



Planning and Transport Research Centre

ANNUAL REVIEW 2005



The Planning and Transport Research Centre (PATREC) is a collaboration between the four public universities of Western Australia, Curtin University of Technology, Edith Cowan University, Murdoch University and The University of Western Australia. It also receives financial support from the Government of Western Australia (through the Department for Planning and Infrastructure and Main Roads Western Australia).

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The Planning and Transport Research Centre (PATREC) is a unique collaboration between Western Australia's four public universities. Established in May 2003, it offers high quality post-graduate education and research programs in transport, logistics and land use / transport interaction.

PATREC's 'founding sponsors' are Curtin University of Technology, Edith Cowan University, Murdoch University, The University of Western Australia, the Western Australian Department for Planning and Infrastructure and Main Roads WA.

Its role is to build professional and academic capability by offering postgraduate professional education programs and expanding the number and quality of researchers in its specialist fields. PATREC's governance structure involving universities, founding industry partners and an independent chairman ensures independence and quality outcomes.

PATREC brings together people with very strong national and international experience in research, industry and government, so its programs are highly relevant to contemporary public policy, planning and business issues. Able to use resources from all four public universities in the State, it can address a wide range of research issues. Academic resources can be supplemented by other resources from industry.

PATREC affiliates with national and international stature include Stuart Hicks (Chairman, East Perth Redevelopment Authority, former Chairman of the National Transport Commission and former WA Director General of Transport), Greg Martin (WA Director General for Planning and Infrastructure, member of Australia's intergovernmental Standing Committee on Transport and the Australian Logistics Council), Professor Fred Affleck (member of the National Transport Commission, Chairman, Midland Redevelopment Authority, member of the Australian Logistics Council, former General Manager in the National Rail Corporation Ltd, former CEO of the Australasian Railway Association Inc, and advisor to the Australian Transport Council and the Commonwealth Grants Commission), Professor John Taplin (Professor of Information Management and Marketing, former WA Director General of Transport, Deputy Secretary of Australia's Department of Transport and Director of the Bureau of Transport Economics), Carey Curtis (Associate Professor in Curtin University's Department of Urban and Regional Planning and Member of the WA Planning Commission), and Professor Jeffrey Kenworthy of Murdoch's Institute of Sustainability and Technology Policy.

PATREC's strongest areas of educational and research focus are integrated transport and land use planning, transport economics, logistics and supply chain management, transport modelling and data management, transport sustainability, and transport safety and risk management. In a number of these areas PATREC has created long-term industry-supported post-doctoral research programs and PhD-level degree programs. In 2005 PATREC began offering a new professional Masters Degree in Transport Studies. Students can enrol in any of the four universities and will undertake significant research as part of their degree.

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2005 was a busy year for PATREC ...

2005 was the second full year of operation for the Planning and Transport Research Centre, and much was achieved.

Our professional Masters degree has been launched and the Centre's research program has expanded and diversified. We held our first major national research conference – on transit oriented development – and made substantial progress in establishing more robust governance structures and process for the Centre. This Annual Review for 2005 provides details on all these things.

The collaborative Master of Transport Studies has been central to the plan for PATREC. It was launched late in 2004 and enrolled its first students in Semester One of 2005. It is receiving a good level of support from industry. To supplement this, the Board agreed that from 2006 we would offer two scholarships to enable more students to participate.

It is very important to the future viability of this degree that in 2006 we reach agreement between our participating universities to permit enrolment of international students.

PATREC's research program has begun to mature with a focus on areas of importance to the State and to Australia, using research strengths in our participating universities. In 2005, a team of researchers collaborating through PATREC won a very substantial Linkage grant from the Australian Research Council, which is being strongly supplemented by local research partners.

The research program is also being supported by occasional conferences, seminars and professional short courses. Our first national and international research conference – *Transit Oriented Development: Making it Happen* – was a landmark in this regard. We also commenced our series of annual one-day PATREC Research Forums.

Enlargement and improvement of the Centre's website www.patrec.org during 2005 has been aimed at strengthening communications with our research partners, research collaborators and students.

I would like personally to thank my colleagues on the Board of PATREC and the Centre's management team for their individual contributions to an excellent year.

Stuart Hicks AO
Chairman
Planning and Transport Research Centre

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PATREC's Role in Planning and Transport

PATREC has created a network to promote collaboration and interaction between academic teaching and research people, who share skills, knowledge and intellectual property where appropriate with each other and with industry partners. Where there are shared interests, we also work closely with academic researchers in other universities.

Researchers associated with PATREC are of three kinds: Full-time academic staff who combine teaching and research at our sponsor universities; full-time academic staff who devote all their time to research and are generally attached to a specialised research institute at one of our sponsor universities; and part-time 'adjunct' academic staff who are appointed by one of the universities to undertake research (and often also teaching), whose appointment is based on extensive industry or other experience and expertise.

'Planning and transport' span very diverse academic fields, but the linkages are strong through a broad commonality of policy concerns and a skill base with many shared elements. The field includes study of interaction between transport infrastructure and land use, travel behaviour, sustainability, urban land use and regional development planning. This broad web of knowledge, skills and policy interests provides the basic structure for PATREC's Master's degree course, and for collaboration on many research projects.

The major focus for PATREC's research program is the policy and social sciences and business and public management, not engineering.

Virtually all PATREC post-graduate students and post-graduate and post-doctoral research fellows conduct their studies within faculties or research institutes located within one of our four founding sponsor universities. Often they work in partnership with industry sponsors. All are affiliated with PATREC for funding, capacity building and research collaboration. An important objective of PATREC's Board and management is to foster and support this collaboration and capacity building.

Structure and governance

The Planning and Transport Research Centre is an unincorporated entity established by a *Memorandum of Understanding* between Western Australia's four public universities: Curtin University of Technology, Edith Cowan University, Murdoch University and The University of Western Australia.

PATREC is a formal collaboration between the four universities with the stated purposes of offering a professional Masters Degree in Transport Studies and conducting a research program supported by industry and government grants and by national and State-based competitive grants. PATREC's education program is conducted on its behalf by its four collaborating universities, who are also responsible for conducting all research arranged on their behalf by PATREC. All research grant monies are paid directly to one or more of these universities. Where appropriate PATREC forms alliances with other research centres in Western Australia, elsewhere in Australia and overseas. PATREC operates from offices located at Curtin University of Technology in Perth, Western Australia.

PATREC is governed by a Board representing its sponsoring universities and the Government of Western Australia that meets three times per year. The Centre is managed by the Executive Director, who occupies the Chair of Transport Studies in Curtin University, and holds separate appointments as Adjunct Professor at each of the other collaborating universities.

Funding

PATREC is supported by grant income from Western Australia's four public universities and Western Australia's Departments for Planning and Infrastructure and Main Roads. In 2005, the six 'founding sponsors' contributed annual subscriptions totalling \$347,500, made up as follows:

Curtin University of Technology	\$60,000
Department for Planning and Infrastructure	\$100,000
Edith Cowan University	\$7,500
Main Roads WA	\$60,000
Murdoch University	\$60,000
The University of Western Australia	\$60,000

This income is supplemented by minor income from research funding and from interest on account balances held by Curtin University of Technology on behalf of all sponsors.

PATREC's Board

The independent Chairman of PATREC's Board is Stuart Hicks AO. Four of its remaining members represent the four collaborating universities. The Government of Western Australia is represented by the Director General of Planning and Infrastructure.

At 31 December 2005 PATREC's Board comprised the following members:

Stuart Hicks AO	Chairman
Prof Barney Glover	Representing Curtin University of Technology
Prof Bill Loudon	Representing Edith Cowan University
Prof Andris Stelbovics	Representing Murdoch University
Dr Paul McLeod	Representing The University of Western Australia
Mr Greg Martin	Representing the Government of Western Australia

Mr Stuart Hicks AO, BEc, FAIM, FCILT, FAICD, MIMC is also Chairman of the East Perth Redevelopment Authority and Chairman of the John Curtin Institute for Public Policy at Curtin University of Technology. He is a former Chairman of the National Transport Commission and former Director General of Transport in Western Australia. Stuart holds separate appointments as Adjunct Professor at Curtin University of Technology, Edith Cowan University, Murdoch University and The University of Western Australia.

Professor Barney Glover BSc (Hons), Dip Ed, MSc, PhD was (until March 2006) Pro Vice-Chancellor Research and Development at Curtin University of Technology.

Professor Bill Loudon BA, DipEd, MEd, PhD was (until February 2006) Pro Vice-Chancellor (Research) and Executive Dean of the Faculty of Community Services, Education and Social Sciences at Edith Cowan University.

Professor Andris Stelbovics BSc (Hons), PhD, FAIP is Pro Vice-Chancellor Research at Murdoch University.

Dr Paul McLeod BEc, PhD is a Lecturer in the School of Economics and Commerce at The University of Western Australia, and former Dean of the Faculty of Economics and Commerce (UWA Business School).

Mr Greg Martin BEng (Hons), BCom, MS, Grad Dip (Urban Systems), FIE (Aust), FAIPM, FCILT, FAIM, MAICD, MPMI is Director-General of WA's Department for Planning and Infrastructure.

Academic Advisory Board

The Memorandum of Understanding between PATREC's participating universities for the collaborative Master of Transport Studies degree requires the establishment of an Academic Advisory Board.

The Academic Advisory Board comprises the Executive Director of PATREC, and one member appointed by each university. Its function is to advise the Executive Director and the universities on academic matters, including student admissions and awarding of degrees. It meets as required. It also advises the Director on the selection of scholarships awardees and other matters. The members of the Academic Advisory Committee are the PATREC Executive Director (chairman) and representatives of the four collaborating universities:

Assoc Prof Carey Curtis BSc (Hons) Geog (Middlesex Polytechnic); MSc Rural Planning (Reading); PhD (Curtin), DipTP Urban Planning (Oxford Polytechnic); Certificate of Teaching in Higher Education (SEDA UK), Associate Professor in the School of Urban and Regional Planning, Faculty of Built Environment and Design, Curtin University of Technology. Dr Curtis is a member of the Western Australian Planning Commission.

John Georgiades BSc (UWA), BEc (UWA), Diploma in Computing (Postgrad)(UWA), Adjunct Research and Teaching Fellow, School of Management, Faculty of Business and Public Management, Edith Cowan University.

Prof Jeffrey Kenworthy BSc (Hons) (Murdoch), PhD (Murdoch), Institute of Sustainability and Technology Policy, Murdoch University. Dr Kenworthy is a member of a number of public advisory committees, including the Public Transport Authority's Customer Advisory Council (Urban Rail), the Walking WA Committee of the Department for Planning and Infrastructure and the Western Australian Land Information System Advisory Committee.

Prof John Taplin AM, PhD (Cornell), MAgEc (New England), BA (Economics and Philosophy)(New England), School of Economics and Commerce, The University of Western Australia. John Taplin is Adjunct Professor at Tongji University (Shanghai) and is a former Director General of Transport in WA.

PATREC's Management Team

PATREC is managed by a full time team of two, the Executive Director and the Business Manager, plus a part-time Administrative Assistant.

The Executive Director of the Planning and Transport Research Centre is Professor Fred Affleck BA (Hons) (*Brit Col*), PhD (*London*), FAICD, FCILT. Dr Affleck has worked in a several areas of transport – rail, port access, roads and road transport, urban public transport and aviation. He has held government, management and consulting roles in Australia and Canada since 1969, among these as Advisor to the Commonwealth Grants Commission on railways and public transport (1978-1985) and General Manager Corporate Affairs in the National Rail Corporation Ltd (1992-2000). Fred Affleck is also Chairman of the Western Australia's Midland Redevelopment Authority and a member of the Australia's National Transport Commission.

PATREC's Business Manager and the Board's executive officer is Andrew McLean BA (Hons) (*Curtin*).

Murdoch University provided office accommodation to PATREC from May 2003 to March 2005. In March 2005 the PATREC office was relocated to Curtin University of Technology.

Academic and Research Staff/Students

Zeenat Abdoolakhan	PhD candidate, Information Management and Transport	The University of Western Australia
Dr Fred Affleck	Professor of Transport Studies	Planning & Transport Research Centre
Dr Paul Arthur	Postdoctoral Research Fellow, Centre for Social and Community Research	Murdoch University
Dr Lou Caccetta	Director, WA Centre of Excellence in Industrial Optimisation	Curtin University of Technology
Dr Rina Cercarelli	Acting Director, Injury Research Centre	The University of Western Australia
Dr Elizabeth Chang	Professor of Information Systems	Curtin Business School
Dr Trudi Cooper	Lecturer, School of Community Services, Education and Social Sciences	Edith Cowan University
Dr Carey Curtis	Assoc Professor of Urban and Regional Planning	Curtin University of Technology
Ghassan Daban	PhD candidate, Information Management and Transport	The University of Western Australia
Mike Dockery	Research Associate, Economics and Finance	Curtin Business School
Angela Durie	Graduate Research Assistant, School of Community Services, Ed'n & Social Sciences	Edith Cowan University
Melanie Freeman	Lecturer in Psychology	Murdoch University
John Georgiades	Adjunct Associate Lecturer, Faculty of Business and Law	Edith Cowan University
Izumi Hart	PhD candidate, School of Psychology	Murdoch University
Dr Laurence Hartley	Assoc Professor of Psychology	Murdoch University
Dr Trevor Heaver	Visiting Research Fellow	Professor Emeritus, University of British Columbia
Delia Hendrie	Lecturer, School of Population Health	The University of Western Australia
Carlindi Holling	Research Associate, Housing and Urban Research Institute of WA	Curtin University of Technology
Farookh Khadeer Hussain	PhD candidate, Centre of Extended Enterprises and Business Intelligence	Curtin Business School
Wen Huang	Research Associate, Information Management and Transport	The University of Western Australia
Dr Jeffrey Kenworthy	Professor in Sustainable Cities, Institute for Sustainability and Technology Policy	Murdoch University

Dr Peter Lawrence	Adjunct Associate Professor	Edith Cowan University
Dr Terry Love	Research Fellow, School of Design	Curtin University of Technology
Melanie Montgomery	Research Associate, School of Urban and Regional Planning	Curtin University of Technology
Dr Fiona McKenzie	Director, Housing and Urban Research Institute of WA	Curtin University of Technology
Dr Peter Newman	Professor of City Planning and Sustainability	Murdoch University
Dr Doina Olaru	Lecturer, Information Management and Transport	The University of Western Australia
Dr Terri Pikora	DPI Research Fellow in Marine Safety, Injury Research Centre	The University of Western Australia
Vidyasagar Potdar	PhD candidate, Centre of Extended Enterprises and Business Intelligence	Curtin Business School
Dr Min Qiu	Senior Lecturer, Information Management and Transport	The University of Western Australia
Dr Volker Rehbock	Senior Lecturer, Mathematics and Statistics	Curtin University of Technology
Dr John Renne	Visiting Research Associate	Assistant Professor, University of New Orleans
Sharif Siddique	PhD candidate, Information Management and Transport	The University of Western Australia
Brett Smith	Lecturer, Information Management and Marketing	The University of Western Australia
John Smoker	M.Phil candidate, Institute of Sustainability and Technology Policy	Murdoch University
Luke Li Stange	PhD candidate, Institute of Sustainability and Technology Policy	Murdoch University
Yu Chao Sun	PhD candidate, Information Management and Transport	The University of Western Australia
Dr John Taplin AM	Professor of Information Management and Transport	The University of Western Australia
Dr Malcolm Tull	Assoc Professor of Economics	Murdoch University
Dr Martin West	Deputy Head of School, Information Systems	Curtin Business School
Heather Williams	Graduate Research Assistant, Injury Research Centre	The University of Western Australia
Nick Wills-Johnson	ARG Research Fellow in Railway Competition Policy	Curtin University of Technology
Clare Yu	PhD candidate, Information Management and Transport	The University of Western Australia

Each member of academic staff who will be teaching units in the Master of Transport Studies, supervising post-graduate research and/or contributing to the Centre's research program is employed by one of the four sponsoring universities. From time to time others from outside the universities are invited to participate in teaching and research activities, in order to widen the resource pool available.

Professional Education

PATREC offers a Master of Transport Studies (MTS) degree for full or part-time study. Students may be admitted to study through any of our four sponsoring universities and units of study are delivered by all of them. Taken full time the duration of the degree program is eighteen months. From 2006 a selection of units in the degree are also available for extension (not-for-degree) study. Short courses will also be offered.

It is anticipated that from 2007 PATREC will offer a Graduate Certificate (GCertTS) and Graduate Diploma (GDipTS) as both entry and exit (intermediate) qualifications articulating to the MTS.

Master of Transport Studies

A collaborative professional Masters degree (by coursework), the Master of Transport Studies, is offered through PATREC for full-time or part-time study. During its initial year six students were enrolled for the MTS degree. Information on the MTS is available at www.patrec.org/studies/course_detail.php?id=1.

The 'collaborative' degree program is 18 months' duration full time (up to 5 years part-time) and is offered jointly by the four participating universities. Students successfully completing the course will be awarded the degree by the university where they formally enrol, but the participation of the other three universities will be acknowledged on the degree testamur.

The degree program requires students receiving the Masters degree to have completed eight units of coursework and a major research assignment. There are five mandatory 'core' units of study:

- Cities and Sustainability (Murdoch University)
- Planning for Accessibility (Curtin University)
- Transport Assessment and Evaluation (Edith Cowan University)
- Transport Systems and Policy (University of Western Australia)
- Research methods (to be taken at the university where the student enrolls).

Students will also be required to complete three 'elective' units chosen from the following options:

- Integrated Plan Making (Curtin University)
- Advanced Transport Modelling (University of Western Australia)
- Transport Safety (University of Western Australia)
- Risk Management (Murdoch University)
- Logistics and Supply Chain Management (University of Western Australia)
- Global Distribution and Transportation (Curtin University)
- Principles of Enterprise Logistics Management (Curtin University)
- Project Management (Murdoch University)
- Business Strategy (Edith Cowan University)
- Managing Change (Edith Cowan University)

One semester (or its equivalent) must be devoted to a significant supervised research project undertaken at their enrolling university.

Short Courses

In 2005 PATREC began to offer professional development short courses, as part of our *Planning and Transport Modelling Program* (see **Appendix A** for an overview of this program). Participants from organisations sponsoring the Planning and Transport Modelling Program will be registered free of charge. Others will pay a fee. Two short courses were offered initially:

Transport Planning with STEM: Perth's 'Strategic Transport Evaluation Model': a 1½-day short course presented in November 2005 by Dr Peter Lawrence, Adjunct Associate Professor, Edith Cowan University.

An Introduction to Transport Modelling: A 3-day short course presented in January 2006 by Dr Min Qiu (Senior Lecturer) and Dr Doina Olaru (Lecturer), of the School of Economics and Commerce (UWA Business School).

Further short courses for professional development are planned for 2006 (further information on PATREC short courses is available at www.patrec.org/courses/index.php).

Conferences and Seminars

During 2005, PATREC organised two events to provide opportunities for academic researchers, students, industry and the general public to gain knowledge about research being conducted by PATREC and others. These were a national conference on *Transit-Oriented Development: Making it Happen* (July 2005), and the inaugural *PATREC Research Forum* (October 2005). The proceedings, papers and presentations from these conferences are available on PATREC's website at www.patrec.org/conferences/PATRECForum_Oct2005/PATRECForum_Oct2005.html and www.patrec.org/conferences/TODJuly2005/TODJuly2005.html

PATREC has also placed on its website a database containing all papers delivered to the Australian Transport Research Forum since 1975 (www.patrec.org/atrf/index.php).

PATREC's Research Program

PATREC has four areas of research concentration: freight logistics, integrated land use and transport planning and policy, land use/transport modelling and transport safety and security. Research projects are carried out for public and private sector partners in transport and urban and regional development. Research funding may be sourced from these industry partners and/or from national competitive research grants, including the Australian Research Council (ARC) Linkage and Discovery programs, Cooperative Research Centres (CRCs) and the Western Australian Centres of Excellence program.

Significant partnerships may also be formed for research programs lasting two or more years, some of which support long-term research fellowships. These currently exist for research in the areas of marine safety, railway competition policy, integrated transport and land use modelling, and transit oriented development.

The Centre has formal and informal partnerships with other research bodies, with which we collaborate on research projects, e.g. the CRC for Rail Technology, the CRC for Sustainable Forest Landscapes, the Western Australian Centre of Excellence in Industrial Optimisation, the Western Australian Housing and Urban Research Institute, the Centre for Labour Market Research, the Murdoch Research Institute for Sustainable Energy and the Institute for Sustainability and Technology Policy.

Research staff affiliated with PATREC also undertake occasional consulting, but our primary emphasis is on academic research.

Research outcomes, in the form of reports, working papers, conference papers and published articles and monographs will generally be available on PATREC's website www.patrec.org.

The annual PATREC Research Forum is attended by research partners, researchers, industry people and the general public, and provides opportunities for presentation and discussion of current and completed research projects. PATREC also organises occasional national and local research conferences, e.g. the July 2005 conference on *Transit Oriented Development: making it Happen*.

Post-doctoral and post-graduate research fellowships

During 2005 three research fellows conducted research through arrangements made by PATREC:

Dr Terri Pikora PhD (UWA), MPH (UWA), BHSc (Health Promotion)(ECU), AssDipAppSc (Library Media)(ECU). Dr Pikora was Marine Safety Research Fellow employed by the University of Western Australia in the Injury Research Centre (School of Population Health). This fellowship is fully funded by the Department for Planning and Infrastructure to support its marine safety programs. The substantial program of research led by Dr Pikora produced several publications during 2005.

Dr John L. Renne PhD (Rutgers), MURP (Colorado), BEnvDes (Colorado) is Assistant Professor and Associate Director of the Maritime and Intermodal Transportation Center in the University of New Orleans). From August 2004 to July 2005, John was a PATREC Visiting Research Associate, based at Murdoch University, conducting research part-funded by the Department for Planning and Infrastructure to investigate aspects of transit oriented development in Perth. John Renne will be returning to PATREC in 2006.

Nick Wills-Johnson BEc(Hons)(UWA) is Research Fellow investigating the impact on railway infrastructure investment of national competition policy, including third party track access and vertical separation. This fellowship is fully funded by the Australian Railroad Group Ltd. Nick was appointed to this position at Curtin University of Technology in April 2005 and will complete his research in 2007. Nick is completing a PhD examining the impact of antitrust regulation in Australia.

For one month in December 2005 and January 2006, the Executive Director visited the Centre for Transportation Studies at the University of British Columbia, as a Visiting Professor. While in Vancouver he commenced, in collaboration with Professor Emeritus Trevor Heaver a research project to examine a number of case studies in relating to port-based container logistics.

Doctoral studies

Thirteen students during 2005 were or are currently conducting doctoral research in association with PATREC:

Zeenat Abdoolakhan LScEc (Paris), MScEc (Paris), received a PATREC research grant in 2005 to study the transition to new fuels and vehicle types. She is now the holder of a University Postgraduate Award for PhD studies, in Information Management and Transport, School of Economics and Commerce,

UWA Business School, supplemented by a PATREC scholarship. Zeenat will be continuing her research on the transition to new fuels and vehicle types.

Dr Carey Curtis PhD (Curtin), BSc(Hons) Geog (Middlesex Polytechnic), MSc Rural Planning (Reading), DipTP Urban Planning (Oxford Polytechnic), Certificate of Teaching in Higher Education (SEDA UK), Associate Professor in the Department of Urban and Regional Planning, Curtin University of Technology. Carey received assistance from PATREC to complete her PhD 'by supplication', i.e. by publication) studying the complex relationships between urban form and transport. Dr Curtis was awarded her PhD in February 2006.

Ghassan Daban LdD (Urban & Regional Planning)(Istituto di Architettura Venezia), Master of Urban Planning) (La Sapienza Roma), to study the impacts of transit-led development in Information Management and Transport, School of Economics and Commerce, UWA Business School.

Izumi Hart BSc(Hons)(Macquarie), School of Psychology, Murdoch University, received a PATREC research grant for a preliminary investigation into benchmarking safety culture in the Australian rail industry. Izumi received the "C.Y. O'Connor Prize" for the best presentation at the inaugural PATREC Research Forum in 2005, and has since received a Murdoch University Scholarship to undertake research for a PhD.

Farookh Khadeer Hussain BTech (CS&CE)(Jawaharlal Nehru Technological University), MIT (LaTrobe), Centre of Extended Enterprises and Business Intelligence, Curtin Business School. Farookh's research is developing a methodology for establishing trust in logistics peer-to-peer environments. Farookh is receiving a Curtin University Scholarship and a top-up from PATREC.

Tim Perkins MA (Hons)(Aberdeen), PGradDip (Urban Design & Regl Plg)(Edinburgh), MSc (Edinburgh). Tim's research at Curtin University of Technology is examining travel decision-making behaviour in relation to potential and actual use of public transport options, integrating a social psychology modelling approach with travel modelling and spatial analysis to explain how and why travelers react to public transport options.

Vidyasagar Potdar BSc (Gujarat), MIT (Newcastle), Centre of Extended Enterprises and Business Intelligence, Curtin Business School. Vidy's research concerns 'information hiding' (for protecting intellectual property) and is focussed on developing digital watermarking for use in the logistics industry. Viddy is receiving a PATREC Scholarship.

Brett Smith BAEd (Mathematics)(ECU), GradDip (Mathematics)(ECU), Information Management and Transport, School of Economics and Commerce, UWA Business School, is conducting doctoral research into estimation of direct and cross price elasticities from combined stated preference and revealed preference data.

John Smoker BA(Design) (Curtin), JP, Institute for Sustainability and Technology Policy, Murdoch University. John is initially undertaking an MPhil to examine new indigenous affairs arrangements to be implemented by Indigenous Coordinating Centres in the Kimberley region of Western Australia, with particular focus on their effectiveness and outcomes for management of road assets.

Luke Stange BA (Murdoch), MA (Murdoch), Institute of Sustainability and Technology Policy, Murdoch University. Luke is studying the processes, policies and outcomes of main-street revitalisation in Western Australia within a sustainability framework. Luke is receiving a Murdoch University Scholarship and a top-up from PATREC.

Sharif Siddique BScEng (Bangladesh Institute of Technology), MBA (Dhaka), MIM (UWA), Information Management and Transport, School of Economics & Commerce, UWA Business School. Sharif is studying the joint development of a genetic algorithm and a stated preference survey to optimise policies for ameliorating the environmental impacts of transport. Siddique is receiving a PATREC Scholarship.

Yu Chao Sun BArch (SW Jiao Tong), GradDipEComm (Murdoch), MIM (UWA), is holder of 'The Village at Wellard Scholarship', in Information Management and Transport, School of Economics and Commerce, UWA Business School, awarded in conjunction with an APAI in the ARC Linkage project to study the impacts of transit-led development.

Clare Yu BEng (Qingdao), GradDipComp (Curtin), PGradDipCompSc (Curtin), MSc (Curtin), Information Management and Transport, School of Economics and Commerce, UWA Business School. Clare's research will examine the integration of economic, environmental and social factors into formulating and prioritising transport policies, with a focus on determining appropriate relative weights for these factors. Clare is receiving a PATREC Scholarship.

Collaborating research organisations

PATREC facilitates research by initiating research projects with government and industry partners. Research projects are then conducted by academic staff in the four sponsoring universities, often in collaboration across institutions. A key role for PATREC therefore is to identify appropriate centres of research excellence that can become affiliated with its research program.

Research collaborators affiliated with PATREC during 2005 are shown in the Table below.

PATREC research collaborators 2005
Centre for Extended Enterprise and Business Intelligence, Curtin University of Technology
Centre for Labour Market Research, Curtin University of Technology
Centre for Transportation Studies, University of British Columbia
Cooperative Research Centre in Railway Technology, Central Queensland University
Cooperative Research Centre for Sustainable Forest Landscapes, Melbourne University
Curtin Business School
Faculty of Business and Law, Edith Cowan University
Faculty of Community Services, Education and Social Services, Edith Cowan University
Housing and Urban Research Institute of WA, Curtin University of Technology
Injury Research Centre, The University of Western Australia
Institute for Sustainability and Technology Policy, Murdoch University
Murdoch Business School
Research Institute for Sustainable Energy, Murdoch University
School of Urban and Regional Planning, Curtin University of Technology
School of Psychology, Murdoch University
School of Economics and Commerce, The University of Western Australia Business School
WA Centre of Excellence in Industrial Optimisation, Curtin University of Technology

Research Partners

The principal research partners of PATREC and its collaborating university research teams during 2005 are shown in the table below.

PATREC research funding partners 2005
Australasian Railway Association Inc
Australian Railroad Group Pty Ltd
Australian Research Council
Centre for Excellence in Rail Training (CERT)
City of Cockburn
City of Gosnells
City of Joondalup
City of Melville
City of Perth
City of Rockingham
City of Swan
CRC for Rail Technology
Department for Planning and Infrastructure (WA)
Department of Housing and Works (WA)
East Perth Redevelopment Authority
Fremantle Ports
LandCorp (Western Australian Land Commission)
Main Roads WA
Midland Redevelopment Authority
MVM Rail Pty Ltd
Office Crime Prevention WA

Peet and Co Pty Ltd
Public Transport Authority (WA)
QR (Queensland Rail)
Town of Kwinana
Western Australian Planning Commission

Research Projects

Total grant funding facilitated by PATREC for research projects commenced and/or completed in 2005 and paid to PATREC's participation universities was \$306,000. **Appendix A** at the rear of this report contains information on the scope and purpose of research these projects; **Appendix C** shows grants received during 2005 and their distribution among PATREC's participating universities. An overview of projects in progress or completed in 2005 is shown below.

Research Project	Funding Partner(s)	Collaborating University(s)	Description
Travel behaviour and economic impacts of transit oriented development (TOD)	Australian Research Council, Wellard Sthn JV, WA Planning Commission (WAPC), WA Public Transport Authority (PTA), LandCorp, Midland Redevelopment Authority (MRA), East Perth RA (EPRA), Cities of Cockburn, Melville, Rockingham & Kwinana	UWA, Curtin	Describe and model impacts of transit-led development in SW rail corridor on travel behaviour and economic development
Obstacles and opportunities for TOD ♦	WA Dept for Planning and Infrastructure	Murdoch	Identify obstacles and opportunities for Perth transit oriented development
Housing choices in TOD precincts	WA LandCorp, WA Dept of Housing and Works	Curtin	The nature and quantity of demand for medium density housing in TOD precincts
Car fleet transformation in response to future energy prices ♦	PATREC	UWA	Analyse relationships between demand for car types and prices for fuel types
Rail competition policy fellowship	Australian Railroad Group Ltd (ARG)	Curtin	Evaluate impacts of national competition policy on rail infrastructure investment
Perth freight model	WAPC, Main Roads WA, City of Perth, MRA, EPRA, Fremantle Ports	UWA, ECU	Develop model of freight movements by road and rail for of corridor and location optimisation
Port-based container logistics	PATREC, University of British Columbia Centre for Transportation Studies	Curtin	Issues in port-based container logistics: Case Studies of Vancouver and Fremantle
Rail sector workforce planning	Rail CRC, WA PTA, Centre for Excellence in Rail Training (CERT), Queensland Rail, Aust Rwy Assoc, ARG Ltd, MVM Rail PL	UWA, Curtin	Estimating future demand and supply of skilled labour in the Australian rail industry
Rail safety culture ♦	PATREC	Murdoch	Piloting survey instrument to benchmark safety culture in Australian rail industry
School bus costing ♦	WA PTA	Curtin	Independent review of the viability of WA Class C school bus contracts
Marine safety fellowship	WA DPI	UWA	Develop and measure effectiveness of evidence-based safety countermeasures
Youth rail	WA Office of Crime Prevention, WA PTA, Cities of Armadale, Gosnells, Joondalup & Swan	ECU, Curtin	Developing youthwork strategies for managing crime and anti-social behaviour in rail station precincts
Short history of WAGR	WA PTA	Murdoch	Short history of WA Government Railways 1902-2003

♦ *Project completed in 2005.*

Appendix A at the rear of this report contains information on the scope and purpose of research projects initiated, continuing or completed in 2005. **Appendix C** shows grants received during 2005 and their

distribution among PATREC's participating universities. **Appendix D** shows applications submitted for new research funding during 2005.

PATREC Round Table on Public Transport

During 2005 PATREC invited a number of senior academics, transport system managers and planners to participate in a periodic 'round table' on public transport convened by PATREC's Chairman. It is envisaged the PATREC Round Table on Public Transport will become a forum for discussion and development of principles for application to successful integrated long-term development of public transport and urban development in Perth's rapidly growing metropolis.

An inaugural meeting of the Round Table occurred late in 2005. It is proposed that in 2006 meetings should occur approximately every three months.

Publications

Appendix B contains a list of publications relevant to PATREC research during the year. Papers and presentations made to PATREC conferences and seminars are available to be downloaded from PATREC's website, www.patrec.org. During 2005, PATREC commenced publishing a new series of Working Papers reporting outcomes from selected PATREC research projects. These are included in Appendix B.

Australian Transport Research Forum, 1975-2005

PATREC's website includes a database of all papers presented to the Australian Transport Research Forum (ATRF) from its first meeting in 1975 up to date (ATRF2005) (www.patrec.org/atrf/index.php). This database contains scanned copies of all papers from 1975 to 2001 (searchable by date and author/s), and electronic searchable copies of papers after that date. Assistance to cover a portion of the cost of compiling this very large database was provided by the organisers of ATRF2004 (Adelaide) and by the WA Department for Planning and Infrastructure.

*Planning and Transport Research Centre
Perth, Western Australia*

March 2006

APPENDIX A: Research Programs

Transit Oriented Development in Western Australia

This is an important theme in PATREC's research program. Projects that were commenced or completed in 2005 are listed below. Substantial further research is planned for 2006.

Transit oriented development (TOD) is a form of urban design comprising medium and high-density mixed land uses within precincts of walkable radius (generally up to 400 metres) centred on public transport nodes (most often railway stations). The aim of TOD is to facilitate the growth of strong urban activity nodes, supported by and supporting the public transport system. They are characterised by walkable catchments, a variety of housing styles and densities, and mixed land uses. As an important part of the Action Plan for the Network City strategy for the future of Perth, the Government of Western Australia's Transit Oriented Development Coordinating Committee is coordinating development of TOD at a number of sites in the Perth area, including greenfield sites on the new Perth-Mandurah railway. This will involve coordinated actions by State agencies, local governments and the private sector, within an innovative framework of land use regulation and public transport infrastructure development. The committee has developed a close relationship with PATREC, which is undertaking research to improve understanding of process issues and to develop measures of performance for TOD.

During 2005 PATREC joined with a number of sponsors to present a major international conference on *Transit Oriented Development: Making it Happen*. Papers/presentations from this event are available at www.patrec.org/conferences/TODJuly2005/TODJuly2005.html.

Obstacles and Opportunities

Chief Investigator: Assistant Prof John L Renne (Murdoch University)

Interviews and focus groups were conducted with stakeholders from local and State governments and the urban development industry, to identify commonly held objectives for TOD and substantive and process issues seen to be inhibiting progress in planning and implementation. This completed project was partially funded by the Department for Planning and Infrastructure WA. See www.patrec.org/conferences/TODJuly2005/papers/Renne%20WA%20paper.pdf.

Demand for housing in TOD precincts in Perth

Chief Investigator: Prof Fiona Haslam McKenzie (Curtin University of Technology)

This qualitative and quantitative research study will identify the characteristics of households and individuals likely to choose to live in TOD precincts; these characteristics will be used to describe relevant housing market segments and to specify statistical indicators to be used for measurement and forecasting of these segments. It will evaluate opportunities for affordable housing in TOD precincts. The research will be conducted by use of focus groups, a survey questionnaire distributed to a sample of existing TOD households and potential purchasers, interviews with selected estate agents and housing providers and the analysis of census and other statistical data. This project is being funded by LandCorp (the WA Land Corporation) and by the WA Department of Housing and Works.

Impacts of transit led development in a new rail corridor

Chief Investigators: Prof JHE Taplin AM, Prof FN Affleck, Assoc Prof C Curtis, Dr Min Qiu (The University of Western Australia, Curtin University of Technology)

The Government of WA is investing \$1.5 billion to build a new strategic railway corridor through the southern suburbs of the Perth, adding 73 km to the electrified passenger rail network, to commence operating in mid-2007, largely through 'green fields'. To facilitate accessibility and economic opportunity, government and the private sector are planning for TOD communities at suitable station precincts. The main purpose of the study is to capture the effects of these developments on emerging travel behaviour and on choice of location and housing type. Current travel models are calibrated from past surveys; to evaluate the impact of TOD a revealed/stated preference survey on transport modal choices will be used. The results of the RP/SP survey will be used to update Perth's STEM model to assess the travel impacts of the novel features of TOD. This project is supported by an ARC Linkage grant (LP:0562422) and eleven industry sponsors: The Peet Southern JV Pty Ltd, Department for Planning and Infrastructure WA, LandCorp, Public Transport Authority WA, Subiaco Redevelopment Authority, East Perth Redevelopment Authority, Midland Redevelopment Authority, City of Cockburn, City of Melville, City of Rockingham and the Town of Kwinana.

Main Street revitalisation

PhD candidate: Luke Li Stange (Murdoch University)

Luke is studying the processes, policies and outcomes of main-street revitalisation in Western Australia within a sustainability framework. This research is being conducted under the supervision of Professor Jeff Kenworthy, in the Institute of Sustainability and Technology Policy, Murdoch University.

Planning and Transport Modelling Program

Following examination of all of the principal transport models used by transport planning agencies in Western Australia (reported in MAP Taylor and D Scrafton (2004), *Review of the Main Roads Western Australia (MRWA) Transport Model, An Overview of the Findings*), the State Government of WA initiated a program of research and education through PATREC aimed at making more effective use of these models. This program has two major components, a suite of research projects (outlined below), and a training program, comprising a number of short courses to familiarise non-technical planning staff with available modelling tools and with the uses of specific applications.

This program is supported by State government agencies, the Department for Planning and Infrastructure, Main Roads WA, the Public Transport Authority, the City of Perth, Fremantle Ports, and the East Perth and Midland Redevelopment Authorities. The initial stages of the Planning and Transport Modelling Program (PTMP), committed for two years, is focussing on the following projects.

A freight model for Perth

Chief Investigator: Dr Min Qiu, Director, PTMP (The University of Western Australia)

This project will build a new freight model of Perth with a view to optimising freight corridor choices and major facility locations.

Scoping potential uses of the PTA SmartRider database

Chief Investigator: Dr Doina Olaru (The University of Western Australia)

The Public Transport Authority of WA is currently implementing an innovative ‘smartcard’-based fare collection and accounting system, SmartRider, which will as a by-product of its main functions also collect a large amount of trip-related data. It is proposed to use datasets from this system to develop innovative models to assist with infrastructure and planning and analysis of travel behaviour.

Enhancing the Strategic Transport Evaluation Model

Chief Investigator: Adjunct Prof Dr Peter Lawrence (Edith Cowan University)

The aim of this research is to replace the trip generation stage of STEM (Strategic Transport Evaluation Model) with a module that generates trip chains and to enhance the mode choice module. This would involve replacement of current regression-based algorithms with a range of new approaches including, for example, logit and discrete choice modelling.

Assisting development of trip generation database

Chief Investigator: Dr Min Qiu, Director, PTMP (The University of Western Australia)

The PTMP team will assist the principal project sponsors to specify and scope a project to develop a trip generation database, similar to the UK’s TRICS, for transport modelling, transport impact assessments, and parking standards in town planning schemes.

Marine Safety

This suite of research projects is being undertaken by the School of Population Health in The University of Western Australia. Beginning in 2004, these projects have been supported by a three-year funding program by the Marine Safety Directorate in the Department for Planning and Infrastructure WA for a Marine Safety Research Fellow.

Defining marine-related injuries and incidents

Chief Investigator: Dr Terri Pikora (The University of Western Australia)

This project developed definitions related to marine and boating-related fatalities, injuries and incidents. It provides a list of key definitions to guide future research in the area of marine safety research, both at a state and national level.

Publications: Pikora, Terri J (2004). *Definitions for Marine Safety Research*. Injury Research Centre, School of Population Health, The University of Western Australia, report RR 151; Pikora, Terri (2005). “Marine safety research in Western Australia”. Presented to the *PATREC Research Forum*, Perth.

Analysis of existing marine-related injury and incident data sets

Investigators: Dr Terri Pikora, Dr Rina Cercarelli (The University of Western Australia)

This project reported on the range of marine and boating-related fatality, injury and incident data that are currently available in Western Australia. These data sets include those from the health sector (such as the death data and the hospitalisation data), the marine incident data as reported to the Department for Planning and Infrastructure, and marine search and rescue data as reported to the WA Water Police. This research was one of the first either nationally or internationally, to obtain and report on these data sets together. It provides current information on marine and boating-related injuries and incidents.

Publications: Pikora T (2005), "Boating-related fatalities, injuries and incidents in Western Australia, 1989-2003", presentation to annual *Sea Rescue Conference*, South Perth; Pikora, Terri (2005), "Boating-related fatalities, injuries and incidents in Western Australia", presented to *Marine Safety 2005 Conference*, Hobart, April 2005; Pikora, Terri J and L Rina Cercarelli (2004), *Quantifying Boating-Related Fatalities, Injuries and Incidents in Western Australia*, Injury Research Centre, School of Population Health, The University of Western Australia, report RR 154.

Survey of recreational boaters attending boating safety courses in Western Australia

Investigators: Dr Terri Pikora, Dr Rina Cercarelli (The University of Western Australia)

The aims of this project are: To determine the characteristics of recreational boaters who participate in boater education training courses prior to the introduction of compulsory competency training; and To evaluate boater education safety courses. This research will assist in the identification of promotional strategies that may be used to assist in encouraging boaters to undertake boater training. This research will involve training courses that are conducted in both metropolitan and rural areas of Western Australia.

Identifying the factors related to the reporting of marine incidents

Chief Investigator: Dr Terri Pikora (The University of Western Australia)

There appear to be a number of marine-related incidents that are not reported to the Department for Planning and Infrastructure, resulting in underestimation of marine-related incidents for commercial and recreational vessels. The aims for this project were to identify the barriers to the reporting of marine-related incidents in WA; to identify ways to encourage boaters to report marine incidents; to identify which items on the MID reporting form need to be modified to improve both the reporting of incidents and the quality of the data reported; and to identify if there is a need to conduct an education program related to the incident reporting process. This project involved conducting in-depth interviews with recreational and commercial boaters in both metropolitan and rural areas. The results have assisted in identifying aspects of the MID reporting form that may require modification and strategies to encourage boaters to report incidents.

Survey of risk factors associated with marine-related injuries and incidents in WA

Chief Investigator: Dr Terri Pikora (The University of Western Australia)

The aim of this project is to determine factors that may be associated with marine-related injuries and incidents. These may include those related to individuals' age, gender, experience, knowledge of safety procedures and/or knowledge of safety requirements; behavioural factors, e.g. alcohol consumption; level, currency and quality of boater training and/or wearing of PFDs; social factors, e.g. number of passengers, beliefs/perceptions about acceptable behaviour; and environmental factors, e.g. weather conditions, size and type of vessel. This project will seek to determine, at a population level, the number, level of severity and outcome of boating related injuries and incidents. It will also lead to the development of a conceptual framework for boating-related injuries and incidents among WA boaters.

Development and piloting of a logbook to determine the level of exposure to the risk of injury among recreational boaters

Investigators: Dr Terri Pikora, Heather Williams (The University of Western Australia)

This project will develop exposure data in relation to the amount of time spent boating. There are data indicating the number of registered vessels, but there are no data on the number of boats or the number of boaters. The aim of this project is to develop and pilot a log book to collect this data. Information collected will include the frequency of vessel use, the length of time that vessels are used and activity types.

Railway safety and security

PATREC's program in this area is in an early stage of development, and during 2005 involved two projects. Further projects in this theme are being developed for commencement in 2006.

Preliminary investigation into benchmarking the safety culture in the Australian rail industry

Chief Investigator: Izumi Hart (Murdoch University)

The quality of safety culture has been subject to criticism in some Australian railways. 'Safety culture' is the underlying values, expectations and assumptions related to safety in a workplace; in contrast, 'safety climate' characterises the perceptions and attitudes about the way safety is practised and managed in a workplace. The aim of this research project was to pilot a survey instrument to assist in evaluating the quality of safety culture in rail organisations. The experimental survey instrument comprised questions about six main cultural dimensions: safety values, beliefs and assumptions; leadership and safety; structure of safety (the social meaning of safety); cognitive styles; behavioural norms; and drivers of safety performance. This research was supported directly by PATREC, and its findings are reported in PATREC Working paper No 4. Izumi Hart is currently undertaking doctoral research on this topic under the supervision of Assoc Prof Laurence Hartley.

Publications: Hart, Izumi (2005), "Preliminary investigation of benchmarking the safety culture of the Australian rail industry", presented to the *PATREC Research Forum 2005*, Perth; Hart, Izumi (2005), *Railway Safety Culture Survey 2005: Report to the Advisory Panel*, PATREC Working Paper 4.

A youthwork strategy to manage crime and anti-social behaviour in rail station precincts

Chief Investigator: Dr Terry Love (Curtin University)

Investigators: Angela Durie and Dr Trudi Cooper (Edith Cowan University)

The hypotheses driving this research are that substantial success in controlling and reducing crime and anti-social behaviour could be achieved by the use of strategies called 'youth work', 'detached style youth work', and 'outreach youth work', and that people who use and 'hang out' in railway stations can be 'diverted' to other non-threatening activities. Public transport throughout the world is a venue for crime and anti-social behaviour. The spaces in and around railway stations are also places where people gather, which can be perceived as threatening to others, who might be deterred from using the rail system. The focus of the research is on deterring and controlling anti-social behaviour in stations and surrounding precincts; it is not directly concerned with controlling behaviour on trains. The approach comprises observation in stations and station precincts, descriptive analysis, workshoping of this analysis with public transit guards and youth workers, and designing, implementing and reporting on a pilot program.

This research is being funded by the WA Office of Crime Prevention, the Public Transport Authority of WA, and the Cities of Joondalup, Swan, Gosnells and Armadale.

Freight Logistics

PATREC has a substantial multi-disciplinary program in freight logistics and supply chain management, aimed at adding value to key aspects of supply chain processes. Included in this program to date are ten research projects:

The impact of Competition Policy on investment in rail infrastructure

Chief Investigator: Nick Wills-Johnson, ARG Research Fellow (Curtin University of Technology)

The focus of this research is Australia's 'third-party access regimes' and the vertical separation of above-rail and below-rail management, which has generally been associated with implementation of these access regimes. The research is examining whether there is evidence that price-based access regulation and vertical separation are inhibiting investment in railway infrastructure. The issue is a complex one, and the investigation is examining institutional, economic and behavioural factors. This independent research is being funded by the Australian Railroad Group Pty Ltd.

Publications: Wills-Johnson, Nick and Fred Affleck (2005), "Regulating Rail for Growth: Alternative regulatory paradigms", in the Proceedings of the *Australasian Transport Research Forum 2005*, Sydney; Bloch, H, P Kenyon and N Wills-Johnson (2005), "Estimation of the X-Factor in CPI-X Regulation of the Western Australia Rail Industry", *The NRRJ Journal of Applied Regulation*, vol 3: 79-94.

Factors Contributing to Under-Provision of Rail Infrastructure Capacity

Chief Investigator: Prof Fred Affleck (Curtin University of Technology)

This research uses two case studies – the coal railway networks of Queensland and in the Hunter Valley of New South Wales – to examine factors that may be contributing to under-investment in railway infrastructure. This research was undertaken for a paper presented to the 2005 regulatory conference of the Australian Competition and Consumer Commission.

Publications: Affleck, Fred (2005), "Exploration of Some Factors Contributing to Under-Provision of Infrastructure Capacity: Coal Railway Networks in Queensland and Hunter Valley of New South Wales", in proceedings of *ACCC 2005 Regulatory Conference*, Gold Coast, 28-29 July 2005.

A model for government funding of private sector rail infrastructure

Chief Investigator: Prof Fred Affleck (Murdoch University)

Railways in most of Australia were 'privatised' between 1997 and 2002. A result of this dramatic change in governance models that had applied for well over a century is that governments have lost their ability, cases of market failure, to invest directly in railway infrastructure or operating assets. In a number of jurisdictions, including a number in North America and Australasia, there are programs through which governments provide funding for targeted rail investment on a range of terms and conditions. Drawing on these examples, the aim of this research, conducted in 2004, was to create guidelines for potential application in WA, to enable productive and prudent investment by government in targeted railway infrastructure. Funding for this research was provided by the WA Department for Planning and Infrastructure.

Publications: Affleck, FN, J Ryan and JHE Taplin (2004), *Report on Options for Public Assistance for Rail Infrastructure Financing*, report for the WA Department for Planning and Infrastructure, Perth.

Rail branchline options in New South Wales

Chief investigator: Prof Fred Affleck (Murdoch University)

This project, conducted in 2003, assisted the NSW Grain Infrastructure Advisory Committee to complete a study of options for the future of some 20 grain branchlines in the State. This study was funded by the NSW Ministry of Transport.

Publications: Grain Infrastructure Advisory Committee (2004), *Report on Road/Rail Options for Grain Logistics* www.transport.nsw.gov.au/giac/GIAC-Report.pdf.

Future directions for the Australian Logistics Council

Chief investigator: Prof Fred Affleck (Murdoch University)

This research consultancy, conducted in 2004, was commissioned by the Chairman of the Australian Logistics Council (ALC), to examine the functions and programs of the ALC, and provide advice on new governance and management structures and a work program. As a result of this work the Council engaged a new management team and has adopted a number of new issue management strategies.

Publications: Australian Logistics Council (2004), *Report on Future Directions*, to the Chairman of the Australian Logistics Council, by Professor Fred Affleck, Perth.

A freight model for Perth

Investigators: Dr Min Qiu and Wen Huang (The University of Western Australia)

This project, part of the Planning and Transport Modelling Program (see above), will build a new freight model of Perth with a view to optimising freight corridor choices and major facility locations. This need for this project was an identified at PATREC's Industry Conference on Maritime Logistics: Land-side issues and opportunities (November 2004).

Urban container logistics: a global local problem (two case studies)

Investigators: Prof Emeritus Trevor Heaver (University of British Columbia) and Prof Fred Affleck (Curtin University of Technology)

Achieving a smooth and balanced integration between the multi-stage functions of handling freight between ship and shore has always been challenging. Imbalances between functions give rise to discontinuities in processes and to bottlenecks. The challenges of integration are greater in container transport than in bulk transport because of the much larger number of organizations that are involved in the cargo on a container vessel than on a bulk ship. The imbalances may show up as queues of trucks at terminal gates or delayed trains. However, these are only the evident symptoms of problems that are associated with a wide array of aspects of the port-inland interface. This study is examining two case studies, the ports of Vancouver Canada and Fremantle Australia.

Publications: Heaver, Trevor (2004), "Maritime Logistics: landside issues and opportunities", report on the conference of the Planning and Transport Research Centre, Fremantle, 25-26 November 2004 (www.patrec.org/conferences/MaritimeLogistics2004/Summary%20of%20proceedings%20and%20outcomes%20text.pdf)

A methodology for establishing trust in logistics peer-to-peer environments

PhD candidate: Farookh Hussain (Curtin University of Technology)

Farookh Khadeer Hussain is conducting research in this topic for his PhD thesis, under the supervision of Professor Elizabeth Chang, Director of the Centre of Extended Enterprises and Business Intelligence, Curtin Business School.

Publications: Chang, E, FK Hussain, and T Dillon (2005), "Reputation ontology for reputation systems", Lecture Notes in *Computer Science*, vol. 3762/2005, 957; Chang, E, FK Hussain and T Dillon (2005), "CCCI trustworthiness measure for agent networks", *Proceedings of the 2005 IEEE/WIC/ACM International Conference on Intelligent Agent Technology (IAT)*; Chang, E, FK Hussain and T Dillon (2005), "Ontology based trust and reputation for distributed anonymous environments", *Proceedings of the IEEE Systems Management and Cybernetics Conference*; Chang, E, FK Hussain and T Dillon (2005), "Reputation ontology for reputation systems", *Proceedings of the On the Move to Meaningful Internet Systems 2005*; Chang, E, FK Hussain and T Dillon (2005), "Trustworthiness measure for e-service", *Proceedings of the Third Annual Conference on Privacy, Security and Trust*; Chang, E, FK Hussain and TS Dillon (2005), "Trust modelling using trust case diagrams", *Proceedings of the Second Workshop on Secure Web Services*; Chang, E, FK Hussain, TS Dillon, and P Thomson (2005), "Trust and reputation modelling language", *Proceedings of the First IFIP/WG2.12 and WG 12.4 International Workshop on Web Semantics*; Chang, E, P Thomson, F Hussain and TS Dillon (2005), "Trust ontology for quality of business service assessment", *Proceedings of the 4th WSEAS International Conference on Information Security, Communications and Computers*; Chang, E, T Dillon and FK Hussain (2005), "Formalizing a grammar for reputation in peer-to-peer communication", *Proceedings of the Seventh International Conference on Information Integration and Web-based Applications and Services*; Chang, E, TS Dillon and FK Hussain (2005), "Reputation ontology", *Proceedings of the First IFIP/WG2.12 and WG 12.4 International Workshop on Web Semantics*; Chang, E, TS Dillon and FK Hussain (2005). "Trust and reputation", Invited Keynote for *IFIP Academy on the State of Software Theory and Practice*; Chang, E, TS Dillon and FK Hussain (2005), "Trust for e-business", Invited Keynote for the *3rd International Conference on Information Technology and Applications*; Hussain, FK, E Chang, and TS Dillon (2005). "Markov model for managing dynamic trust", *Proceedings of IEEE's 3rd International Conference on Industrial Informatics*; Hussain, O, E Chang, FK Hussain, B Soh and TS Dillon (2005), "A methodology for determining riskiness in peer-to-peer communication", *Proceedings of IEEE's 3rd International Conference on Industrial Informatics*; Hussain, O., E Chang, FK Hussain, TS Dillon and B Soh (2005), "Modelling the risk relationships and defining the risk set", *Proceedings of the LatAm Collaborative Electronic Commerce Technology and Research Conference*.

Information Hiding and Tamper Detection for Ubiquitous RFID-enabled Supply Chain

PhD candidate: Vidy Potdar (Curtin University of Technology)

Vidyasagar Potdar is conducting research in this topic for his PhD thesis, under the supervision of Professor Elizabeth Chang, Director of the Centre of Extended Enterprises and Business Intelligence, Curtin Business School.

This research concerns 'information hiding', for protecting intellectual property (steganography) and is focussed on developing digital watermarking for use in the logistics industry. The main aim of his research is to propose a new steganographic model that would achieve high embedding capacity as well as low perceptibility. Image Steganography is one sub-branch of digital steganography. The fundamental requirements of any steganography model are imperceptibility against detection, high embedding capacity and robustness against attacks. This research is being conducted under the supervision of Professor Elizabeth Chang.

Publications: Potdar, V, MA Khan, E Chang, M Ulieru and P Worthington (2005), "E-Forensics Steganography System for Secret Information Retrieval", *International Journal of Advanced Engineering Informatics*, vol. 19, 235-241; Potdar, V and E Chang (2005), "Scalar quantization based robust image watermarking algorithm in the wavelet domain", *Proceedings of the ICT WA 2005 Conference*; Potdar, V, C Wu and E Chang (2005), "Tamper detection for ubiquitous RFID-enabled supply chain", *Proceedings of the International Conference on Computational Intelligence and Security (CIS)*; Potdar, V, S Han and E Chang (2005), "A survey of digital image watermarking techniques", *Proceedings of IEEE's 3rd International Conference on Industrial Informatics*; Potdar, V, S Han and E Chang (2005), "Dictionary module and UDC: Two new approaches to enhance embedding capacity of a steganographic channel", *Proceedings of IEEE's 3rd International Conference on Industrial Informatics*; Potdar, V, S Han and E Chang (2005). "Fingerprinted secret sharing steganography for robustness against image cropping

attacks”, *Proceedings of IEEE’s 3rd International Conference on Industrial Informatics* (received Best Paper (Presentation) Award and Invited for IEEE Transactions; Potdar, Vidyasagar (2005), “Information Hiding and Tamper Detection for Ubiquitous RFID-enabled Supply Chain”, *Presented to the PATREC Research Forum 2005*.

An inventory of railway skills and a long-term forecast of requirements

Chief Investigator: *Michael Dockery* (Curtin University of Technology)

This project is aimed at providing information to the railway industry on recruitment and training needs in the medium-to-long term, segmented by major region and competency groups. It will create an inventory of railway human resources, and produce estimates of likely exits and the resulting requirements for new recruitment and training. Data is being collected from rail systems and from other available sources. This research is being supported by the CRC for Rail Technology, Queensland Rail, the Australian Railroad Group Pty Ltd, the Public Transport Authority of WA, MVM Rail Pty Ltd and CERT (Centre for Excellence in Rail Training).

Sustainable transport fuels

Transforming the Australian vehicle fleet

Investigators: Zeenat Abdoolakhan, Prof John Taplin, Dr Doina Olaru, Brett Smith (The University of Western Australia)

Increasing petrol prices impacting directly on consumers’ budgets have recently triggered wide interest in alternative fuel vehicles and new technology cars. Using an early pilot study, this project has developed a proposed research method to assess the influence of various choice factors in the decision to purchase a new vehicle – type and size of vehicle, type of fuel, operating cost, vehicle purchase price and cargo space – within a discrete choice model framework. The model also accounts for individual characteristics and latent lifestyle and belief factors.

Publications: Abdoolakhan, Zeenat (2005), “Viability of Alternative Fuels and New Technology Vehicles. Presented to the *PATREC Research Forum 2005*, Perth; Olaru, D, Z Abdoolakhan and N Smith (2005), “Choice factors in the adoption of alternative fuels and new technology vehicles: An SP approach”, *27th Conference of the Australian Institutes of Transport Research*, Brisbane; Taplin, John and Zeenat Abdoolakhan (2005), *Transformation of the Australian Car Fleet: Likely Responses to Current and Projected Petrol Price*, Information Management and Transport, School of Economics and Commerce, The University of Western Australia, PATREC Working Paper 2.

Transport and the Environment

Optimising policies for reducing the environmental impacts of transport.

PhD Candidate: Sharif Siddique (The University of Western Australia)

Sharif’s PhD research examines the impact of travel related policy instruments on air quality within the central business district of Perth. It aims at joint development of a genetic algorithm and a stated preference survey to optimise policies for ameliorating the environmental impacts of transport. This research is being conducted under the supervision of Prof John Taplin, in the School of Economics and Commerce in the UWA Business School.

Publications: Siddique, Sharif (2005), “Modelling of Transport Mode Selection by Travellers to Perth City”, presented to the *PATREC Research Forum 2005*, Perth.

Integrating economic, environmental & social factors for prioritising transport policies

PhD Candidate: Clare Yu (The University of Western Australia)

The focus of this research is to determine the relative weights of economic, environmental and social factors used in formulating transport policies based on multi-criteria analysis. Discrete choice modelling, based on revealed and stated preference survey data, will be used to disclose individuals’ willingness to pay for maintained or improved environmental and social outcomes. Significantly, the relative importance of the economic, environmental and social factors is determined at the regional level. This research is being supervised by Dr Min Qiu of the School of Economics and Commerce, UWA Business School.

Publications: Yu, Clare (2005), “Willingness to Pay for Environmental Externalities, for Self-Interest or for Community-Interest?” presented to the *PATREC Research Forum 2005*, Perth.

Indigenous management of transport systems

Who really makes the decisions?

MPhil candidate: John Smoker (Murdoch University)

This research will examine the development, implementation and acceptance of shared responsibility agreements by Indigenous people in developing community sustainability in partnership with all levels of government, in particular the effectiveness of new arrangements being implemented by indigenous coordinating centres in the Kimberley region of Western Australia, with special on the effectiveness and outcomes of the Regional Partnership Agreements (RPAs) and Shared Responsibility Agreements (SRAs) for the remote communities of Balgo and Kalumbarru, and processes for creating new local representative bodies being developed to replace the ATSIC regional councils. This research is being supervised by Prof Peter Newman, Director of the Institute for Sustainability and Technology Policy, Murdoch University. Funding for incidental expenses is being provided by Main Roads Western Australia.

Short history of the WA Government Railways

Investigators: Prof Fred Affleck and Linley Batterham (Murdoch University)

The former WA Government Railways Commission (the WAGR, established in 1902) ceased to exist when the Public Transport Authority of WA was established in 2003. A substantial but partial history (1950-1976) of Westrail (the trading name used by the WAGR before privatisation of its freight business in 2000) was published by Fred Affleck in 1978. The WA Section of the Australian Railway Historical Society continues to publish short articles on the history of the WAGR and the Midland Railway Company of WA Ltd (absorbed by the WAGR in 1964). The purpose of this research, in progress, is to provide a complete short history of the WAGR from its origins in 1879 to 2003, where possible incorporating oral history sources. This project is supported by funding from the Public Transport Authority of Western Australia.

Publications: Affleck, Fred (1978), *On Track: The Making of Westrail, 1950-1976*, Perth.

APPENDIX B: Publications 2005

The following list comprises publications and conference presentations made by academic staff and student researchers affiliated with PATREC. It includes publications reporting outcomes of PATREC research projects (see also previous section above), and publications by PATREC affiliates in related areas.

- Bloch, H, P Kenyon and **N Wills-Johnson** (2005), "Estimation of the X-Factor in CPI-X Regulation of the Western Australia Rail Industry", *The NRRJ Journal of Applied Regulation*, vol 3: 79-94.
- Chang, E, FK Hussain**, and T Dillon (2005). "Reputation ontology for reputation systems", Lecture Notes in *Computer Science*, vol. 3762/2005, 957.
- Curtis C** (2005). "Creating Liveable Streets – Developing Traffic Management Guidelines for Western Australia", 183-203 in *Spatial Planning, Urban Form and Sustainable Transport*, K Williams, (ed.) Ashgate UK.
- Curtis C** (2005). "Network City: Retrofitting the Perth Metropolitan Region to Facilitate Sustainable Travel". *Urban Policy and Research*.
- Curtis C** (2005). "The Windscreen World of Land Use Transport Integration: Experiences from Perth, a Dispersed City". *Town Planning Review* Vol 76 (4).
- Curtis, C** (2006 forthcoming). "Network City: Retrofitting the Perth Metropolitan Region to Facilitate Sustainable Travel". *Urban Policy and Research*.
- Kenworthy, J, R Murray-Leach C Townsend** (2005). "Sustainable Urban Transport", in KC Hargroves and MH Smith, in *The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century*, Chapter 19, 371-386, London.
- Kenworthy, JR** (2005). "Sustainable urban transport: Developing sustainability rankings and clusters based on an international comparison of cities", in *Handbook of Sustainability Research*, Chapter 16, 409-437, Frankfurt.
- Kenworthy, JR** and FB Laube (2005). "An international comparative perspective on sustainable transport in European Cities". *European Spatial Research and Planning* 12 (1), pp 11-50.
- Olaru, D** and **B Smith** (2005). "Modelling behavioural rules for daily activity scheduling using fuzzy logic." *Transportation* 32(4), 423-441.
- Pikora, Terri J and Heather A Williams** (2005). "Identifying Factors to Improve the Reporting of Marine-related Incidents in Western Australia". Injury Research Centre, School of Population Health, The University of Western Australia, report RR 170.
- Pikora, Terri J and L Rina Cercarelli** (2005). "Survey of Recreational Boaters Voluntarily Attending Boating Education Courses in Western Australia". Injury Research Centre, School of Population Health, The University of Western Australia, report RR 156.
- Potdar, V, MA Khan, E Chang, M Ulieru and P Worthington** (2005). "E-Forensics Steganography System for Secret Information Retrieval." *International Journal of Advanced Engineering Informatics*, vol. 19, 235-241.
- Scheurer, J, **J Kenworthy** and **P Newman** (2005). "Most liveable and best connected? The economics of investing in public transport in Melbourne". *A Policy Document for the Melbourne Transport Forum*. Metropolitan Transport Forum, Melbourne. 34 pp.
- Taplin, JHE, Min Qiu, Vivian K Salim and Renlong Han** (2005). *Cost-Benefit Analysis and Evolutionary Computing: Optimal Scheduling of Interactive Road Projects*. In *Transport Economics, Management and Policy*, General Editor: Kenneth Button. UK.

Conference Presentations

- Abdoolakhan, Zeenat** (2005). "Viability of Alternative Fuels and New Technology Vehicles. Presented to the *PATREC Research Forum 2005*, Perth.
- Affleck, Fred** (2005). "Logistics into the Fast Lane – Building our future super corridors". Presentation to *Smart 2005 Conference*, "Staying in the Fast Lane – from planning to execution", Sydney.
- Affleck, Fred** (2005). "Too much traffic, too little time". Public address in series *Innovative Solutions to Stress on a Modern City*. Curtin University of Technology, 10 May 2005.
- Affleck, Fred** (2005). "Exploration of Some Factors Contributing to Under-Provision of Infrastructure Capacity: Coal Railway Networks in Queensland and Hunter Valley of New South Wales". In

- Proceedings of *ACCC 2005 Regulatory Conference*, Gold Coast, 28-29 July 2005.
- Affleck, Fred** (2005). "The Tyranny of Distance: Infrastructure in Western Australia". Presentation to the *CEDA Infrastructure Series*, Perth.
- Chang, E, FK Hussain** and T Dillon (2005). " 'CCCI trustworthiness measure for agent networks', *Proceedings of the 2005 IEEE/WIC/ACM International Conference on Intelligent Agent Technology (IAT)*, Compiègne, France, 19-22 Sept 2005,
- Chang, E, FK Hussain** and T Dillon (2005). "Ontology based trust and reputation for distributed anonymous environments", *Proceedings of the IEEE Systems Management and Cybernetics Conference*, Hawaii, 10-12 Oct.
- Chang, E, FK Hussain** and T Dillon (2005). "Reputation ontology for reputation systems", Proceedings of the *On the Move to Meaningful Internet Systems 2005: OTM 2005 Workshops*, Agia Napa, Cyprus, Oct/Nov, 957-966.
- Chang, E, FK Hussain** and T Dillon (2005). "Trustworthiness measure for e-service", Proceedings of the *Third Annual Conference on Privacy, Security and Trust*, New Brunswick, Canada, 12-14 Oct.
- Chang, E, FK Hussain** and TS Dillon (2005). "Trust modelling using trust case diagrams", Proceedings of the *Second Workshop on Secure Web Services (SWS)*, Fairfax, USA, 11 Nov.
- Chang, E, FK Hussain**, TS Dillon, and P Thomson (2005). "Trust and reputation modelling language", Proceedings of the *First IFIP/WG2.12 and WG 12.4 International Workshop on Web Semantics (SWWS)*, Agia Napa, Cyprus, 1-2 Nov.
- Chang, E**, P Thomson, **F Hussain** and TS Dillon (2005). "Trust ontology for quality of business service assessment", Proceedings of the *4th WSEAS International Conference on Information Security, Communications and Computers (ISCOCO)*, Canary Islands, Spain, 16-18 Dec.
- Chang, E**, T Dillon and **FK Hussain** (2005). "Formalizing a grammar for reputation in peer-to-peer communication", Proceedings of the *Seventh International Conference on Information Integration and Web-based Applications and Services (iiWAS)*, Kuala Lumpur, 19-21 Sept.
- Chang, E**, TS Dillon and **FK Hussain** (2005). "Reputation ontology", Proceedings of the *First IFIP/WG2.12 and WG 12.4 International Workshop on Web Semantics (SWWS)*, Agia Napa, Cyprus, 1-2 Nov.
- Chang, E**, TS Dillon and **FK Hussain** (2005). "Trust and reputation", Invited Keynote for *IFIP Academy on the State of Software Theory and Practice*, Porto Alegre, Brazil, 18 July.
- Chang, E**, TS Dillon and **FK Hussain** (2005). "Trust for e-business", Invited Keynote for the *3rd International Conference on Information Technology and Applications (iCITA)*, Sydney, 4-7 July.
- Hart, Izumi** (2005). "Preliminary investigation of benchmarking the safety culture of the Australian rail industry". Presented to the *PATREC Research Forum 2005*, Perth.
- Hussain, FK, E Chang**, and TS Dillon (2005). "Markov model for managing dynamic trust", Proceedings of *IEEE's 3rd International Conference on Industrial Informatics (INDIN)*, Perth, 10-12 Aug.
- Hussain, O, **E Chang, FK Hussain**, B Soh and TS Dillon (2005). "A methodology for determining riskiness in peer-to-peer communication", *Proceedings of IEEE's 3rd International Conference on Industrial Informatics (INDIN)*, Perth, 10-12 Aug.
- Hussain, O., **E Chang, FK Hussain**, TS Dillon and B Soh (2005). "Modelling the risk relationships and defining the risk set", Proceedings of the *LatAm Collaborative Electronic Commerce Technology and Research Conference (COLLECTer)*, Talca, Chile, 3-5 Oct.
- Kenworthy, J**, R Murray-Leach and C Townsend (2005). "Sustainable Urban Transport", in KC Hargroves and MH Smith, *The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century*. Chapter 19:371-386. London.
- Kenworthy, JR** (2005). "Sustainable urban transport: Developing sustainability rankings and clusters based on an international comparison of cities", in *Handbook of Sustainability Research*, Chapter 16: 409-437. Frankfurt.
- Kenworthy, JR** and FB Laube (2005). "An international comparative perspective on sustainable transport in European Cities", *European Spatial Research and Planning* 12 (1), 11-50.
- Lawrence, Peter** (2005). "Some empirical observations on travel behaviour from the Perth and Region Travel Survey". Presented to the *PATREC Research Forum 2005*, Perth.

- Olaru, D**, T Beer, J Powell and R Gillett (2005). "Linking activity-travel analysis and exposure assessment. Benefits and challenges", in Proceedings of *Environmental Exposure and Health*, Atlanta, 5-8 Oct, 161-174.
- Olaru, D**, N Smith and T Ton (2005). "Activity spaces and travel time in Sydney". In the Proceedings of the *European Transport Conference 2005*, Strasbourg.
- Olaru, D**, N Smith and J Peachman (2005). "Whereabouts from Monday to Sunday?" In Proceedings of the *Australasian Transport Research Forum 2005*, Sydney.
- Olaru, D**, Z **Abdoolakhan** and N Smith (2005). "Choice factors in the adoption of alternative fuels and new technology vehicles: An SP approach", The *27th Conference of the Australian Institutes of Transport Research*, Brisbane 7-9.
- Olaru, Doina** and **Brett Smith** (2005). "Activity Spaces or Access and Mobility for Individuals and Households". Presented to the *PATREC Research Forum 2005*, Perth.
- Pikora T** (2005). "Boating-related fatalities, injuries and incidents in Western Australia, 1989-2003". Presentation to annual *Sea Rescue Conference*, South Perth.
- Pikora, Terri** (2005). "Marine safety research in Western Australia". Presented to the *PATREC Research Forum*, Perth.
- Pikora, Terri** (2005). *Boating-related fatalities, injuries and incidents in Western Australia*. Presented to Marine Safety 2005 Conference, Hobart, April 2005.
- Pikora, Terri J** (2004). *Definitions for Marine Safety Research*. Injury Research Centre, School of Population Health, The University of Western Australia, report RR 151.
- Pikora, Terri J** and **L Rina Cercarelli** (2004). *Quantifying Boating-Related Fatalities, Injuries and Incidents in Western Australia*. Injury Research Centre, School of Population Health, The University of Western Australia, report RR 154.
- Potdar, V** and **E Chang** (2005). "Scalar quantization based robust image watermarking algorithm in the wavelet domain", Proceedings of the *ICT WA 2005 Conference*, Perth, Western Australia, 18 Nov.
- Potdar, V**, C Wu and **E Chang** (2005). "Tamper detection for ubiquitous RFID-enabled supply chain", Proceedings of the *International Conference on Computational Intelligence and Security (CIS)*, Xi'an, China, 15-19 Dec.
- Potdar, V**, S Han and **E Chang** (2005). "A survey of digital image watermarking techniques", Proceedings of *IEEE's 3rd International Conference on Industrial Informatics (INDIN)*, Perth, 10-12 Aug.
- Potdar, V**, S Han and **E Chang** (2005). "Dictionary module and UDC: Two new approaches to enhance embedding capacity of a steganographic channel", Proceedings of *IEEE's 3rd International Conference on Industrial Informatics (INDIN)*, Perth, 10-12 Aug.
- Potdar, V**, S Han and **E Chang** (2005). "Fingerprinted secret sharing steganography for robustness against image cropping attacks", Proceedings of *IEEE's 3rd International Conference on Industrial Informatics (INDIN)*, Perth, 10-12 Aug. Received Best Paper (Presentation) Award and Invited for IEEE Transactions.
- Potdar, Vidyasagar** (2005). "Information Hiding and Tamper Detection for Ubiquitous RFID-enabled Supply Chain". Presented to the *PATREC Research Forum 2005*, Perth.
- Qiu, Min** (2005). "A modelling framework for freight terminal/trans-shipment facility decisions for the Perth region". Presented to the *PATREC Research Forum 2005*, Perth.
- Roos, Kaspar, **Martin West** and **Elizabeth Chang**, "An Eco-Solution for Track & Trace of Goods and Third Party Logistics", Proceeding of *IEEE International Conference on Industrial Informatics*, August 10-12, Perth, Western Australia, 61-164
- Scheurer, J, **J Kenworthy** and **P Newman** (2005). "Most liveable and best connected? The economics of investing in public transport in Melbourne", in *A Policy Document for the Melbourne Transport Forum*. Metropolitan Transport Forum, Melbourne. 34 pp.
- Siddique, Sharif** (2005). "Modelling of Transport Mode Selection by Travellers to Perth City". Presented to the *PATREC Research Forum 2005*, Perth.
- Tull, M** (2004). "Fremantle Harbour: from commercial port to recreational centre?" Presented to the *IVth International Maritime History Association Conference*, Corfu, June 22-27.
- Wills-Johnson, Nick** and **Fred Affleck** (2005). "Regulating Rail for Growth: Alternative regulatory paradigms", in the Proceedings of the *Australasian Transport Research Forum 2005*, Sydney.

Yu, Clare (2005). "Willingness to Pay for Environmental Externalities, for Self-Interest or for Community-Interest?" presented to the *PATREC Research Forum 2005*, Perth.

PATREC Working Papers

(available at www.patrec.org/publications/index.php?category=W1)

Renne, John L (2005). *Transit-Oriented Development in Western Australia: Attitudes, Obstacles and Opportunities*. Report prepared for the Department for Planning and Infrastructure WA. **PATREC Working Paper 1.**

Taplin, John and **Zeenat Abdoolakhan** (2005). *Transformation of the Australian Car Fleet: Likely Responses to Current and Projected Petrol Price*. **PATREC Working Paper 2.**

Olaru, Doina and **Brett Smith** (2005). *Choice factors in the adoption of alternative fuels and new technology vehicles: An SP approach*. **PATREC Working Paper 3.**

Hart, Izumi (2005). *Railway Safety Culture Survey 2005: Report to the Advisory Panel*. **PATREC Working Paper 4.**

APPENDIX C: Research income 2005

Project Title	Grant Agency	Start Date	Length of Grant	Grant in 2006	Total Grants for Each Project				
					Total	Curtin	ECU	Murdoch	UWA
	Note (a)		(years)	\$	\$	\$	\$	\$	\$
Marine Safety Research Fellowship	DPI	1-Mar-04	3	102,460	316,113	0	0	0	316,113
Transit oriented development	DPI	1-Aug-04	< 1	50,000	55,000	0	0	55,000	0
Rail Competition Policy Research Fellow	ARG	1-Mar-05	2	54,475	221,417	221,417	0	0	0
Review of Class C School Bus contracts	PTA	1-May-05	< 1	40,000	0	0	0	0	0
Rail safety culture inventory - pilot survey	PATREC	1-May-05	< 1	31,000	34,100	0	0	34,100	0
Transformation of the Australian Car Fleet	PATREC	1-Jul-05	< 1	28,000	31,350	0	0	0	31,350
TOTALS				305,935	657,980	221,417		89,100	347,463

Note (a): DPI: Department for Planning and Infrastructure WA; ARG: Australian Railroad Group Pty Ltd; PTA: Public Transport Authority WA

It is a requirement of Murdoch University that this report list Murdoch academic staff “involved in the Centre (including an estimate of time commitment to the Centre)”. This is provided as follows:

Murdoch University Staff Member	Nature of involvement with PATREC	%-age commitment to PATREC
Melanie Freeman	Managing one research project	4%
A/Prof Laurence Hartley	Supervising one PhD	4%
Prof Jeffrey Kenworthy	Member, Academic Advisory Board	5%
	Supervising one PhD	
Prof Peter Newman	Supervising one PhD	4%
A/Prof Malcolm Tull	Liaison with Business School	0%
Prof Andris Stelbovics	Member, PATREC Board	2%

Planning and Transport Research Centre

A joint program of Curtin University of Technology, Edith Cowan University, Murdoch University
and The University of Western Australia supported by the Government of Western Australia

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