



 THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

CENTRE FOR TRANSPORT STRATEGY 2003 ANNUAL REPORT



QUEENSLAND
TRANSPORT
MAIN ROADS
QUEENSLAND RAIL
UNIVERSITY OF
QUEENSLAND



Message from the Director

The transport Portfolio University Group has facilitated increased collaboration between the University of Queensland and the Queensland University of Technology and the transport agencies under the aligned Memoranda of Understanding, in research, education and professional services during 2003. This process has been aided by the development of the *Strategy for Research and Professional Development* with a three year outlook. This report marks the half way point of the current Memorandum.

The 2003 work program included a number of joint research and education projects, which were successfully progressed during the year. An example was the joint UQ-QUT short course on *Multi-modal Transport Evaluation* conducted in early September 2003. Students attended from across Australia and New Zealand, with nine undertaking the course as a graduate subject.

Research activity has progressed under the four strategic themes of transport system performance, freight and logistics, mobility management and transport operations. Potential extension of proposed research is being explored with links to national programs, such as Austroads and to complement transport agency programs, such as with Queensland Transports' travel demand management program.

Supporting the Centre has paid dividends for the transport agencies, in the form of ongoing research outputs, provision of professional advice on a range of transport strategy and institutional development projects and opportunities for professional capability development for staff, as well as ensuring a supply of graduates who have been educated in transportation engineering. The transport industry generally, including local government, non-government and private sector organisations have also benefited from provision of capability development and information transfer through courses, publications and events.

The Centre has been active in the transport industry, through ongoing involvement in professional associations, such as the Engineers Australia and membership on advisory committees and inter-agency organisations.

Information transfer has been an important ongoing activity, through newsletters, reports, papers, presentations, conferences and seminars. The Transport Futures project, including the availability of the newsletter online, has continued to generate interest from a range of transport professionals.

Collaboration between areas within the University have been further developed during 2003, such as the transit oriented design project in Architecture and present opportunities for increased collaboration in the future.

Prof Phil Charles
Director
Centre for Transport Strategy

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Centre for Transport Strategy

The University of Queensland

The Centre was established at the University of Queensland in 1998 as a partnership between three state transport agencies (Queensland Transport, Main Roads and Queensland Rail) and three University Schools (Engineering; Economics; and Geography, Planning and Architecture) to undertake research and provide professional development and consulting services.

An initial three year Memorandum of Understanding (MoU) (1998-2001) was extended for one year, and in 2002 a further three year MoU was signed by all parties.

The University provides undergraduate and postgraduate transportation engineering programs, undertakes leading research in transport strategy and advanced transportation technology and provides professional services and advice to industry.

The Centre's focus areas include transport policy and institutional development, integrated transport planning, intelligent transportation systems, transport management and operations, public transport, transport economics, logistics and freight transport, travel demand management, sustainability of transport and stakeholder and community interaction.

Objectives

The aim is to be a centre of excellence in transport strategy and contribute to more integrated and sustainable transport by:

- undertaking, evaluating and promoting innovative, cross-disciplinary research and development in transport strategy and planning
- developing and advancing opportunities for joint ventures in research and development, training and the provision of professional services in transport strategy and planning
- raising the profile of transport strategic planning among researchers, government and industry
- developing appropriately skilled professionals for the transport sector.

Activity Areas

The key activities of the Centre are to undertake **research**, provide **professional development**, collate transport related data, provide **professional services** and advice and develop methodologies and policies in transport strategy.

a. policy studies

- Identification of emerging transport policy issues
- Integrated assessments of transport policy alternatives - economic, social and environmental
- Strategic infrastructure planning - public and private sector funded
- Information dissemination techniques on the use of transport to promote social change, while maintaining community support
- Investigation of the relationships between transport and economic and regional development
- Scenario analysis and risk identification
- Multi-disciplinary planning in a socio-political environment with a focus on the nexus between transport infrastructure provision, funding and employment

b. data and information

- Collection and dissemination of information
- Transport strategy databases, technology and techniques
- Performance evaluation techniques for transportation - total system management, transport management and logistics management
- Spatial analysis techniques and technology

c. transport strategy methodologies

- Modelling of traffic and network simulation
- Cost-benefit and multi-criteria analysis
- Survey technology and methods
- Transfer of better practices and emerging technologies in transportation strategic planning.

Centre Partners

Queensland Transport

Queensland Transport aims to make it safer, easier, environmentally-friendlier, and more cost effective to move people and goods across town, state and overseas. The department works closely with the community, industry and government agencies, to ensure a coordinated, consultative and integrated approach to addressing and resolving transport challenges. < www.transport.qld.gov.au >

Queensland Main Roads

As owner and manager of the State's road network, Main Roads strategically plans and develops road infrastructure. Through identifying community needs, and setting departmental priorities and program objectives, we effectively manage a road network that contributes to the State's development and progress. < www.mainroads.qld.gov.au >

Queensland Rail

Queensland Rail (QR) is a \$2 billion a year business and one of Australia's largest and most innovative transport operators. On any weekday, the QR network operates 900 train services, transports more than 400,000 tonnes of freight and safely carries around 160,000 people. < www.qr.com.au >

The University of Queensland – Engineering

Expanding research activities in the field of Transportation Engineering. The Centre for Transport Strategy was established to undertake research and provide professional development and consulting services. Research projects undertaken by the Department cover Advanced Transport Technologies, Intelligent Transportation Systems and Travel Demand Management. < www.eng.uq.edu.au >

– Economics

Specialising in microeconomic policy, public enterprise economics, transport economics. Research interests: Australian transport policy; government regulation of industry; cost-recovery in the transport sector; economic effects of cross-subsidisation policies of public authorities. < www.uq.edu.au/economics/ >

– Geography, Planning & Architecture

Combines the disciplines of geography and geographic information science with urban and regional planning and development and offers study leading to career opportunities in the fields of geographic information science, urban and regional analysis, planning and development and environmental processes and management. < www.gpa.uq.edu.au >

Memorandum of Understanding

The current Memorandum of Understanding (MoU) operates for three years commencing July 2002, and outlines the cooperative relationship between the industry partners, Queensland Transport, Main Roads, Queensland Rail, and the University of Queensland (UQ) to achieve mutual benefit through a joint approach in transport through research, education, training and service delivery, and any commercial opportunities that may accrue.

Objectives

The high level objectives of this arrangement between the agencies and the university in relation to the MoU are to:

1. Develop a cooperative working relationship between the parties.
2. Enhance the capabilities of each organisation to achieve their goals by sharing expertise, knowledge and resources.
3. Develop appropriately skilled professionals for the transport sector and facilitate a critical mass of education and research expertise.
4. Progress interdisciplinary research and development in transport, education and training, opportunities for joint ventures in research and development, and the provision of professional services.
5. Promote these arrangements within the partner institutions and in the community to facilitate informed debate on transport issues and solutions.

Strategic Management Committee

The Strategic Management Committee was established under the MoU to:

- provide strategic direction for the work of the Centre;
- approve an annual set of goals;
- approve an annual work program of activities;
- determine funding arrangements by the partners to the MoU; and
- review the benefits, execution and outcomes of the approved program.

The membership of the Committee comprises:

- Director-General, Queensland Transport
- Director-General, Main Roads
- Chief Executive, Queensland Rail
- Executive Dean, Faculty of Engineering, Physical Sciences and Architecture, UQ (Chair)
- General Manager (Road System & Engineering), Main Roads
- Executive Director (Integrated Transport Planning), Queensland Transport
- Chief Strategy Officer, Queensland Rail
- Head, School of Engineering, UQ

Other representatives are invited as observers to the Strategic Management Committee, including the Director of the Centre for Transport Strategy, representatives from the other relevant schools at UQ and the transport agency program managers.

The Strategic Management Committee meets at least annually and UQ provides administrative support.

Portfolio University Group

The transport Portfolio University Group (PUG) was established to:

- overview transport research and development activities across the universities;
- prepare a draft annual program and budget in accordance with broad objectives outlined by the Strategic Management Committee, including quantitative and/or milestone objectives for approval by the Strategic Management Committee;
- monitor and review progress against the annual program; and
- facilitate collaboration between agencies and universities and seek research funding leverage through Australian Research Council grants.

The Portfolio University Group is chaired by:

- Executive Director (Integrated Transport Planning), Queensland Transport; and
- General Manager (Road System Engineering), Main Roads.

Membership of the Group comprises representatives from all the partners in the Centre. A similar agreement exists between Queensland University of Technology (QUT) and transport portfolio agencies. The Portfolio University Group facilitates both arrangements.

A primary role of PUG has been to develop and update the *Strategy for Cooperative Research & Professional Development*, coordinate activities between UQ and QUT and oversight the development of the forward program for both universities. The Group met a number of times through the year.

Staff

Prof Phil Charles

BE (NSW), BBus (Public Admin)(RCAE), MEngSc (NSW), GDM (Public) (UTS), GDM (Business) (NSW), FIEAust MASCE MITE CPEng

Professor of Transport Strategy and
Director, Centre for Transport Strategy

Key research areas and expertise

- Transport strategy and policy development, including infrastructure development and management, intelligent transport systems, road safety & traffic management, transport operations, travel demand management and sustainable transport
- Strategic analysis, futures scanning and scenario planning, strategy and business planning
- Stakeholder interaction and consultation
- Institutional development and strengthening, including policy development, organisational restructuring, implementation planning and monitoring, public private partnerships, and professional capability development.

Faculty & Research Staff

Dr Hussein Dia

BSc (Purdue), MSc (Purdue), PhD (Monash) MIEAust MASCE MITE CPEng NPER

Senior Lecturer, Civil Engineering &
Director Intelligent Transport Systems Laboratory

Key research areas and expertise

- Development of computer algorithms for real-time traffic management (eg automated incident detection, dynamic travel time estimation & short-term traffic flow prediction) and traveller information systems (eg Internet-based traffic information systems)
- Application of artificial intelligence and advanced computing techniques such as expert systems and neural networks to the transportation area
- Evaluation of real-time ATMS and ATIS applications and algorithms using proprietary computer models/techniques.
- Modelling/assessing the transport and environmental impacts of ATMS and ATIS.

Research Facility

Intelligent Transport Systems Research Laboratory

The ITS Research Laboratory is located at UQ St Lucia Campus where significant research into the ITS area is being conducted. The Laboratory has been equipped with high-end computing and communications servers and wide range of simulation tools and traffic management systems software.

The Laboratory equipment is used to retrieve raw field data from a test-bed comprising a large number of road links in a regional, partially instrumented road network. This data is collected for operational purposes by the Queensland Department of Main Roads and comprises traffic data (eg speed & flow), in addition to live video coverage of the test-bed. Intersection related traffic data is also being collected and transmitted to a central Main Roads location.

This data is made available to the Laboratory for research purposes. The equipment is being used to retrieve and pre-process the raw data, store and manage transport planning data, develop micro-simulation traffic models of the test-bed and make these data and models available for use by each of the partners.

< www.itslab.eng.uq.edu.au >

Research Program

The transportation research strategy places a high priority on the relevance of research to industry and government needs. This strategy, which is subject to ongoing development in consultation with the transport industry, involves:

- developing industry oriented approaches – tailoring best practice approaches to integrated transport, public transport, traffic, intelligent transport systems, logistics and freight planning and management; and sustainable transport issues relating to economic, social, safety and environmental impacts
- progressing modelling and evaluation methodologies; test conceptual frameworks and demonstrate feasibility of approaches and set up a transport modelling and transport simulation laboratory and research capability in cooperation with industry partners and other higher education institutions
- develop strategic alliances with other higher education institutions and transport research centres and maximising access to resources including leveraging funding through research grant schemes

Strategic Themes

A *Strategy for Cooperative Research & Professional Development* has been developed to define the strategic themes for research being undertaken by universities associated with Queensland transport agencies.

The purpose of this strategy is to provide direction for research and professional development activities of the UQ Centre and the Chair in Transport QUT under the MoU arrangements, for the purposes of developing research proposals, including funding proposals under grant schemes, and postgraduate study and preparing professional development programs and short courses.

It provides for a focused effort on four broad priority areas:

1. **System Performance** – evaluation frameworks, data & information
2. **Freight and Logistics** – heavy vehicles & asset management
3. **Mobility Management** – public transport, demand management & land use
4. **Transport Operations** – traffic & incident management & ITS

Research Priorities

System Performance – evaluation frameworks, data & information – to develop sound and transparent economic, social and environmental evaluation frameworks to facilitate multi-modal investment decisions regarding transport infrastructure and management of system performance.

- economic justification modelling for transport infrastructure – model specifications and functionality, ownership and management, accessibility, freight/passenger interaction
- best practice review of multi-modal evaluation framework models & transit evaluation methodologies
- system efficiency versus operator efficiency driven transport planning
- infrastructure funding models – potential models for funding the development of transport infrastructure
- appropriate performance indicators for evaluation purposes

- transport system case studies – review of specific project case studies – economic and commercial imperatives, policy impacts etc
- cross-institutional issues associated with transport – eg role of various institutions and implications of purchaser-provider framework
- urban transport organisation and institutional issues
- integrated public transport – effectiveness and impacts of modal integration in Australian cities from various perspectives – customer, purchaser, provider, political etc

Freight and Logistics – heavy vehicles & asset management – to undertake research focussed on improving the efficiency of the freight and logistics sectors, whilst minimising the potentially detrimental impacts on the environment.

- identify the most appropriate and effective roles of governments at all levels, in the management of supply chains
- develop an appropriate evaluation framework for the evaluation of freight modal alternatives, using specific case-studies.
- identify the role of its in the improvement of freight and logistics activities and in the management of supply chains
- identify how e-business and e-commerce can/should be integrated with its initiatives for better supply chains
- identify and quantify the major determinants of freight modal choice
- quantify the effects of more freight efficient vehicles on modal shares; asset damage; environmental and urban amenity impacts

Mobility Management – public transport, demand management & land use – the changing nature of travel and the changing transport now and into the future, both passenger and freight transport. To progressively identify and develop transport trends, data & information and models to facilitate improved land use and transport planning.

- reviewing current global transport planning and policy trends
- progressing transport futures scenario planning work undertaken in Queensland
- transport and the environment – modal shift analysis, greenhouse gas mitigation initiatives, noise mitigation, role of ITS

- freight movements in urban areas - economic evaluation on the restrictions on freight movements, priority lanes for road freight, etc.
- travel survey methodology, transport data requirements and analysis techniques
- integrated transport planning skills for local authorities

Transport Operations - traffic & incident management & intelligent transport systems - to explore initiatives for cost-effective improvements to the capacity and productivity of existing transport infrastructure. To assist in better management of existing infrastructure.

- identify/evaluate potential initiatives aimed at improving the transport system infrastructure capacity, through inter-modal initiatives, use of technology etc
- infrastructure capacity management - role of individual modes, capacity modelling parameters of fixed infrastructure, inter-modal initiatives, travel demand management, role of ITS in managing and improving capacity
- develop appropriate ITS evaluation methodologies with the use of case-studies. Quantify costs and benefits attributable to ITS system components
- review asset management practices and identify Portfolio R&D projects with high rates of return
- the port-rail interface - improving the efficiency and effectiveness of the interface.

Research

Prof Phil Charles, Centre for Transport Strategy

Transport Agency Institutional Development
Status: In progress

This research focuses on the life cycle of transport strategy development, implementation and evaluation to identify success factors and sustainable processes. In particular transport system management and integration issues have become priority directions for transport agencies. Recent initiatives in the road sector involving strengthening traffic management, use of technology and deploying incident management has moved the focus from road infrastructure provision to managing the use of the transport system, including multi-agency cooperation and coordination.

Also to increase public transit ridership, initiatives such as bus rapid transit and integrated transport, such as bus and rail coordination and integrated ticketing need ongoing development and analysis of success factors.

Recent initiatives in this research include preparing case studies on the learnings from recent programs and projects, conferences and involvement in projects such as the framework for decision making and strategic information management, incident management strategy and memorandum of understanding, traffic management organisational arrangements and development of intelligent transport systems strategic plans.

Transport Futures – Strategic Analysis and Building Strategic View Capability

Status: In progress

Sound strategic planning is based on a strategic analysis of past, present and future issues and trends. It is difficult for today's busy transport professionals to take the time to consider the strategic view. Development of that capability is also not part of normal curriculum in transportation.

Transportation is a derived demand and as such developments in the drivers of that demand need to be monitored and trends identified and analysed for their implications for transport pol-

icy, strategy and infrastructure needs and capability development.

Professional Capability Development in Transportation

Status: In progress

Transportation professionals have to address the challenge of transport needs being far in excess of resources available to provide new infrastructure. Also, recent experience with intelligent transport systems (ITS) deployment and road use management, indicates that institutional issues provide far greater challenges to the success than technical issues. To build capability a range of additional and innovative professional development and support activities are required, including training courses, seminars and flexible delivery modes of education. Recent initiatives include conferences, short courses, postgraduate research and papers at international conferences.

South East Queensland Transit Evaluation

Status: In progress

Providing independent advice to Queensland Transport on the evaluation framework for the South East Transit project, including an implementation program. The Director, CTS is the chair of an Independent Expert Advisory Committee. Assistance was provided to TransLink (a division of Queensland Transport) in establishing an evaluation framework for their transit programs.

Public – Private Partnerships in the Delivery of Transport Infrastructure and Services

Status: In progress

One means of supplementing public funded infrastructure is to consider public-private partnerships in providing innovative financing. Numerous challenges and opportunities arise from a public-private alliance. These two sectors are vastly different, therefore careful consideration is needed of benefits and costs and risk identification and management. Understanding the characteristics of the public and private sectors in Australia, and Queensland to assist in developing principles for successful partnerships.

Mobility and access and travel demand management

Status: In progress

Explore potential for managing the movement of people to a major transport generator (such as UQ) & encouraging a change in attitude & behaviour towards more sustainable modes of transport (fuel efficient, low emission vehicles, high occupancy, walking, cycling, public transport). Student research projects have been undertaken. Also exploring linkages with the Sustainable Energy Research Group at UQ to extend their research on alternative fuels and vehicle powertrains to sustainable public transport.

Best practice improvements in traffic incident management

Status: In progress

This research involves undertaking assessment of incident management practices in South East Queensland, including benchmarking of current practices, development of an incident management strategy for Queensland, undertaking a review on ITS and security and developing multi-criteria analysis processes for incident management. The next phase intends extending the research to other major cities in Australia.

Mr Frederick Preisler

Sustainability in Transport Projects

Status: In progress

(PhD candidate – supervisor Prof Charles)

The main objective of this research is to develop a robust method for evaluating sustainability in the assessment of transport projects. A robust method is proposed to reduce the opportunity for users to subjectively influence the evaluation methodology and result.

Dr Hussein Dia, Civil Engineering & Intelligent Transport Systems Research Laboratory

Freeway Incident Detection Using Artificial Neural Networks

Status: In progress

Neural network incident detection models are currently running on-line on a number of freeways in Melbourne and Adelaide. These have been shown to outperform existing automated incident detection models in terms of providing

higher detection rates, lower false alarms and faster times of detection. Dr Dia is currently involved in developing a new generation of artificial neural network (ANN) freeway incident detection models based on recent advances in the theory of neural computation. In particular, new methodologies are being developed to improve the ANN model performance by implementing dynamic decision thresholds based on prevailing flow conditions. The on-line training of ANN models using real-time data from loop detectors is also being investigated in an effort to partly automate the models' re-calibration for new or changed conditions and improve their transferability potential.

Modelling the Impacts of Advanced Traveller Information Systems Using Intelligent Agents
Status: In progress

This project involves using *Intelligent Agents* to model travel behaviour on congested traffic commuting corridors based on behavioural surveys of drivers. These models will be used to evaluate the impacts of providing drivers with real-time traffic information. The behavioural studies provide a useful insight into the characteristics of drivers and how their route and departure decisions may be influenced in order to improve mobility and reduce traffic congestion. These models will provide road authorities with a valuable tool to implement effective traveller information systems aimed at reducing congestion and enhancing the performance of the road network.

Prediction of Short-term Traffic Conditions Using Neuro-genetic Techniques
Status: In progress

This project aims to demonstrate the feasibility of using advanced modelling techniques, based on neural networks and genetic algorithms, to develop traffic flow models for predicting future traffic conditions on road facilities. Prediction of short-term traffic conditions is a vital component of advanced traffic management systems and will provide Metropolitan Traffic Control Centres with an automated tool for anticipating the congestion that may arise on road facilities. This information can then be provided to drivers to give them realistic estimates of travel times,

delays and alternative routes to their destinations.

Usability Evaluation of Advanced Traveller Information Systems
Status: In progress

This project involves the application of 'usability engineering' techniques to evaluate the user acceptance of a range of advanced traveller information systems. A prototype Internet-based application that was developed for the Tullamarine Freeway in Melbourne is being evaluated in this project to test user acceptance and understanding of the application. This project is being undertaken in co-operation with Dr. Ghassan Al-Qaimari (human computer interaction expert) from the Computer Science Department at RMIT University in Melbourne.

Modelling the Impacts of Travel Demand Management Strategies
Status: In progress

This project involves the development of a computer simulation program that can be used to evaluate the impacts of implementing isolated or combined travel demand management (TDM) strategies in Brisbane. TDM measures under consideration include car-pooling, alternative work schedules and telecommuting. The model developed in this study will provide road authorities with a valuable tool for predicting the operational and environmental impacts of TDM measures based on user-defined measures of effectiveness.

Mr Nicholas Cottman
Assessing the Environmental Impacts of Intelligent Transport Systems
Status: Complete
(Master of Engineering conferred 2003 – supervisor Dr Dia)

This research aims to develop and evaluate modelling frameworks that can be used to assess the environmental impacts of ITS. While the application of new technologies to the transport area has the potential reduce traffic congestion and enhance air quality, it is still not clear whether the environmental benefits of improved system efficiencies could be partially offset by the induced travel associated with ITS services. This research will contribute to progressions in

the methodologies needed to address this question by developing modelling platforms that address the short and long-term potential deployment outcomes and demonstrating how this modelling approach can be used to capture the induced demand effects.

Ms Caroline Sutandi

*Evaluation of Adaptive Traffic Control Systems in Developing Countries [Status: In progress]
(PhD candidate – supervisor Dr Dia)*

This research aims to evaluate the performance of adaptive traffic control systems in the context of developing countries. Bandung, Indonesia, where an ATCS has been implemented, will be used as a case study. Field data collected from before and after studies will be supplemented with microscopic traffic simulation to assess network performance under ATCS. The research will determine the critical parameters in the operation of ATCS in constrained networks and evaluate, both in simulation and from field data, the most appropriate forms of advanced traffic control strategies aimed at alleviating traffic congestion and enhancing mobility. The project will also evaluate the safety and network performance improvements; and make recommendations to the feasibility and cost-effectiveness of implementing similar systems in other cities in the developing world. This project is being undertaken in conjunction with Parahyangan Catholic University, Bandung, Indonesia.

Ms Kim Thomas

*Neural Network Models for Arterial Incident Detection Using Probe Vehicle and Fixed Detector Data [Status: In progress]
(Masters candidate – supervisor Dr Dia)*

This project aims to demonstrate the feasibility of using neural network modelling techniques to develop automated incident detection models for arterial roads. Early detection of these incidents is a vital component of advanced traffic management systems which aim to reduce traffic congestion, improve mobility and enhance air quality. These models will provide road authorities with an automated tool for detecting incidents on arterial roads as soon as they happen. This information can then be provided to drivers to give them realistic estimates of travel times, delays and alternative routes to their des-

tinations. Providing drivers with this information is believed to have the potential to alleviate traffic congestion and enhance the performance of the road network.

Mr Suphasawas Nigarnjanagool

*Development and Evaluation of an Agent-Based Adaptive Traffic Signal Control System
Status: In progress
(PhD candidate – supervisor Dr Dia)*

The primary objective of this research is to demonstrate the feasibility of using agent technologies to develop a decentralised adaptive traffic control system. By modelling the signal controllers as intelligent agents, it is possible to tune the actions of individual controllers through the agent concept of collaboration. The research also aims to evaluate the performance of the agent-based traffic signal control system by comparing its performance to other adaptive signal control systems. This will be achieved in simulation studies by developing an interface to link the agent-based traffic signal control system with a microscopic traffic simulation tool.

Mr Sakda Panwai

*Evaluation of Microscopic Car-Following Behaviour [Status: In progress]
(PhD candidate – supervisor Dr Dia)*

Microscopic traffic simulation tools are increasingly being applied to deal with dynamic and operational traffic problems and ITS applications. Each tool has its own formulation of microscopic traffic behaviour and this has an impact on the accuracy of the model in replicating traffic behaviour on the road. This research looks at the car-following models implemented in a number of commercial traffic simulation tools. The study examines the application of these simulators to an experimental data set that was collected from a European study. The field experiment recorded the speed and relative distance of the follower and leader vehicles on a one-lane road using especially equipped vehicles. The data from the study was used to test the car following behaviour of a number of microscopic traffic simulators.

Undergraduate Research

- Ang M S, Chow Y F and Huang W S (2003) *Approach to Evaluate Benefits of Traffic Incident Management*
- Di Lizio S (2003) *Performance measurements in traffic management systems*
- Lim T & Ong J (2003) *Application of Technology for Travel Demand: electronic road pricing*
- Singh R & Rosbrook G (2003) *Mobility and Transport Access at UQ*
- Tan C H & Ng C K (2003) *Evaluating the Benefits of Incident Management*
- Watkins D & Di Lizio (2003) *Cross-institutional issues - passenger rail transport in Queensland*
- Yang K K (2003) *ITS technologies and systems requirements needed to respond to security incidents for Southeast Queensland*
- Yang K K & Tang C Y (2003) *ITS Applications to Homeland Security*

Professional Development

The University of Queensland offers core and elective Transport Engineering courses in the undergraduate civil engineering program. Students may also complete a double major in Civil Engineering together with Transport, by taking all the transport elective subjects available.

Undergraduate Courses

- Traffic Flow Theory and Analysis
- Transport Systems Engineering
- Traffic Systems Operations and Management
- Transport Systems Analysis
- Intelligent Transport Systems

Project and research thesis subjects can also be taken on a transport related project.

Postgraduate/Professional Development Courses

All postgraduate courses are available by flexible delivery and can also be taken as continuing professional development (non-credit) courses. Participants are provided with access to on-line web-based modules supplemented with study guides and CDs. These courses are designed for transport professionals interested in broadening their knowledge of transport planning, designing and implementing transport and ITS projects. The targeted audience primarily includes postgraduate students, engineers, consultants, project managers and planners.

- Advanced Transport Technologies
- Traffic Systems Operations and Management
- Advanced Traffic Flow Theory
- Applied Systems Engineering for Transport Projects

Other professional development activities

A number of short courses were also held during 2003:

- Short course: *Economic Evaluation of Transport Infrastructure Projects*, 29 May 2003 Parramatta Australia (Coordinated by Prof Charles)
- Short course: *Multi-modal Transport Evaluation: methods and techniques*, 2-4 September 2003 Brisbane Australia (Jointly coordinated & presented with QUT by Prof Charles)
- Short course: *Marketing Technical Consulting Services in Asia-Pacific* - 6 October 2003, Brisbane Australia (Coordinated by Prof Charles)

Information Transfer

selected publications

- Charles, P (2003) *Managing Traffic Services in South East Queensland: Discussion paper - current state and issues*, report to Department of Main Roads, Jan 2003
- Charles, P (2003) *Intelligent Transport Systems, a multi-modal strategy for ITS in Queensland*, outline draft for Department of Main Roads, Jan 2003
- Charles, P; Ferreira, L; Sayeg, P and Scrafton, D (2003) *Framework for Decision Making and*

- Strategic Information Management*, final report to Queensland Transport, Feb 2003
- Charles, P and Sayeg, P (eds)(2003) *Smart Urban Transport magazine*, Feb, Jun & Nov 2003
 - Charles, P and Walsh, D (2003), *Increasing the Emphasis on Road Operations within Main Roads*: briefing note and project proposal to Department of Main Roads, Feb 2003
 - Charles, P and McEvoy, J (2003) *One TMC for Brisbane: discussion paper*, Brisbane City Council, Feb 2003
 - Charles, P (2003) *Traffic and transport Strategy, moving people and goods*, prepared for NSW Roads and Traffic Authority, Sydney Feb 2003
 - Charles, P (2003) *Queensland Traffic Incident Management Strategy, including national security incidents*, prepared for Department of Main Roads, Mar 2003
 - Charles, P and Ferreira, L (2003) *Recommended Strategic Framework: vision, key result areas, key goals & measures*, TransLink (Queensland Transport), Mar 2003
 - Charles, P and Sayeg, P (eds) (2003) *ITS Australia News*, produced for ITS Australia, March, June, September & December 2003
 - Bray, D; Charles, P and Sayeg, P (2003) *Samoa Transport Sector Review*, final Report to The World Bank and Samoa Ministry of Works, Transport and Infrastructure, Jun 2003
 - Charles, P (ed)(2003) *Smart Urban Transport 2003*, conference proceedings on the third international conference, Parramatta, May 2003
 - Charles, P (ed)(2003) *Transport Futures*, Jun 2003
 - Charles, P and Sayeg, P (2003) *Handbook on Intelligent Transport Systems*, produced for ITS Australia, Aug 2003
 - Sayeg, P; Charles, P and Ferreira, L (2003) *Developing Regional Outcomes for Transport*, draft SEQ2021 submission for Queensland Transport, Aug 2003
 - Charles, P (2003) *Intelligent Transport Systems Strategy*, prepared for NSW Roads and Traffic Authority, Sydney Sep 2003
 - Charles, P; Dunn, K; Fitzgerald, P; Peters, N and Reardon, G (2003) *Establishing Inter-Agency Regional Incident Management in Brisbane Australia*, 10th World Congress on ITS, 16-20 November 2003, Madrid
 - Charles, P and Sayeg, P (2003) *Submission on Caboolture to Landsborough Rail Upgrade Study: Draft Stage 3 Working Paper*, prepared for Rail, Tram and Bus Union, Dec 2003
- selected presentations**
- Queensland Department of Main Roads, *Traffic management in Main Roads: current state, issue and future state - initial concepts*, 7 Jan 2003 (Prof Charles)
 - Queensland Department of Main Roads, *Road Operations: strategic directions*, 21 Jan 2003 (Prof Charles)
 - Queensland Transport, Senior Executive Group, *Framework for Decision Making and Strategic Information Management*, 10 Feb 2003 (Prof Charles)
 - Queensland Department of Main Roads, Senior Management Group - *Increasing the emphasis on Road Operations*, 21 Feb 2003 (Prof Charles)
 - Queensland Department of Main Roads, Traffic Management Taskforce - *Increasing the emphasis on Road Operations*, 27 Feb 2003 (Prof Charles)
 - Brisbane Incident Management Coordination Group, *Report on TRB Incident Management Workshop held Jan 2003*, 7 Mar 2003 (Prof Charles)
 - Brisbane Incident Management Coordination Group, *One Traffic Management Centre for Brisbane*, 7 Mar 2003
 - TransLink Board of Management, *Recommended Strategic Framework: vision, key result areas, key goals & measures*, 2 Apr 2003 (Profs Charles & Ferreira))
 - Brisbane Incident Management Coordination Group, *Traffic Incident Management & Security: benchmarking*, 6 Jun 2003 (Prof Charles)
 - UITP conference *Transport Solutions for the Living City, New Directions in Transport*, 1 Sep 2003 (Prof Charles)
 - Multi-modal Transport Evaluation short course, *Project Appraisal Methods & Traffic operations case study*, 2-4 Sep 2003 (Prof Charles)

- Marketing Technical Consulting Services in Asia Pacific short course, *Planning for the Market*, 6 Oct 2003 (Prof Charles)
- IEAust Transport Panel student presentations: Tan C H & Ng C K, *Evaluating the Benefits of Incident Management*, 22 Oct 2003

attendance at conferences

- 82nd Transportation Research Board Annual Meeting - 12-16 January 2003, Washington, DC USA (Prof Charles)
- Conference: third international conference on *Smart Urban Transport*, 27-28 May 2003, Parramatta Australia (Conference organiser Prof Charles)

Activities and Services

- Committee Member - International Consortium for ITS Training and Education (CITE) *comprises more than 41 universities and industry partners and aims to provide ITS courses on the Internet.*
- Committee Member - Institution of Engineers, Australia, Queensland Division Transport Panel,
- Member - Queensland Ministerial Transport Planning Advisory Group
- Member - Brisbane Incident Management Coordination Group
- South East Transit Evaluation - Chair Independent Expert Advisory Committee
- Editor *Smart Urban Transport* magazine and electronic newsletter
- Editor Intelligent Transport Systems Australia newsletter

Where next?

- Continue the collaboration between UQ and the transport industry in Queensland, nationally and internationally
- Continue the development of collaboration between QUT and UQ, on research, education and services
- Undertake a range of research activities as developed in the draft 2004 work program
- Pursue research grants, contract research and postgraduate scholarship proposals to build on the ITS Research Facility
- Provide a range of professional development and continuing education opportunities
- Attract new postgraduate research students
- Provide opportunities for information transfer through seminars, conferences and publications
- Produce further editions of Transport Futures

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