Contents

Director’s Report ........................................ 4
Overview ...................................................... 5
Overview 2013 .................................................. 5
Appointments ..................................................... 5
Expansion of the rCITI core team ..................... 6
Collaborative workshops ................................... 7
Visit from Purdue University (USA) - Study Abroad Program ..................................... 7
Visiting Academic and Guest Speakers ............. 7
Conferences, Seminars and Workshops .............. 7
The Centre .................................................... 9
Core Centre Staff – 2013 ................................... 10
rCITI Steering Committee ................................. 11
Research Interests ............................................. 12
S. Travis Waller ................................................... 12
Vinayak Dixit ....................................................... 12
Upali Vandebona ................................................. 12
Lavy Libman ....................................................... 12
Lauren Gardner ................................................... 13
Taha Hossein Rashidi ......................................... 13
David Rey ............................................................ 13
Zhitao Xiong ....................................................... 13
Saeed Bastani ..................................................... 13
Publications ..................................................... 14
Book Chapter ..................................................... 14
Journal – REFEREED & Scholarly Articles ........ 14
Conference papers – full paper referred .............. 14
Reports ............................................................. 15
Visitors, Seminars And Workshops .................... 16
Visitor Seminars/Talks ....................................... 16
Workshops ......................................................... 16
Selected Centre Highlights & Research Projects ..................................................... 17
Australian Research Council (ARC) Linkage, Infrastructure, Equipment and Facilities
(LIEF) Grants ..................................................... 17
Australian Research Council (ARC) Linkage Grants ..................................................... 17
UNSW Engineering Faculty Research Grant /
Early Career Researcher Grants Program .......... 18
Students & Supervision ...................................... 19
PhD ................................................................. 19
Masters ............................................................. 20
Honours ............................................................ 20
Taste of Research (ToR) ...................................... 20
Practicum .......................................................... 20
Grant Income / Research Funding ..................... 21
Statement of Financial Performance .............. 22
I am delighted to report that the Research Centre for Integrated Transport Innovation (rCITI) has performed exceptionally well throughout 2013. As Centre Director, I am proud of the significant accomplishments we realized in central areas this year towards our centre goals.

Of particular note are our funding success and opportunities for collaboration: We have been awarded two Australian Research Council (ARC) Linkage Projects and established a substantial partnership with Transport for NSW (TfNSW) for funding over three years. In addition, we continued and further expanded our relationships and collaboration with key partners including Evans & Peck, NICTA, inter-disciplinary researchers across Campus as well as with researchers, Government and industry, both nationally and internationally. We are grateful for the continued support we receive and for the research opportunities, allowing us to explore and act on the identified scope for contribution to transportation research.

Our ongoing research work includes projects such as the “Identification and Evaluation of Transformative and Environmental Applications and Strategies”, a major initiative of the Federal Highway Administration (FHWA) of the United States Department of Transportation (US DOT). rCITI is leading the network modelling component of this research and will develop novel network evaluation methodologies for active traffic management where environmental impact is the primary issue.

The full deployment of the Travel Choice Simulation Laboratory (TRACSLab) is also underway. This proposal was awarded an ARC LIEF grant and will be a world-first facility to observe collective travel choice in a realistic lab environment. It is unique due to the focus on travel choice, networked interaction and strong teaming (including our partners at the University of Sydney and iCinema). The findings of the lab will support a new generation of transport analysis techniques for emerging issues such as sustainability, reliability, and intelligent transport systems (ITS).

Another essential achievement is the introduction of transport curriculum initiatives for next year. Two new courses and a Masters Specialization in Transport will be on offer from 2014. This augments another stepping stone for rCITI and the Centre’s contribution to transportation research at the University. On behalf of the rCITI team, I thank the School of Civil & Environmental Engineering and the Faculty of Engineering for their support with this crucial task.

We were also able again to conduct and disseminate important novel research, for example at major conferences such as TRB Transportation Research Board Annual Meeting, Washington, USA), HICSS (Hawaii International Conference on System Sciences), the International Conference of the Hong Kong Society for Transportation Studies (HKSTS) and the NSW Transport Infrastructure Summit in Sydney.

At this occasion, I am extending a warm welcome to our new staff members who have joined us this year. rCITI has expanded its core team with international researchers whose expertise complements our interdisciplinary efforts in transportation research.

rCITI’s achievements also reflect the need and opportunity for further collaboration and research in future, in order to be able to transition core research into usable tools and solutions. As we look forward, I would like to re-emphasize rCITI’s mission of becoming a world-leading organization in integrated interdisciplinary transport research and development. Our overarching aim is to be a major contributor and facilitator to shaping the global research field of integrated transport systems and ultimately attaining safe, efficient and sustainable transport for society.

Relevant interdisciplinary research and continuous liaison with Government and industry, all on a global level, form the foundation for rCITI’s mission and the realization of substantial contributions. This has been a major year for rCITI and I sincerely thank all supporters and the centre’s dedicated and excellent staff. I am looking forward to 2014 and the real opportunities lying ahead of us.

S. Travis Waller
Evans & Peck Professor of Transport Innovation and Director, Research Centre for Integrated Transport Innovation (rCITI)
Overview

Overview 2013

In 2013 the Research Centre for Integrated Transport Innovation (rCITI) continued to expand and strengthen its collaborative network with other schools across the UNSW campus, with relevant government and industry groups.

The core Academic team supervised and supported 13 Doctor of Philosophy (PhD), 3 Masters by Course work and 1 Masters by Research, 1 Taste of Research and 16 Honours students. In addition, rCITI hosted two Practicum Exchange Program students from University of Connecticut, USA and Harbin Institute of Technology, China.

The School of Civil & Environmental Engineering curriculum reviews were attended by Professor Waller and the Transport group. They were charged with the developing and implementing new transport courses and program initiatives, so that two new transport courses and one new Masters Transport Specialization stream could be offered to students from 2014.

Significant achievements for 2013 include:-

1. On the 28 June 2013 it was announced that UNSW Australia was awarded $13.2 million in Linkage Project grants from the Australian Research Council (ARC). This was highest level of funding in the state and the second highest in the country. rCITI was successful in winning funding for two of the thirty-five UNSW projects proposals. rCITI’s winning projects will focus on the optimisation of urban transport.

   - The first ARC Linkage Grant was won by investigators from rCITI at UNSW Australia, ITLS at the University of Sydney and industry partner Transport Simulation Systems (TSS) Australia (one of the main transport software vendors globally), to conduct research on the “Methodologies for the Incorporation of Congestion Propagation and System Reliability into Transport Network Models for Consistent Multi-Scale Planning”. The project will look to improving the capabilities of transport planning techniques. Specifically, new methods are to be introduced which improve the realism of regional congestion modelling as well as the mathematical representation of traveller decision-making, thereby permitting an improved long-term transport plan.

   - Government organisations have expressed interest in this particular project and are involved in project meetings to discuss potential collaboration.

2. The second Linkage Grant was won by investigators from rCITI at UNSW Australia and industry partner GoGet Carshare to conduct research on the “Integrating Network Modelling with Observed Choice Data for Multi-Criteria Optimization of Complex Carshare Systems: Cost, Mobility and Transit Usage”. The aim of this research is to develop methods to determine an efficient carshare system, which includes optimal location, one-way carsharing, and how carshare influences the broader transport system. By adopting such new comprehensive methods, the overall transport system will benefit through potential improvements in public transit usage.

   - The signing of a three year partnership with Transport for NSW (TfNSW) with a budget $1.5 million.

After ongoing meetings and scoping of potential collaboration, Professor Waller was notified by Mr Les Wielinga, Director General of Transport for NSW (TfNSW), that TfNSW agreed to enter into a three-year collaboration with funding to rCITI of $500,000 per year. This project will involve close ongoing interaction between researchers and students from rCITI at UNSW and TfNSW to conduct research on the topic “Develop and Deploy Novel Integrated Network Techniques to Enhance the NSW Transport System”.

---

CITI ANNUAL REPORT 2013 PAGE <5>
Appointments

rCITI and its staff received a number of new external appointments in 2013, these include:-

- The appointment of rCITI to the Transport Modelling Service Panel of Transport for NSW jointly with Evans & Peck, after undergoing a competitive tender submission and selection process.

- Professor Waller was appointed:-
  - As Associate Director of the iCinema Centre for Interactive Cinema Research, an interdisciplinary arts, engineering, science and social science Centre at UNSW Australia.
  - As a member of the Steering Committee for the City Futures Research Centre, UNSW’s leading urban policy research centre within the Faculty of the Built Environment, focusing on key research areas such as urban planning, housing, design, development and social policy.

Expansion of the rCITI core team

Throughout the year, Professor Waller further expanded the rCITI’s core team, securing Dr David Rey, Mr Zhitao Xiong and Dr Saeed Bastani in Post-Doctoral positions and Ms Maria Lee as Centre Manager. Their respective expertise complements the Centre’s efforts in key areas.

Dr David Rey joined rCITI in February from the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR) in France. His core interest is in Operations Research, which allows him to contribute to essential rCITI projects and further expand the Centre’s cross-campus collaboration into areas such as aviation and air traffic flow.

Mr Zhitao Xiong joined rCITI in June after submitting his PhD thesis in Transport Studies at the University of Leeds, Great Britain and will deploy his expertise in Driving Simulation and Driving Behaviour to focus on rCITI’s TRACsLab (ARC LIEF grant).

Dr Saeed Bastani joined UNSW in September after the completion of his PhD at the University of Sydney, he worked with Dr Libman at the School of Computer Science and Engineering on the project "Distributed Protocols for Dense and Dynamic Wireless Systems with Application to Vehicular Traffic Control", studying the impact of wireless beaconing policies on the accuracy of traffic estimation and designing novel mechanisms for "blending" of information gathered from wireless position beacons into road traffic models for purposes such as incident detection and real-time travel time estimation.

Ms Maria Lee joined rCITI in December as Centre Manager. She is a highly experienced administrator with expertise in office, finance, committee and event management. Prior to joining rCITI, she spent over 15 years at the Royal Australasian College of Dental Surgeons in her roles as Membership Officer and Manager of Accounts. She holds a BTax and BScience from UNSW.
Collaborative workshops

rCITI co-organized two collaborative workshops with researchers, academics and staff from NICTA (1 November 2013) and the School of Computer Science and Engineering (22 November 2013). This further strengthened existing ties and explored additional areas for potential mutual research and projects. Both of these workshops were well received and we look forward to the possibility of hosting similar events in the future.

Visit from Purdue University (USA) - Study Abroad Program

rCITI hosted a study abroad program from the School of Civil Engineering, Purdue University (USA), 7-12 May 2013. Associate Professor Satish Ukkusuri (Faculty), Cindy Lawley (co-instructor), Kathy Heath (Program Coordinator) and 26 students enjoyed their visit to the Research Centre for Integrated Transport Innovation (rCITI). Activities included a tour around the UNSW campus; attending presentations from UNSW International discussing global educational opportunities at UNSW; and attending a mini-talk series on Sustainability and Infrastructure, from the following speakers:- Dr Vinayak Dixit, Dr Lauren Gardner, Dr Taha Hossein Rashidi, Associate Professor Tommy Wiedmann, Professor Ashish Sharma and Associate Professor Jinling Wang.

Visiting Academic and Guest Speakers

rCITI continued to attract a variety of visiting academics and guest speakers to the School for relevant research collaboration and seminars. This year’s visitors included Professor Mark Hickman (University of Queensland), Mr Andrew Saul (Genovation Cars), Assistant Professor Nick Lownes, (University of Connecticut) and Professor Laurent Denant-Boemont (University of Rennes).

Conferences, Seminars and Workshops

Professor Waller and other rCITI staff attended and were invited to present at a variety of conferences, seminars and workshops during the year. These include:-

- 10th International Conference of Eastern Asia Society for Transportation Studies (EASTS), Taipei, Taiwan. 9-12 September 2013.
- 18th International Conference of Hong Kong Society for Transportation Studies (HKSTS) 2013, Hong Kong. 14-16 December 2013.
- Bureau of Infrastructure, Transport and Regional Economics (BITRE) Toll Road Patronage Forecasting Seminar, Sydney NSW Australia. 26 March 2013.
- Bureau of Infrastructure, Transport and Regional Economics (BITRE) toll road patronage forecasting, Steering Group Workshop, Sydney NSW Australia. 23 April 2013.
- Creative Construction Conference 2013, Budapest, Hungary. 6-9 July 2013.
- European Transport Conference, Frankfurt, Germany. 30 September 2013.
- IEEE 38th Conference on Local Computer Networks (LCN), Sydney NSW Australia. 21-24 October 2013.
Mathematics of Transportation Networks workshop as part of the celebrations for the International Year for the Mathematics of Planet Earth, Australian Mathematical Sciences Institute (AMSI) Monash University, Clayton Australia. 19-21 June 2013.

NSW Transport Infrastructure Summit, Sydney Australia, 7-8 August 2013.

OPTIMUM 2013 International symposium on recent advances in transport modelling, Gold Coast, QLD Australia. 21-23 April 2013.


World Conference on Transport Research (WCTR), Rio de Janeiro, Brazil. 15-18 July 2013.

rCITi is proud of the staff’s accomplishments during 2013 from obtaining substantial funding to the starting of new research, to the steadily expanding PhD program and teaching curriculum. These activities further strengthen the Centre’s relationships with academia, industry and government, from across the UNSW campus, nationally and internationally, while building a world-class Centre.
Mission Statement

To become a world-leading organization in integrated interdisciplinary transport research and development.

Towards this mission, rCITI will investigate sustainable approaches to transport infrastructure and operations, with extensive liaison with industry and government. The Centre pursues these activities building on five core research pillars including Transport Planning, ITS Communications, Computational Sustainability, Infrastructure and Energy / Fuel.

Transport planning: To reshape the nature of integrated transport policy, planning, optimization, financing, delivery and real-time management.

ITS Communications: To improve the safety, efficiency and reliability of the transport system via the introduction of novel communication methods and technologies to enhance cooperative ITS by connecting the diverse range of transport elements (eg. Travellers, vehicles, signal controls, bridges, roads, ramps and system operators).

Infrastructure: To develop new materials, techniques and mathematical engineering tools which permit the enhancement of infrastructure construction, maintenance, management and rehabilitation.

Energy/Fuel: To develop new transformative technologies and techniques to deliver, alter and utilize energy/fuel more efficiently in the transport system.

Computational Sustainability: To develop computational tools for the quantified assessment of sustainable approaches to transport management and operations that simultaneously consider technical, social, environmental and economic aspects.
Core Centre Staff – 2013

DIRECTOR
Professor S. Travis Waller, Evans & Peck Professor of Transport Innovation

DEPUTY DIRECTOR
Dr Vinayak Dixit, Senior Lecturer

ACADEMICS
Dr Upali Vandebona, Senior Lecturer
Dr Lavy Libman, Senior Lecturer, UNSW School of Computer Science and Engineering
Dr Lauren Gardner, Lecturer
Dr Taha Hossein Rashidi, Lecturer

RESEARCHERS
Dr David Rey, Research Associate (from February 2013)
Mr Zhitao Xiong, Post doctoral Researcher (from June 2013)
Mr Saeed Bastani, Post doctoral Researcher, UNSW School of Computer Science and Engineering (from September 2013)

CENTRE MANAGER
Ms Sylvia Brohl
Ms Maria Lee (from December 2013)

VISITING ACADEMICS
Visiting Fellow
Dr Hironobu Hasegawa, Akita National College of Technology, Japan
Dr Peter Hidas, Transport for New South Wales, Bureau of Transport Statistics (BTS), Sydney, Australia

Visiting Professorial Fellow
Professor Laurent Denant-Boemont, Department of Economics, University of Rennes 1, Rennes, France

Adjunct Senior Lecturer
Dr Ken Doust, Director, Windana Research, Sydney, Australia

L-R: Maria Lee, Zhitao Xiong, Taha Hossein Rashidi, Lauren Gardner, David Rey, Vinayak Dixit and S. Travis Waller.
rCITI Steering Committee

L-R: Graham Davies, Ian McIntyre, Stephen Foster, Rob Fitzpatrick, S. Travis Waller, Glenn Geers, Nasser Khalili and Maurice Pagnucco.

Professor Graham Davies
Dean, Faculty of Engineering

Professor Nasser Khalili
Associate Dean (Research), Faculty of Engineering

Professor Stephen Foster
Head of School, Civil and Environmental Engineering

Professor S. Travis Waller
Evans & Peck Professor of Transport Innovation and Director, Research Centre for Integrated Transport Innovation (rCITI)

Associate Professor Maurice Pagnucco
Head of School, Computer Science and Engineering

Mr Ian McIntyre
Principal, Evans & Peck

Mr Rob Fitzpatrick
Director, Infrastructure Transport & Logistics, NICTA

Dr Glenn Geers
Technology Director, Infrastructure Transport & Logistics, NICTA
Research Interests

S. Travis Waller
Evans & Peck Professor of Transport Innovation and Director, Research Centre for Integrated Transport Innovation (rCITI)
BSc, Ohio State University, USA.
MSc and PhD, Northwestern University, USA.

Research Interests:
Transportation network modelling, particularly systems characterized by dynamics, uncertainty and information; large-scale integrated transport optimization and planning. Specific applications or problem domains include Dynamic Traffic Assignment (DTA), routing algorithm development, network equilibrium, stochastic optimization, integrated demand/supply modelling, network design, adaptive equilibrium, system analysis of public-private partnerships, and bi-level optimization of transport networks.

Teaching Areas/Interests:
Transport Network Modelling
Integrated System Analysis
Optimization
Simulation
Intelligent Transportation Systems

Upali Vandebona
Senior Lecturer
BSc, University of Ceylon, Peradeniya, Sri Lanka;
MEng, Asian Institute of Technology, Bangkok, Thailand;
PhD, Monash University, Melbourne, Australia.

Research Interests:

Teaching Areas/Interests:
Transport systems and operations design
Traffic engineering
Transport planning, transport infrastructure development, transport economics and environmental assessments
Highway Engineering

Vinayak Dixit
Senior Lecturer
Deputy Director, Research Centre for Integrated Transport Innovation (rCITI)
Integrated M Tech, Indian Institute of Technology, Delhi, India
PhD, University of Central Florida, USA.

Research Interests:

Teaching Areas/Interests:
Transportation Modelling and Simulation
Transportation Management and Control
Traffic Flow Theory
Traffic Engineering

Lavy Libman
Senior Lecturer
BSc, MSC and PhD Technion, Israel Institute of Technology, Israel.

Research Interests:
Cross-layer performance optimization of wireless networks: Cooperative and opportunistic retransmission and routing strategies; Error control and failure recovery methods; Wireless network coding; Protocols for devices with limited energy, memory, and computational power resources; Protocols for networks with highly dynamic topologies (e.g. vehicular networks)
Applications of game theory to networks and distributed systems: Pricing and market-based schemes for distributed resource allocation and optimization; Analysis, design and optimization of autonomous networks; Distributed detection of network equilibria and violations thereof (e.g. incident detection in transportation networks)

Teaching Area/Interests:
Wireless Communication
Intelligent transportation systems
Lauren Gardner
Lecturer
BS ArchE, MSE and PhD, University of Texas at Austin, USA.

Research Interests:
Network modelling for multi-domain integrated systems: congestion pricing models accounting for uncertainty, the role of real-time information and adaptive pricing; Sustainability models integrating transportation and electricity systems: developing network-based optimization models to predict the role of global transport systems in the spread of contagious disease.

Teaching Areas/Interests:
Computational Sustainability
Urban Transportation Planning
Congestion Pricing and Economics

Taha Hossein Rashidi
Lecturer
BSc, MSc (CVEN) Sharif University of Technology Tehran, Iran; PhD University of Illinois Chicago, USA.

Research Interests:
Travel Behavior Analysis; Transportation Planning; Activity-Based Travel Demand Modeling; Housing Search and Land Use Modelling; Integrated Land-Use and Transportation Models; Goods Movement Modelling; Microsimulation Modeling Methods for Urban Activities

Teaching Areas/Interests:
Applied Econometrics and Statistics in Transport Modelling
Travel Demand and Land Use Modelling
Planning Sustainable Infrastructure

David Rey
Research Associate
BSc, MSc EE & IT University of Montpellier, France; MSc Maths PUC Rio, Brazil; PhD IFSTTAR Lyon, France.

Research Interests:

Zhita Xiong
Postdoctoral Researcher
BE and ME Beijing Institute of Technology, China; PhD University of Leeds, UK.

Research Interests:
Scenario Orchestration in Driving Simulation; Driving Behaviour/Driver Model; Autonomous Land Vehicle (ALV); Ontology Engineering; Automated Action Planning & Scheduling; Multi-agent System.

Saeed Bastani
Postdoctoral Researcher
PhD University of Sydney, Australia.

Research Interests:
Cooperative medium access control in 802.11 based wireless networks and high efficiency wireless design.
Publications

Book Chapter

Journal – Refereed & Scholarly Articles

Dixit, V. V., Wilmot, C., & Wolshon, B. (2013). Modeling risk attitudes in evacuation departure choices. Transportation Research Record, 2312(1 December 2012), 159-163. doi: 10.3141/2312-17


Gayah, V. V., & Dixit, V. V. (2013). Using Mobile Probe Data and the Macroscopic Fundamental Diagram to Estimate Network Densities. Transportation Research Record: Journal of the Transportation Research Board, 2390(1), 76-86. doi: 10.3141/2390-09


Conference papers – full paper referred


Dixit, V., & Zhang, Z. (2013) Integration Of Cell Transmission Model And Macroscopic Fundamental Diagram: Network Aggregation For Dynamic Traffic Models. 18th International Conference of the Hong Kong Society for Transportation Studies:

CITI ANNUAL REPORT 2013 PAGE 14
Transportation and Infrastructure, Hong Kong. 14-16 December 2013.


Reports


## Visitors, Seminars And Workshops

### Visitor Seminars/Talks

<table>
<thead>
<tr>
<th>Date</th>
<th>Host/Organizer</th>
<th>Guest Speaker</th>
<th>Title/Position</th>
<th>Affiliation</th>
<th>Seminar Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 March</td>
<td>rCITI</td>
<td>Prof. Mark Hickman</td>
<td>ASTRA Chair and Professor of Transport Engineering and Director, Director of the Centre for Transport Strategy</td>
<td>School of Civil Engineering, University of Queensland</td>
<td>Analysing and Modelling Passenger Behaviour in Public Transport Networks</td>
</tr>
<tr>
<td>16 April</td>
<td>rCITI &amp; MME</td>
<td>Mr Andrew Saul</td>
<td>Founder &amp; CEO</td>
<td>Genovation Cars – The Green Car Company</td>
<td>Batteries are Included: Transport in the 21st Century</td>
</tr>
<tr>
<td>3 June</td>
<td>rCITI</td>
<td>A/Prof. Nick Lownes</td>
<td>Director, Center for Transportation and Livable Systems</td>
<td>School of Civil &amp; Environmental Engineering, University of Connecticut</td>
<td>Leveraging big data for equity and efficiency in public transportation systems</td>
</tr>
<tr>
<td>11 July</td>
<td>rCITI</td>
<td>Prof. Laurent Denant-Boemont</td>
<td>Professor of Economics, Co-Director Laboratory for Experiments in Economics and Management</td>
<td>School of Economics, University of Rennes 1</td>
<td>Transport Costs and Location Choices in Urban Areas: Evidence from Laboratory Experiments</td>
</tr>
</tbody>
</table>

### Workshops

<table>
<thead>
<tr>
<th>Date</th>
<th>Organizer</th>
<th>Topic</th>
<th>Speakers</th>
<th>Additional Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Nov</td>
<td>rCITI &amp; CSE</td>
<td>Collaborative Workshop</td>
<td>Prof. S. Travis Waller, Dr Vinayak Dixit, Dr Upali Vandebona, Dr David Rey, Dr Lavy Libman, Mr Saeed Bastani</td>
<td>rCITI and CSE Academics and Research Students</td>
</tr>
<tr>
<td>22 Nov</td>
<td>rCITI &amp; NICTA</td>
<td>Collaborative Workshop on Transport Studies</td>
<td>Prof. S. Travis Waller, Dr Lauren Gardner, Dr Vinayak Dixit, Dr Lavy Libman, Prof. Fang Chen, Hoang Nguyen, Dr Wei Liu, Dr Chen Cai</td>
<td>rCITI and NICTA Staff, Academics and Research Students</td>
</tr>
</tbody>
</table>

rCITI = Research Centre for Integrated Transport Innovation (rCITI)  
MME = School of Mechanical and Manufacturing Engineering  
CSE = School of Computer Science & Engineering  
NICTA = National Information Communications Technology
The Australian Research Council (ARC) Linkage, Infrastructure, Equipment and Facilities (LIEF) Scheme provides funding for research infrastructure, equipment and facilities to eligible organisations. The scheme enables higher education researchers to participate in cooperative initiatives so that infrastructure, equipment and facilities can be shared between higher education organisations as well as with industry. The scheme also fosters collaboration through its support of the cooperative use of international and national research facilities. The objective of the LIEF scheme is to a) encourage institutions to develop collaborative arrangements among themselves, across the higher education sector and with organisations outside the sector, in order to develop research infrastructure; b) support large-scale cooperative initiatives involving two or more institutions, thereby allowing expensive facilities to be shared; and c) enhance support for areas of research strength.

The rCITI research team were awarded an ARC grant for Linkage Infrastructure, Equipment and Facilities (LIEF) starting in 2013 to fund the study of a TRAvel Choice Simulation LABoratory (TRACSLab): A visualisation laboratory to study travel behaviour and drivers’ interactions. This project will establish innovative new facilities that will assist in the re-design of fundamental choice assumptions needed to support emerging transport issues such as sustainability, reliability and ITS. The TRACSLab (networked driving simulators combined with traffic modelling and collective interaction) represents a unique world-first facility for comprehensive analysis of travel choice. The TRACSLab (i) focuses on collective travel choice (ii) allows for group interaction through networking and (iii) the involvement of researchers across multiple inter-disciplinary boundaries dedicated to the research of travel choice, econometrics, experimental economics, visualization and transport network analysis. Our partners include ITLS at the University of Sydney and ICinema at UNSW.

The ARC Linkage Projects scheme works to benefit the broader Australian community by funding collaborative research projects between the University and industry, government or community organisations. The scheme is designed to support projects that are of strategic value to end-users and will help advance the development of innovative solutions to current problems.

Linkage Project 1 - “Methodologies for the Incorporation of Congestion Propagation and System Reliability into Transport Network Models for Consistent Multi-Scale Planning”:

This project will include researchers from rCITI at the UNSW Australia, The Institute of Transport and Logistics Studies (ITLS) at the University of Sydney and a leading transport software company, TSS - Transport Simulation Systems Australia which will develop the research to improve the capabilities of transport planning techniques. It will endeavour to use new methodologies such as:-

(i) the enhancement of macroscopic time-invariant regional modelling to represent congestion effects more realistically;

(ii) the review of new behavioural model accounting for reliability and strategic traveller decision-making;

(iii) time-variant transport network model incorporating the new behavioural approach; and

(iv) methodologies for obtaining consistency between the models since professionals often use multiple models in cooperation for different aspects of transport planning.

The desired outcome of this research is to develop research that will discover new derived techniques, formulations and solution algorithms for the noted problems.
Linkage Project 2 - “Integrating Network Modelling with Observed Choice Data for Multi-Criteria Optimization of Complex Carshare Systems: Cost, Mobility and Transit Usage”:

This project will include researchers from rCITI at UNSW Australia and GoGet Carshare. The aim is to promote the research of novel integrated network models incorporating observed choice and stated preference data to develop a multi-criteria optimization of complex carshare systems considering broad system impacts (e.g., public transit usage). Providing opportunity’s to enable the rigorously addressing of carshare operational design with the goal of achieving both organizational as well as system-wide societal benefits. (e.g., Fuel efficiency, cheaper insurance, improved safety)

The desired outcomes from this research is the development of new methodologies obtained from the incorporation of complete carshare data with formal transport planning models and data benefiting the community and the broader transport system

Other Research Project(s):

“Quantifying the Spatiotemporal Energy Consumption Patterns and of Electric Vehicles in Regional Transport Networks.”

Principal Investigator: Dr Lauren Gardner

Granting Organisation: UNSW Engineering Faculty Research Grant / Early Career Researcher Grants Program

Project Summary: Future potential plug-in electric vehicle (PEV) usage requires that long-term transport planning models expand to explicitly account for relevant system impacts from this alternative vehicle technology. The integration of PEVs into the transport system will impact not only the transport system, but also regional energy providers who will need to incorporate mobile energy use into their traditional stationary demand models. Vehicle level energy consumption patterns must be modelled in order to accurately predict the spatiotemporal demand levels, as well as sustainability metrics, such as environmental impact. However, the uncertain nature of PEV adoption as well as their cross-cutting characteristics will require new techniques for modelling PEV traveller behaviour, which is necessary to compute the mobile energy consumption. This project addresses these items through the development and implementation of novel traffic assignment modelling tools.

Furthermore, an evaluation framework to examine multiple performance measures (e.g., travel time, energy consumption) under a range of future scenarios regarding the integration of PEVs into the transport system is established.

Project Outcome: The project resulted in two journal papers and four international conferences proceedings at which related research was presented. The conferences include the 46th Hawaii International Conference on System Sciences (HICSS 2013, the 92nd and 93rd Annual meeting of the Transportation Research Board, Washington, D.C, and the 36th ATRF Conference in Brisbane, QLD, 2013. Additional related research topics have evolved and are still ongoing.
### Students & Supervision

#### Doctor of Philosophy (PhD)

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Supervisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alireza Ahmadian Fard Fini</td>
<td>Predicting delay and minimizing its impact in construction context.</td>
<td>A Akbar Nezhad, T Hossein Rashidi, ST Waller</td>
</tr>
<tr>
<td>Abdulmajeed Sulaiman M Alsultan</td>
<td>Urban traffic network design.</td>
<td>V Dixit, ST Waller</td>
</tr>
<tr>
<td>Nima Amini</td>
<td>Solution Methods for Incorporation and Evaluation of Real Time Ramp Metering Strategies Using Dynamic Traffic Assignment on Regional Networks.</td>
<td>L Gardner, ST Waller</td>
</tr>
<tr>
<td>David Arbis</td>
<td>Modelling the dynamics of subjective risk perception of drivers.</td>
<td>V Dixit, T Hossein Rashidi</td>
</tr>
<tr>
<td>Melissa Duell</td>
<td>Strategic traffic assignment: methods of modelling day-to-day flow volatility.</td>
<td>L Gardner, ST Waller</td>
</tr>
<tr>
<td>Milad Ghasrikhouzani</td>
<td>Disaggregate behavioural land use modelling: Integration of housing search, job search and households’ dynamics.</td>
<td>T Hossein Rashidi, ST Waller</td>
</tr>
<tr>
<td>Asif Hassan</td>
<td>Mobile Phone Distraction and Traffic Safety.</td>
<td>V Dixit, ST Waller</td>
</tr>
</tbody>
</table>

#### Masters by Coursework

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Supervisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sisi Jian</td>
<td>The Modelling of Balanced Vehicle Distribution in One-Way Car-sharing systems.</td>
<td>V Dixit, ST Waller</td>
</tr>
<tr>
<td>Mojtaba Maghrebi</td>
<td>Using machine learning to automatically plan concrete delivery dispatching.</td>
<td>ST Waller, C Sammut</td>
</tr>
<tr>
<td>Bipul Sen (CSE)</td>
<td>Exploiting MAC-layer Cooperative Retransmission in Wireless Mesh Networks.</td>
<td>S Jha, L Libman</td>
</tr>
<tr>
<td>Tao Wen</td>
<td>Methodologies for Origin-Destination Travel Demand Estimation within a Strategic Traffic Assignment Model.</td>
<td>L Gardner, ST Waller</td>
</tr>
<tr>
<td>Kasun Wijayaratna</td>
<td>Modelling Disrupted Transport Network Behaviour.</td>
<td>V Dixit, ST Waller</td>
</tr>
<tr>
<td>Asif Hassan</td>
<td>Evaluating Risk Attitudes and Subjective Beliefs of Taxi Drivers from a Field Experiment.</td>
<td>V Dixit</td>
</tr>
<tr>
<td>Xun Li</td>
<td>Revenue Neutral Congestion Pricing: A Mechanism to Fund Public Transit and Control Urban Traffic</td>
<td>Dixit, ST Waller</td>
</tr>
</tbody>
</table>
### Masters by Research

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Supervisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex Karki</td>
<td>Parking Optimization.</td>
<td>V Dixit, T Hossein Rashidi and Co-Supervisor D Rey</td>
</tr>
<tr>
<td>Buddhini Wagasooriya</td>
<td>Pricing Natural Disaster Risk.</td>
<td>V Dixit</td>
</tr>
<tr>
<td>Norman Yuwono</td>
<td>A Network-Based Risk Assessment Model to Evaluate the Risk Posed by International Air Travel in Importing Dengue into Australia.</td>
<td>L Gardner</td>
</tr>
</tbody>
</table>

### Honours Students

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Supervisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard Banzon</td>
<td>Ridership Analysis of the CBD and South East Light Rail Project.</td>
<td>T Hossein Rashidi, Co-supervisor: ST Waller</td>
</tr>
<tr>
<td>Nan Chen</td>
<td>The Optimal Locations for Charging Stations for Electric Vehicles in a Network.</td>
<td>ST Waller, L Gardner</td>
</tr>
<tr>
<td>George Dunstan</td>
<td>Scenario Based Algorithm in Stochastic Time Dependent Networks.</td>
<td>V Dixit</td>
</tr>
<tr>
<td>Edwin Gunawan</td>
<td>The Relationship Between Transportation, Build environment, and General Health.</td>
<td>L Gardner</td>
</tr>
<tr>
<td>Sunny Gunawan</td>
<td>Development of an Instrumented Vehicle.</td>
<td>V Dixit, Co-supervisor: Z Xion</td>
</tr>
<tr>
<td>Jiyang Guo</td>
<td>Understanding traffic flow characteristics of bicycle facilities.</td>
<td>V Dixit</td>
</tr>
<tr>
<td>Aaron Hargraves</td>
<td>A Feasibility Study into the use of String Transport Systems for Passenger Rail in New South Wales.</td>
<td>U Vandebona</td>
</tr>
<tr>
<td>Trevor Hyland</td>
<td>The Correlation Between Public Transport and Health.</td>
<td>L Gardner</td>
</tr>
<tr>
<td>Christopher Mavromoustakos</td>
<td>Traffic investigation of the Metroroad 5 of Sydney: Dynamic Lane Management Modelling in PTV VISSIM.</td>
<td>V Dixit, ST Waller</td>
</tr>
<tr>
<td>Alekxandar Minic</td>
<td>Traditional and Flexible Car-sharing Systems As Traffic Demand Management.</td>
<td>V Dixit</td>
</tr>
<tr>
<td>Rinie Tan</td>
<td>Optimising Design of Railway Platforms for Time Efficiency.</td>
<td>U Vandebona</td>
</tr>
<tr>
<td>John Trieu</td>
<td>Use of GPS Data to Determine Value of Travel Time Savings for Motorists in Sydney.</td>
<td>V Dixit</td>
</tr>
</tbody>
</table>

### Taste of Research (ToR)

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanley He</td>
<td>(Supervisor: ST Waller)</td>
<td></td>
</tr>
<tr>
<td>Haiyang Liu</td>
<td>(Supervisor: ST Waller) on exchange from Harbin Institute of Technology, China.</td>
<td></td>
</tr>
<tr>
<td>Kelly Bertolaccini</td>
<td>(Supervisor: ST Waller) on exchange from University of Connecticut, USA.</td>
<td></td>
</tr>
</tbody>
</table>

### Practicum

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haiyang Liu</td>
<td>(Supervisor: ST Waller)</td>
<td></td>
</tr>
<tr>
<td>Kelly Bertolaccini</td>
<td>(Supervisor: ST Waller) on exchange from University of Connecticut, USA.</td>
<td></td>
</tr>
<tr>
<td>Senior Investigator(s) / Researcher(s)</td>
<td>Subject Area / Research Topic</td>
<td>Granting Organization / Industry Sponsor</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Prof. S. Travis Waller</td>
<td>Identification &amp; Evaluation of Transformative Environmental (AERIS) Applications and Strategies Project.</td>
<td>US Department of Transportation (USDOT), Federal Highway Administration (FHWA); sub-contract from Booz Allen Hamilton Inc.</td>
</tr>
<tr>
<td>Prof. S. Travis Waller, Dr. Vinayak Dixit, Prof. Michiel Bliemer (USyd) and Prof. Dennis Del Favero (icinema)</td>
<td>TRAvel Choice Simulation LABoratory (TRACSLab): A visualisation laboratory to study travel behaviour and drivers’ interactions</td>
<td>Australian Research Council (ARC) LIEF Grant</td>
</tr>
<tr>
<td>Prof. S. Travis Waller</td>
<td>Develop and Deploy Novel Integrated Network Techniques to Enhance the NSW Transport System</td>
<td>Transport for NSW</td>
</tr>
<tr>
<td>Prof. S. Travis Waller, Dr. Vinayak Dixit, Prof. Michiel Bliemer (USyd), Prof. Michael Bell (USyd), Dr Alexandre Torday (Industry Partner TSS)</td>
<td>Methodologies for the Incorporation of Congestion Propagation and System Reliability into Transport Network Models for Consistent Multi-Scale Planning</td>
<td>ARC Linkage Project</td>
</tr>
<tr>
<td>Prof. S. Travis Waller, Dr. Vinayak Dixit, Dr. Lauren Gardner, Dr. Taha Hossein Rashidi, Mr. Bruce Jeffreys (Industry Partner GoGet Carshare)</td>
<td>Integrating Network Modelling with Observed Choice Data for Multi-Criteria Optimization of Complex Carshare Systems: Cost, Mobility and Transit Usage</td>
<td>ARC Linkage Project</td>
</tr>
<tr>
<td>Dr. Lauren Gardner</td>
<td>Quantifying the Spatiotemporal Energy Consumption Patterns and of Electric Vehicles in Regional Transport Networks</td>
<td>Faculty Research Grant Program / Early Career Researcher Grants Program</td>
</tr>
</tbody>
</table>
# Research Centre for Integrated Transport Innovation, rCITI

## Statement of Financial Performance

for the Year Ending 31 December 2013

<table>
<thead>
<tr>
<th>Funds</th>
<th>Notes</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Research Funds</td>
<td>1**</td>
<td>1,038,200.00</td>
</tr>
<tr>
<td>Other Research Funds</td>
<td></td>
<td>190,000.00</td>
</tr>
<tr>
<td>Faculty Research Grants</td>
<td></td>
<td>20,034.00</td>
</tr>
<tr>
<td>UNSW Strategic Funds</td>
<td>2</td>
<td>395,344.00</td>
</tr>
<tr>
<td><strong>Total Funds</strong></td>
<td></td>
<td><strong>1,643,578.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel Costs</td>
<td></td>
<td>269,504.00</td>
</tr>
<tr>
<td>Materials and Maintenance</td>
<td></td>
<td>20,481.00</td>
</tr>
<tr>
<td>Travel incl. Visitors, Speakers, Students</td>
<td></td>
<td>66,085.00</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td>12,555.00</td>
</tr>
<tr>
<td>Other Non-People Cost</td>
<td></td>
<td>13,717.00</td>
</tr>
<tr>
<td>Internal Expense (incl. Overhead)</td>
<td></td>
<td>132,459.00</td>
</tr>
<tr>
<td><strong>Total Costs</strong></td>
<td></td>
<td><strong>514,801.00</strong></td>
</tr>
</tbody>
</table>

| Operating Result*          |       | **1,128,777.00** |
| **Opening Balance**        |       | 0.00     |
| **Closing Balance**        |       | **1,128,777.00** |

## Notes to the Statement of Financial Performance

1. rCITI was awarded External NICTA Research Funds of $209,354 for salary contributions S.T. Waller (CVEN), L. Gardner (CVEN) and L. Libman (CSE) as well as PhD Student Scholarship M. Duell.

   Due to the UNSW structure these funds are reflected under Department IDs CVEN and CSE and appear on the respective School Financial Statement.

2. Salary Contributions L. Gardner and S.T. Waller; Centre Strategic Funds.

* CVEN School Salary Contributions are excluded from this statement as these appear on the School Financial Statement.

** Outstanding invoices are $137,500 as at 31 December 2013.