methods, 8th World Conference on Transport Research, Antwerp, Belgium, 12 -17 July (Ton and Hensher)
- The Reality of Survey Results: An urban goods movement case study, 8th World Conference on Transport Research, Antwerp, Belgium, 12 -17 July (Taylor and Ogden)
- The Asian Economic Crisis and its Implications for Aviation Policy in Asia Pacific, 2nd Air Transport Research Group Conference, Dublin, Ireland, 20 - 21 July (Hooper)
- Invited paper, Needs Assessment for major transport infrastructure investment, National Infrastructure Strategy Symposium and Summit: Developing Australia's National Resources, The Institution of Engineers, 20 - 21 August (Hensher)
- Transport and Infrastructure Opportunities in Vietnam: A Post Asia Crisis, Transport and Infrastructure Opportunities in Asia, Sydney Hilton, Sydney, 28 August (Ton)
- Invited address and keynote paper, Quality of Life, Road Pricing, and Level of Service, Proceedings of the International Conference on Transportation in the next Millennium, Singapore, 9-11 September (Young & Daly)
- Invited paper, Urban development in Australia, Guest Lecture, Michigan State University, USA, 23 September (Young)
- Panel member, Panel discussion on Pricing transport: economics and politics, 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October, (Hensher)
- The Challenge of Change in Managing a Business, Bus and Coach Association New Zealand Annual Conference, 30 September (Brewer)
- Benchmarking for community transport, Annual Conference of the Community Transport Association, The University of Western Sydney, Richmond, 19 October (Hensher)
- China's Maritime Education and Training towards the 21st Century, 'The Next Two Years – Developing martime training in our region', Department of Transport and Regional Services, Canberra, 11 December (Shao)
- Issues in building a network for Sydney, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Bendall)
- The effect of economic crisis on the attitude towards air services liberalisation in ASEAN, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Duangphastra)
- Development of decision support system for vehicle replacement program, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Funes)
- Implications on behavioural values of time savings of alternative assumptions on the specification of discrete choice models, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Hensher)
- How are bus fleets performing in reducing greenhouse gas emissions? The Australian experience, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (King and Hensher)
- Enhancing Melbourne's drive time system, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Paterson)
- The effects of service quality on the measurement of bus efficiency, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Prioni)

- Using GIS for school bus routing: a practical approach, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Ton)
- Modelling road safety trends and predicting road fatalities in Australia, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Wang)
- Towards a model supporting the optimal deployment of road service patrols, 20th Conference of Australian Institutes of Transport Research, The University of Sydney, Sydney, 14-15 December (Youngman)

Conference and seminar attendance

- Japan International Science and Technology Exchange Center (JISTEC), Manila, Philippines, 16 – 18 February (Hooper)
- Second Regional Symposium on Infrastructure Planning in Civil Engineering, Manila, Philippines, 20 – 21 February (Ton)
- First International Conference on Quality of Life in Cities, Issues and Perspectives, National University of Singapore/Conrad International Hotel, Singapore, 4-6 March (Young)
- Heavy Vehicle Weights and Dimensions Symposium, Twin Waters, Maroochydore, Queensland, March 29 – April 2 (Taylor)
- Australian Bus and Coach Association Conference, Cairns, 26 – 29 April (Brewer and Hensher)
- Seventh Annual Australasian Conference of Engineering Management Educators, Corpus Christi College Conference Centre, Monash University, Melbourne, 30 April – 1 May (Young)
- The Intelligent Transportation Society America (ITSA) 8th Annual Meeting, Detroit, 4 – 7 May (Bendall)
- AUSTROADS International Road Safety Audit Forum, Hilton on the Park, Melbourne, 11-12 May (Daly)
- Rail Access Corporation Workshops on Evaluation Methods in Rail Project Assessment, 22 May (Hensher) (attended as a reviewer of methods and RAC's approach)
- 8th World Conference on Transport Research, Antwerp, Belgium, 12 - 17 July (Hensher, Hooper and Ton)
- Air Transport Research Group Conference, Dublin University, Dublin, Ireland, 20 - 21 July (Hooper)
- Institute of Transportation Engineers Annual Meeting, Toronto, Canada, 9-12 August (Taylor)
- Transport and Infrastructure Opportunities in Asia, Sydney Hilton, Sydney, 28 August (Ton)
- 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October (Brewer, Hensher, Hooper, King, Prioni, Taylor and Ton)
- Road Safety Research, Policing and Education Conference, Novotel Wellington, New Zealand, 16-17 November (Daly)
- GLAXO Wellcome, Gender Relations in Business, 25-27 November (Brewer)
- Teleworking: Individuals and Human Resource Management Implications, Cumberland Health & Research Centre, The University of Sydney, 1 December (Brewer)
- 19th ARRB Transport Research Conference, Sydney, 7-11 December (Daly & Young)
- 20th CAITR, Sancta Sophia College, The University of Sydney, Sydney, 14-15 December (Bendall, Brewer, Duangphastra, Funes, Hensher, Paterson, Prioni, Taylor, Ton, Youngman and Wang)

Guest Lectures

???

Media

- David Hensher was mentioned in The University of Sydney News, Volume 30 No. 17, 20 August in relation to a conference on 'Needs Assessment for Major Transport Infrastructure Investment', which he presented a keynote address to.
- David Hensher was interviewed for The University of Sydney News, Volume 30 No. 17, 20 August, on the Key Centres successful DEETYA review.
- David Hensher was interviewed by Jana Price of the Canberra Times on 'Intercity commuting', 27 October.
- Bill Young & Samantha Taylor where featured in the Financial Review entitled 'On the Buses at Monash', 6 February, in relation to the Transport Management course in Bus and Coach Operations at Monash University.
- Bill Young was mentioned in the China News, in relation to an article on 'Road Pricing'.

Other

- David Hensher was involved in the ACT Government, Department of Urban Services' ACT Territory Plan Review on Integrated Land Use and Transport Planning, Canberra, 12 - 13 November.

9. INDUSTRY LINKAGES

Other activities by ITS which contribute to industry and community linkages include positions in conference organisations, international committees and editorial positions, as well as overseas visits and public lecture series.

Positions

ITS staff hold a number of positions in local and international research organisations in the transport industry.

Conference organisation

- Member, Organising Committee and Joint Convenor, 22nd Australasian Transport Research Forum, Sydney, 30 September - 2 October (Brewer)
- Chair, International Association of Traveller Behaviour Research (IATBR), Year 2000 Conference (Hensher)
- Vice-Chair, International Scientific Committee of the World Conference on Transport Research (1998) (Hensher)
- Member, International Technical Committee, Civil & Environmental Conference, New Frontiers and Challenges, Thailand (1998-1999) (Hensher, Young)
- Member, Coordinating Committee, Air Transport Special Interest Group, World Conference on Transport Research Society (1995 to present) (Hooper)
- Organising Secretary, International Association of Traveller Behaviour Research (IATBR), Year 2000 Conference, (King)
- Member, Scientific Committee of the 9th International Association for Travel Behaviour Conference (1998-2000) (Young, Daly)
- Member, International Technical Committee, International Conference on Transportation in the next Millennium, Singapore (1997-1998) (Young)
- Chairman, Organising Committee of the Australian Conference of Engineering Management Educators, Melbourne, (1997-1998) (Young).
- Member, Programming Committee ISATA, (1998) (Young)

International positions

- Member, US Transportation Research Board Committee on Telecommunications and Travel Behaviour (Brewer)
- Member, World Conference on Transport Research Society (Hensher, Hooper, and Taylor)
- Founding member, US Transportation Research Board Committee on Traveller Behaviour and Values (Hensher)
- Member, US Transportation Research Board Committee on Travel Forecasting (Hensher)
- Immediate Past President, International Association for Travel Behaviour Research (Hensher)
- International Vice-Chairman, World Conference on Transport Research Scientific Committee (Hensher)
- Member, US Transportation Research Forum (Hensher, Hooper)
- Representative for Australia on the International Coordinating Group for the Asia Pacific Conference on Transport, Pacific Economic Cooperation Council (PECC) (Hooper)
- Member, PECC Delegation to the 2nd APEC Transportation Ministerial Meeting, (Victoria, B.C., Canada, 22-24 June, 1997) (Hooper)
- Member, National Research Council Transportation Research Board Urban Goods Movement Committee (Taylor)

- Member, US Transportation Research Board Committee on Citizen Participation in Transportation Planning (Underwood)
- Member, Air Transport Research Group (Hensher, Hooper)
- Member, International Advisory Committee, Portland Metropolitan Area Commodity Flow Study (Taylor)
- Fellow, Chartered Institute of Transport, United Kingdom (Young)
- Fellow, Institute of Transportation Engineers, U.S.A. (Young)

Australian positions

- Member, The University of Sydney Steering Group for Academic Entrepreneuring (Brewer)
- Member, The University of Sydney Budgetary Advisory Committee (BAC) (Brewer)
- Member, Logistics Management Association (Brewer)
- Member, Institute of Transportation Engineers (ITE) Australia and New Zealand Section (Daly and Taylor)
- Convenor, Monash Student Chapter, Institute of Transportation Engineers (ITE) (Daly)
- Member, Chartered Institute of Transport (Bendall, Brewer, King and Young)
- Member, Peer Review Committee for Strategic Transport Plan for NSW (Hensher)
- Member, Department of Urban Services, ACT Territory Plan Review for Strategic Transport Plan for Integrated Land Use and Transport Planning (Hensher)
- Member, Transport Data Centre, Technical Advisory Committee, NSW Department of Transport (Hensher)
- Member, Transport Research Centre (RMIT University) Advisory Committee (Hensher)
- Member, The University of Sydney Department of Marketing Advisory Committee (Hensher)
- Member, The University of Sydney Faculty of Economics, Faculty Management Advisory Committee (Hensher)
- Member, The University of Sydney Faculty of Economics, Board of Postgraduate Studies (Hensher)
- Member, The University of Sydney Faculty of Economics, Research Committee (Hensher)
- Member, Australian Capital Territory Transport Reform Advisory Group (Hensher)
- Member, The University of Sydney Committee to Review and Select Key Centre Applicants for Federal Assessment, February-March (Hensher)
- Member, Advisory Committee of the Australian Retailing Committee (Hensher)
- Research Associate, Centre for Applied Economic Research and Analysis, James Cook University of North Queensland (Hooper)
- Member, Board of the NSW Section of the Chartered Institute of Transport, (Hooper)
- Member, Travel and Tourism Research Association (Hooper)
- Member, The University of Sydney Academic Forum (Hooper)
- Secretary, Council of Australian University Tourism and Hospitality Education (Hooper)
- Member, International Networking Group, Air Transport Special Interest Group, World Conference on Transport Research (Hooper)
- Member, Transport Branch Committee of Institution of Engineers Australia (Victorian Division) (Rose, Taylor)
- Chair, Institution of Engineers Australia National Committee on Transport (Rose)
- Member, Transport and Mobility Reference Group established by the City of Hobsons Bay in Melbourne. The reference group has been established to guide the development of the Transport and Mobility layer of the Hobsons Bay Strategy (Rose)
- Secretary, World Conference on Transport Research Society, Special Interest Group on Urban Goods Movement (Taylor)
- Chair, Institute of Engineers, Transport Branch, Victoria Division (Taylor)
- Member, Victorian Board Institution of Engineers, Australia (Taylor)
- Member, Faculty of Engineering Board (Taylor and Young)
- Member, Faculty of Engineering Board, Steering Committee (Young)
- President, Australian Committee, Institute of Transportation Engineers (Young)

- Member, Advisory Committee, Transport Research Centre, Royal Melbourne Institute of Technology (Young)
- Member, Parking Association of Australia (Young)
- Member, Monash University Department of Civil Engineering Management Committee (Young)
- Chair, Monash University Advisory Committee on People with Disabilities (Young)
- Member, Monash University Discipline Committee (Young)
- Member, Monash University Education Committee (Young)
- Chair, Monash University Faculty of Engineering, Academic Progress Exclusion Committee (Young)
- Fellows of the Chartered Institute of Transport (Hensher, Hooper, Young)

Editorial positions

David is Associate Editor of *Asia Pacific Journal of Transport*, Area Editor of *Transport Reviews*; and is on the editorial boards of *Transport Policy*; *Transportation*; *Transportation Research*; *International Journal of Transport Economics*; *Logistics and Transportation Review, Transportation Research Part E* (from 1997); *Journal of Transport Economics and Policy; Transportation Planning and Technology*; *Journal of Retail and Consumer Services, and Journal of Transport and Statistics.* David has been appointed Series Editor for Elsevier/Pergamon Handbooks in Transportation.

Paul Hooper is an Associate Editor of *Logistics and Transportation Research E*

Bill Young is an Associate Editor of *Transportation*.

Geoff Rose is Editor-in-charge of *Transport Engineering in Australia*.

Andrew Kerr is Regional Editor of *International Journal of Physical Distribution and Logistics Management.*

Reviews of papers

Staff reviewed papers for a wide range of transport journals and conferences.

Ann Brewer refereed papers for *Transportation Research F, Transportation Research A & B, Australian Economic Review and Journal of Transportation.*

Peter Daly refereed papers for *??*.

David Hensher refereed papers for *Transportation Research, Journal of Transport Economics and Policy, Transport Reviews, Journal of Transportation and Statistics, the 22nd Australasian Transport Research Forum* and special issues of transport journals for the *International Association for Travel Behaviour Research.*

Paul Hooper refereed papers for *8th World Conference on Transport Research, Transportation, the 22nd Australasian Transport Research Forum* and *Transportation Research E*.

Geoff Rose referred papers submitted to the *8th World Conference on Transport Research and the 22nd Australasian Transport Research Forum* .

Tu Ton refereed papers for *8th World Conference on Transport Research, Transportation Research, the 22nd Australasian Transport Research Forum and Transport Reviews*.

Samantha Taylor refereed papers for ??.

Seminar Series and Policy Workshops

ITS PhD Seminar Series (ITS Sydney)

A weekly PhD Seminar Series from 24 March to 16 June were organised by ITS Sydney. The series featured the following presentations:

- Intercity Travel Demand Modelling: Cases of Endogenous Segmentation & Air Passenger Departure Time & Ticket Type Choice, 24 March, Muriel Beser
- Methods for Studying Car Users Valuation of Road Quality: Illustration and Internet Surveys, 31 March, Camilla Ollson
- Inconsistent Choices' Impact on the Valuation of Travel Time in Stated Choice Studies, 14 April, Kjarten Saelensminde
- Modelling Freight Transport Mode Choice, 21 April, Seu Cheng
- The Effect of Trade Liberalisation in ASEAN on Airline Networks, 5 May, Chackrit Duangphastra
- The Development of Risk Taking Modelling Framework for Road Safety, 19 May, Baojin Wang and Tu Ton
- The Impact of the Economic Problems in Asia on the Region's Airlines and on Aviation Policy, 2 June, Paul Hooper
- Road Rage, 16 June, Ann Brewer

Transport Policy Series (ITS Monash)

A weekly Public Seminar Series from xx to xx was organised by ITS Monash. The series featured the following speakers:

Maintaining industry and international contacts

Overseas & Interstate Visits

Tu Ton visited Manila, Philippines in February. Through his technical expertise and successful presentation of his paper entitled "The Use of Object-Oriented Programming Approach in Representing Traffic Noise at the Network Level" at the Second Regional Symposium on Infrastructure Planning in Civil Engineering, he was asked to comment on a significant project conducted by the National Center for Transportation Studies, University of the Philippines. This project funded by Japan Society for the Promotion of Science (JSPS) aims at studying the environmental impact of transport infrastructure development in Manila. The project has been steered by Dr Tohru Tamura (Chief Advisor/Visiting Professor from Japan) and Dr Ricardo Sigua (Director of the National Center for Transportation Studies). Possible future collaborative research was also discussed during his stay in Manila.

Paul Hooper visited Manila, Philippines in February. He was invited to present a paper for the 'The Third Asia-Pacific R&D Management Seminar', at the Japan International Science and Technology Exchange Center (JISTEC).

Paul Hooper visited Albany Campus, Massey University, New Zealand in April to deliver the course "The Transport Chain" in Diploma in Transport Planning; a program offered by Massey University's Department of Resource and Environmental Planning in cooperation with the Institute of Transport Studies.

David Hensher attended a think tank meeting on transport planning and the role of technology at Warren Centre, the University of Sydney on 17 April.

David Hensher visited the UK, Belgium and France to participate and present papers in the 8th World Conference of Transport Research, the International Choice Symposium and to give an address at the University of Oxford.

Paul Hooper visited Ireland in July where he attended the Air Transport Research Group Conference which was held at Dublin University, Dublin.

Samantha Taylor visited Europe and North America and had discussions with the following organisations:

- Dutch Ministry of Transport regarding the direction of transportation needs in The Netherlands and Europe
- TNO on telematics and policy research in The Netherlands
- Delft University of Technology regarding student 'secondments'
- City of Paris on catering for peoples travel needs in an age where environmental degradation matters
- Port of Paris on the regulation of goods movement and distribution in the Paris region
- Transport Research Laboratory, UK regarding research funding, ITS, and bus related research
- University of Leeds, meeting with the Dr Margaret Bell and a tour of the instrumented city facility
- Department of Environment Transport and the Regions (DETR) on goods movement data collection techniques
- University of Westminster regarding freight research and joint projects with ITS Monash
- FHWA on ITS and CVO strategies and implementation in the USA

David Hensher visited Albany Campus, Massey University, New Zealand in September to deliver the course "Transport Strategy and Management" in Diploma in Transport Planning; a program offered by Massey University's Department of Resource and Environmental Planning in cooperation with the Institute of Transport Studies.

In Semester 2, *Bill Young* was on Outside Studies Program. He visited Nanyang University, Singapore and Michigan State University, U.S.A., from September to October, as a Visiting Professor. He presented papers on 'Land Use, Transport and Road Pricing' and 'Urban Development in Australia' during his visit.

Ann Brewer travelled to Perth in April & October to deliver the Western Australia Certificate of Transport Management and visited Glaxo Wellcome, Victoria in November.

Kirb Bendall & Baojin Wang were invited to witness an offset frontal barrier crash test in November, at the RTA Crash Lab at Rosebery. Baojin is currently researching road safety as part of his PhD.

David Hensher & Tu Ton visited Blue Ribbon Coaches at Maitland, in December, to discuss the possible development of a major truck hub in the Maitland/Newcastle area.

Visitors

The PECC Committee headed by *Johnson Amoako* visited ITS Sydney on 30 January to discuss transport education needs in the Pacific Rim.

Professor Axel Boersch-Supan, from Department of Economics at Manheim University (Germany*)* visited ITS Sydney for three weeks from 23 January to 11 February. He worked on the Interactive Choice Experiments with Ann Brewer and David Hensher that measure the

willingness to telecommute on both employee's and employer's side. Specifically, he adapted a multiperiod-multinomial probit estimation routine to the situation where employer and employee needed several passes to reach an agreement, and did several experiments with various telecommuting options. This program (SML5.1) can also be used for general panel probit applications. He also gave a seminar on recent developments in multi-period multinomial probit estimation and application on 28 January.

Dr Silvio Dotorino, Scientific Attache, Italina Embassy, visited ITS Sydney on 18 February to discuss a transport conference run by ITS Sydney for Italian Researchers to visit Sydney.

Professor Joel Horowitz, from Department of Economics at University of Iowa, visited ITS Sydney on 25 February. During his visit Professor Horowitz discussed research in areas of non-parametric choice modelling with David Hensher.

Dr Pieter Nagel, a Logistics specialist from South Africa visited ITS Sydney in February.

Hugh Rollston and *Angus Robertson*, Warren Centre at the University of Sydney visited ITS Sydney on 25 February to discuss the development of a research program into the role of transport technology in reducing traffic congestion. This has been followed up on 17 April with a forum meeting.

Dr Glen D'Este, from the University of South Australia and PPK Rust, visited ITS Sydney on 27 February to discuss developments in teaching of maritime and logistics.

Camilla Olsson and *Muriel Beser*, both Researchers and PhD students from the Department of Traffic and Transport Planning at the Royal Institute of Technoloby, Sweden, visited ITS Sydney from 2 March to 28 May. During their stay, they worked together on two forthcoming ITS Working Papers entitled "Different estimations technique for estimating travel demand models" and "Valuation of road maintenance using the stated choice method"; the first paper was written under the supervision of David Hensher and the latter was written under the joint supervision of David Hensher and Jordan Louviere. Their other activities during their three month stay included the following:

- Attended and presented their own PhD studies at the ITS PhD seminar series. Muriel presented her studies on intercity travel demand modelling while Camilla presented her work on methods for studying car users valuation of road quality.
- Attended and participated at the PhD seminars at the Department of Marketing, The University of Sydney by reading and reporting on different marketing papers; where topics such as bundling, variety seeking and choice dynamics and consumer search behaviour were discussed.
- Attended a one day workshop at the Department of Econometrics, The University of Sydney on experimental design and experimental data and alternative perspectives.
- Attended several lectures held at ITS and the Department of Marketing.
- Gave a lecture about the Stockholm model system to students taking the course on "Transport Planning Methods" at ITS.

Jeroen Verdam, visited ITS Sydney from the Netherlands to work as a Visiting Research Assistant from March to September. During his stay at ITS, Jeroen worked with Tu Ton, Carlos Funes and Kirk Bendall on the Transport and Environment Strategy Impact Simulator (TRESIS). .

Britt-Marie Thulestedt, *Stefan Hedin* and *Anne Baxter*, members of the Swedish governmental Committee on the regulation of telework visited ITS on 14 April to discuss the development of telework and the legal aspects of telework.

Dr Gun Young Lee, President of The Korea Transport Institute visited ITS Sydney to discuss areas of mutual research interest on 24 April. KOTI is Korea's largest government owned research agency in transportation.

The Chartered Institute of Transport Education Committee (NSW) comprising *Richard Goodman (Chair), Brendan O'Keefe* and *Julie Dryden*, visited ITS Sydney on 14 May to discuss ITS's role in supporting the Chartered Institute of Transport's education program.

The Chartered Institute of Transport Young Professionals Working Party (NSW) comprising *Julie Dryden, Brendan O'Keefe* and *Kirk Bendall* met at ITS Sydney on 16 July. The Working Party has been given the task of developing activities for younger CIT members and improving recruitment. Its current tasks include developing a "Young Transport Professional" prize and activities.

Paola Prioni, commenced her visit to ITS Sydney from the Switzerland under a Post-Doctoral scholarship working in the area of public transport costs and service quality.

Nicolas Gauthier, from Ecole Nationale des Travaux Publixs de l'Etat (ENTP), Lyon, France visited ITS Sydney as a Visiting Research Student for three months from 1st June to 28th August to undertake a research on the planning of Sydney Airport for the Olympic Games 2000.

Maarten Botterman from the DG XIII (Telecommunications, Information Market and Exploitation of Research) by the Netherlands Ministry of Transport, Public Works and Water Management at the European Commission and *Paul Jackson* from Brunel University in the United Kingdom, visited ITS Sydney in July to participate in a Teleworking and Transport workshop held at the Institute. During their visit they collaborated with ITS academics on a joint teleworking research project, to be undertaken in Australia & internationally. Maarten introduced telework within multiple departments of the Dutch Ministry of Transport, following a position as head of the Information and EDP Department of the North Sea Directorate of that same Ministry. Paul has a background in management studies and information systems analysis and design. In the 1996, he was granted a one year European Union fellowship to spend the academic year at the Work and Organisation Research Centre at Tilbury University, The Netherlands.

Trevor Heaver, UPS Foundation Professor of Transportation & Director of the Centre for Transportation Studies from the University of British Columbia visited ITS Sydney from September to November, as Visiting Professor in Maritime. During his visit Professor Heaver was lecturer for maritime markets & maritime logistics in our graduate & certificate program courses. Professor Heaver has authored several books and numerous articles on transportation and logistics with an emphasis on maritime economics. He is President of the International Association of Maritime Economists and a past Chairman of the World Conference on Transport Research.

Professor Ruiqing Shao, a professor in maritime economics, and head of the Department of Finance and Accounting at Shanghai Maritime University is visiting ITS Sydney for a year from September. During his visit Professor Shao will be undertaking a research which focuses on the investing and financing environment in international shipping. Professor Shao is also vice chairman of the Accounting Association of Communications of China. He has given lectures and has been involved in research work in maritime finance and accounting for sixteen years. He has published eight books and more than sixty papers in Chinese in the maritime financing and accounting areas.

K. Raguranam, a senior lecturer at the Department of Geography and principal researcher at the Centre for Transportation Research, National University of Singapore is visiting ITS Sydney for six months from October. During his visit Ragu will be undertaking two main research projects. One will be on the corporate history of Singapore Airline, looking at how it has transformed itself from a small fledging airline to one of the world's most profitable carrier with a special interest in understanding how it balances social and economic objectives in an highly volatile and tightly regulated business environment. The other project is on sustainable urban transport

system which will involve trying to understand the multiple dimensions of this concept and undertaking a comparative analysis of policies and measures in various cities directed at achieving sustainability. Ragu will also be working on some papers in the areas of logistics management, air transport policy and tourism management and will be involved in the Transport Policy Workshop in Semester 2 during his visit at ITS.

Matthias von Schieszl, from the Technical University, Dresden (TU Dresden), Germany visited ITS Sydney on an internship for three months from 2 November. He worked with Tu Ton, Kirk Bendall, Carlos Funes and Cam Ngo on the Transport and Environment Strategy Impact Simulator.

Other Activities

ITS Academic Retreat

ITS Sydney and ITS Monash held a combined one day Retreat for academic staff at Monash University on 17 February 1998. The purpose of the retreat was to focus on future issues arising from managing change in ITS. Activities at the retreat centred on building an agenda for the next three years to promote joint activities amongst Sydney and Monash staff. Staff also provided input through an in-house survey undertaken prior to the retreat. The outcome was that a number of teaching and research projects were identified and targetted for future collaboration. The day was well spent with staff gaining a better understanding of the values and commitments of each node.

ITS Alumni Association

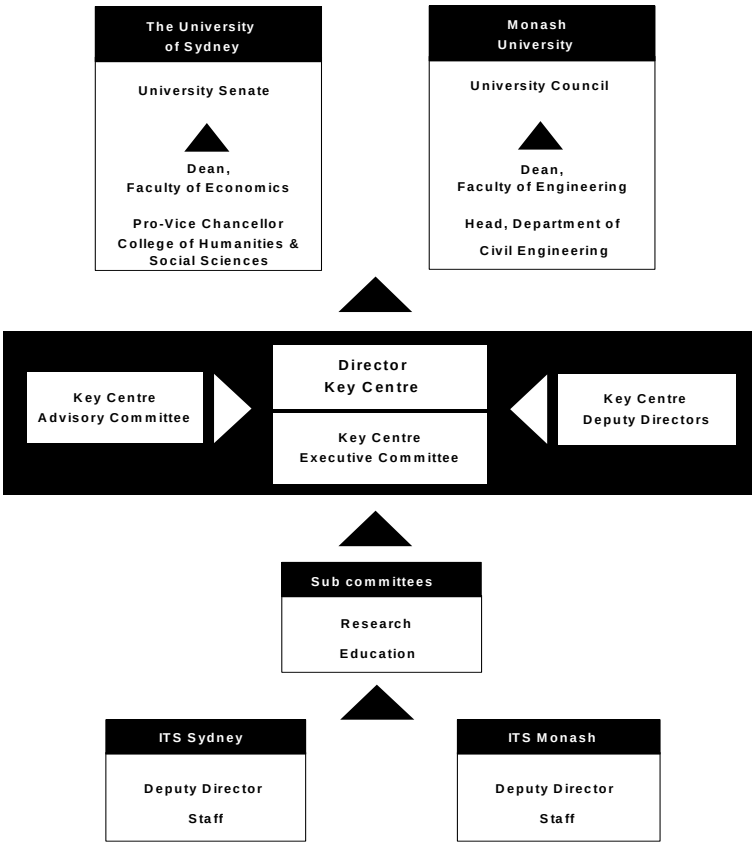
The ITS Alumni Association was formed in 1998 with the intent of creating a forum where past and present students could meet, discuss and remain updated on many issues that relate directly to transport. An Alumni cocktail party was held in August to formerly launch the formation of the ITS Alumni Association. The president of the Association is Matt Hunter and the secretary is Michelle Coulson.

10. MANAGEMENT STRUCTURE

The management structure of the Key Centre is shown in the diagram below.

The role of the Advisory Committee is to provide advice on any matters referred to it by the Key Centre Executive, as well as to initiate matters for consideration that are of interest to the Key Centre, such as the teaching and research program and opportunities for participation of industry and government. The Advisory Committee met in February in Monash to develop recommendations for changing the structure of the Advisory Committee. The recommendations made are:

- That ITS establish a new Advisory Committee in which a maximum of 20 members be invited, selected to be representative of the modal areas and their geographical location. This committee would provide advice on the general directions of ITS and the development of policy.
- That the Advisory Committee meet once per annum, rotating between Sydney and Monash.
- That ITS Sydney and ITS Monash separately establish a small Advisory Committee to handle node-specific matters, comprising the Head of each node and up to 5 members from the Joint Advisory Committee. This committee would provide advice on the functional activities of each node.



Advisory committee members (to July 1998)

Chair: Professor John Taplin
Department of Information Management, University of Western Australia

Mr Neil Aplin
Secretary, Tasmanian Department of Transport

Dr Kay Axhausen
Institut fur Strabenau and Verkehrsplanung, Leopold-Franzens-Universitat

Dr Peter Barnard
General Manager, Policy, Planning & Public Affairs, Australian Meat & Livestock Corporation

Professor Michael Beesley
Professor of Economics, London Business School

Mr David Berry
Deputy Secretary, Strategic Planning and Economic Services

Mr Jim Bosnjak
President, Bus and Coach Association (NSW) / Westbus

Professor Michael Brisk
Dean, Faculty of Engineering, University of Monash

Mr Piers Brogan
Business Sector Manager, Transport, RUST PPK Pty Ltd

Dr Hugh Brown
Manager, N.D. Lea International Ltd

Mr Bob Cain
Manager, Tourism Futures

Mr Murray Cullinan
Assistant Secretary, Planning, Department of Infrastructure (VIC)

Mr Doug Dean
Managing Director, Collex Waste Management Pty Ltd

Mr Terry Dene
Director - Commercial, NSW Road Transport Association

Mr David Ashley
Sinclair Knight Merz

Mr Paul Forward
Director, Road Network Information, Roads and Traffic Authority

Mr Barry Garnham
Consultant

Professor Philip Goodwin
Professor of Transport Policy, ESRC Transport Studies, University College London

Mr Roger Graham
Director, Roger Graham & Associates Pty Ltd

Professor Paul Grundy

Head, Department of Civil Engineering, Monash University

Professor Yoshi Hayashi
Department of Geotechnical and Environmental Engineering, Nagoya University

Professor Soon-Kil Hong
Director, Institute for Aviation Industry & Policy Studies, Hankuk Aviation University

Mr Stephen Hunter
Director, Bureau of Transport and Communications Economics

Dr Ian Johnstone
Executive Director, ARRB Transport Research Ltd

Professor Adib Kanafani
Director, Institute of Transportation Studies, University of California Berkeley

Mr David Kilsby
Associate, Sinclair Knight Merz

Mr Doug Kneebone
Recently retired Chairman, PPK Pty Ltd

Professor Jordan Louviere
Professor of Marketing, Department of Marketing, The University of Sydney

Mr Kevin Norris
Executive Director, Bus Association Victoria

Professor Ken Ogden
Group Manager, Public Policy, RACV

Professor Juan de Dios Ortuzar
Professor of Transport Engineering, Pontificia Universidad Catolica de Chile

Professor Tae Oum
Faculty of Commerce, University of British Columbia

Dr John Paterson
Secretary, Department of Infrastructure (VIC)

Professor Wilfred Recker
Director, Institute of Transportation Studies, University of California, Irvine

Mr John Sanderson
Assistant General Manager, Public Policy, RACV

Mr Karmjit Singh
Chairman, The Chartered Institute of Transport (Singapore)

Mr David Singleton
Managing Director, Ove Arup & Partners

Mr Neil Smith
Consultant

Mr Robert Smith
Consultant

Professor Daniel Sperling
Director, Institute of Transport Studies, University of California Davis

Ms Judi Stack

Chief Executive Officer, Rail Access Corporation

Mr John Stanley
Deputy Commissioner, National Road Transport Commission

Mr Jim Stevenson
Consultant

Dr Alastair Stone
Managing Director, Pacific Infrastructure Corporation

Professor John Taplin
Department of Information Management and Marketing, University of Western Australia

Professor Mike Taylor
Director, Transport Systems Centre, University of South Australia

Mr Don Telford
Director of Operations, Toll Logistics

Professor Marty Wachs
Professor of Urban and Regional Planning and Civil and Environmental Engineering, University of California, Los Angeles

Mr John Walker
Chief Executive, Chief Ministers Office, ACT

From ITS Sydney

Professor David Hensher
Associate Professor Paul Hooper
Associate Professor Ann Brewer
Dr Tu Ton

From ITS Monash

Professor Bill Young
Dr Geoff Rose
Ms Samantha Taylor
Mr Peter Daly

ITS Systemwide Advisory Committee members (from August)

Mr David Berry
Deputy Secretary, Strategic Planning and Economic Services

Mr Jim Bosnjak
President, Bus and Coach Association (NSW) / Westbus

Mr Bob Cain
Manager, Tourism Futures

Mr Doug Dean
Managing Director, Collex Waste Management Pty Ltd

Mr Paul Forward
Director, Road Network Information, Roads and Traffic Authority

Mr Greg Harper

Director, Bureau of Transport Communications & Economics

Dr Ian Johnston
Executive Director, ARRB Transport Research Ltd

Professor Jordan Louviere
Professor of Marketing, Department of Marketing, The University of Sydney

Mr Kevin Norris
Executive Director, Bus Association Victoria

Professor Ken Ogden
Group Manager, Public Policy, RACV

Ms Judi Stack
Chief Executive Officer, Rail Access Corporation

Mr Jim Stevenson
Chief Executive, National Road Transport Committee

Dr Alastair Stone
Managing Director, Pacific Infrastructure Corporation

Professor John Taplin
Department of Information Management and Marketing, University of Western Australia

Mr Don Telford
Director of Operations, Toll Logistics

Mr Jock Murray
Director General, NSW Department of Transport

Mr Llew Russell
Chief Executive Officer, Liner Shipping Services Pty Ltd

Mr Geoff Kloot
General Manager – Traffic & Road Use Management, VicRoads

Mr Joe Perone
Strategic Transport Planner, City of Melbourne

Mr John Reid
Director, Australasian Traffic Surveys

Mr Ray Kinnear
Director – Public Transport Planning, Department of Infrastructure

ITS (SYDNEY) ADVISORY COMMITTEE

Mr Doug Dean
Managing Director, Collex Waste Management Pty Ltd

Mr Jock Murray
Director General, NSW Department of Transport

Mr John King
Advisor on Policy & Strategy, Aviation & Tourism Management P/L

Dr Ian Lin

The Quo Vadis Consulting Group Pty Ltd

Professor Michael Beesley
Professor of Economics, London Business School

ITS MONASH ADVISORY COMMITTEE

waiting for info from Monash.

11. FINANCIAL STATEMENTS

DEETYA, which provides funds for the Key Centres Program, requires a financial statement of income and expenditure using specified categories, as set out below.

Income

	1998		1999	
	Sydney	Monash	Sydney	Monash
ARC Centre grants	$	$	$	$
Other ARC programs	$		$	
Other C'wealth Govt grants	$		$	
State Govt grants				
Local Govt grants				
Industry/Private funds				
Contracts/Consulting	$	$	$	$
Education Programs	$		$	$
Host institution support	$	$	$	$
Other income sources/interest	$	$	$	$
Carried forward from previous	$	$	$	$
Total income	**$**	**$**	**$**	**$**

Expenditure

	1998		1999	
	Sydney	Monash	Sydney	Monash
Salaries	$	$	$	$
Equipment	$	$	$	$
Accommodation	$	$	$	$
Travel	$	$	$	$
Consumables	$	$	$	$
Other expenditure	$	$	$	$
Total expenditure	**$**	**$**	**$**	**$**
Carried forward	$	$	$	$

12. 1998 IN REVIEW

ITS

INSTITUTE OF TRANSPORT STUDIES

The Australian Key Centre in Transport Management

The University of Sydney and Monash University