Where next for Road Authorities?

Research points to Efficiency Gains

Professor David Hensher, ITLS, University of Sydney
Business School
ITEANZ Seminar 3 Feb 2015
What are some Big Challenges?

› Doing more with less: Identifying all potential projects and priorities
› Getting priorities better justified (QuickScan) – value for money
› Communicating the ‘why’ better than we do (including the what, how and when)
› Pricing reform (especially gaining buy in) – car and truck
› Multi-Modalism (Roads move more PT passengers than rail)
› Improved traffic assignment methods (where are the bottlenecks?)
› Wider Economic Benefits (WEBs) as Welfare Benefits and GDP Impacts
› Unencumbered research – breaking new ground that might be risky initially (financial support from Road Authorities)
   • Examples include allowing for risk and uncertainty in travel behaviour research
   • Improved traffic assignment methods in standard software used by consultants
› The need to increase investment in education and research
   - Road Authorities need to be more vigilant over consultants
Early definition of the bigger picture
- Multimodal
- Land use interdependency and feedbacks with travel (“appalling!”)

Utilisation of methods to get a better idea of options
- Ability to ‘scan’ lots of options and to narrow down ones that show real promise (otherwise opportunities can be missed) – can demonstrate the strategic thinking of Road Authorities
- MetroScan as an example (next slide)

Writing the brief for consultants
- Major road projects are increasingly urban revitalisation projects (and not simply roads)
  - This should be used to re-position the arguments to reduce criticism about road focus without merit.

Consultants do not like changing their ways so often, which they have invested in, but academic research is there to do this in part by questioning existing practice and assisting in delivery of improved methods
- even if they are subsequently developed by spin off companies (e.g., Emme/2, Transcad, Nlogit, Ngene, TREDIS, MetroScan).
MetroScan – An example of Research Cooperation

Introducing MetroScan - A Quick-Scan Tool

MetroScan seamlessly integrates the latest releases of Economic Development Research Group’s TREDIS and the Institute of Transport and Logistics Studies’ TRANSIMS models. metroScan uses integrated passenger, freight, land-use and economic models that have rich feedback between location and travel-related decisions, using detailed behavioural data.

Key features of MetroScan compared to other types of models

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MetroScan’s fully integrated and inter-dependent travel forecasting, benefit-cost and economic impact modules provide decision makers with all the relevant information from a single, fully integrated user-friendly interface. It has the following key features:

- User-friendly interface that provides quick results for a large number of spatial and capital projects and policies (typically within minutes or less than an hour).
- Detailed behavioural models including choice of mode and time of day for all of the key trip purposes, choice of work, non-work and residential location (including building type and tenure choice) and vehicle choice (including usage), all fully integrated into one system with feedback.
- Full benefit-cost analysis and evaluation of benefits and impacts on the wider economy.

That allow MetroScan to address broad questions on land use, transportation and economic impacts, such as:

- How might transport policies or investments change a city’s ownership and housing patterns?
- How likely is a comprehensive land-use and transportation strategy to actually “take” in market terms?
- What are the wider economic benefits of a specific transport policy or investment?

Appeal of MetroScan

MetroScan provides relevant spatial and socio-economic detail for project and policy prioritizing, designed to provide advice on projects and policies that show great merit which then can be studied in greater spatial and socio-economic detail.

Using MetroScan

Step 1: Identify all potential projects and policies

Step 2: Use MetroScan’s strategic outputs to prioritise projects

Step 3: Select projects with economic merit

Step 4: Use own model or MetroScan’s detailed outputs for in-depth analysis of selected projects

Institute of Transport and Logistics Studies
The University of Sydney Business School
www.sydney.edu.au/business/bll

Economic Development Research Group
www.edrgroup.com
What has a peer reviewer and adviser to road authorities learnt over the years?

› Early definition of the bigger picture
  - Multimodal
  - Land use interdependency and feedbacks with travel ("appalling!")

› Utilisation of methods to get a better idea of options
  - Ability to ‘scan’ lots of options and to narrow down ones that show real promise (otherwise opportunities can be missed)
  - MetroScan as an example (next slide)

› Writing the brief for consultants
  - Major road projects are increasingly urban revitalisation projects (and not simply roads)
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  › even if they are subsequently developed by spin off companies (e.g., Emme/2, Transcad, Nlogit, Ngene, TREDIS, MetroScan).
Academics do good research in traffic/transport/economics etc.

In general they are weak in “selling” their ideas, something consultants are good at, but latter so often take academic outputs and promote them (e.g., WEBs, specific software developed by Universities); sadly the source is not always (some might say ‘rarely’) acknowledged.

The tricky areas are politics and marketing; for example

- “The problem with road pricing reform is that we (as a broad community) have failed to show how a reform package might work that can gain votes through community acceptance”


- A salient reminder:

  - “I’m struck by what seems to be a huge disconnect between the systems being modeled by academic economists and the proposals emerging from field tests and demonstrations involving actual motorists.” (Poole 2012)
A Specific Issue:
REQUIREMENTS FOR TRAFFIC ASSIGNMENT MODELS FOR IMPROVED TRANSPORT PLANNING

Focussing on an Issue that has been of concern for many years (and which may be a significant source of traffic forecast errors)
Traffic Models

- **Strategic transport models** are used to prepare, assess, and implement plans and projects in order to improve and manage transport systems.
- **Typical outcomes** are traffic flows (patronage) and speeds.
- These outcomes are used to calculate travel time savings, emissions, etc. for economic appraisal (e.g., cost-benefit analysis).
- In Australia, all major metropolitan areas have developed a strategic transport model.

<table>
<thead>
<tr>
<th>Model name</th>
<th>Abbreviation</th>
<th>State</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney Strategic Travel Model</td>
<td>STM</td>
<td>NSW</td>
<td>Sydney</td>
</tr>
<tr>
<td>Melbourne Integrated Transport Model</td>
<td>MITM</td>
<td>VIC</td>
<td>Melbourne</td>
</tr>
<tr>
<td>Canberra Strategic Transport Model</td>
<td>CSTM</td>
<td>ACT</td>
<td>Canberra</td>
</tr>
<tr>
<td>Brisbane Strategic Transport Model – Multi Modal</td>
<td>BSTM-MM</td>
<td>QLD</td>
<td>Brisbane</td>
</tr>
<tr>
<td>Metropolitan Adelaide Strategic Transport Evaluation Model</td>
<td>MASTEM</td>
<td>SA</td>
<td>Adelaide</td>
</tr>
<tr>
<td>Strategic Transport Evaluation Model</td>
<td>STEM</td>
<td>WA</td>
<td>Perth</td>
</tr>
</tbody>
</table>
Traffic Models

TRANSPORT DEMAND
- Trip choice
- Destination choice
- Mode choice
- Departure time choice
- Route choice

Passenger flows
- Congestion

Simulation of vehicles
- Travel times
- Crowding

TRANSPORT SUPPLY
- Road network
- Transit services

Infrastructure
Zonal data
Consistency between strategic static models and operational dynamic models is needed
What travel time benefits will expanding link 4 (RHS red box) have?

- In a static model? (would lead to travel time savings on link 4)
- In a dynamic model? (would not lead to travel time savings on link 4)
Rethinking Traffic Assignments Methods where much of forecasting error is propagated

› Static traffic assignment considers a single time period with instantaneous flow propagation. Traffic flows are not capacity constrained and queues do not exist.

Alternatives:

Quasi-dynamic traffic assignment - considers a single time period and instantaneous flow propagation, but traffic flows are capacity constrained and residual queues are considered.

Semi-dynamic traffic assignment - considers multiple time periods with instantaneous flow propagation within each time period. Residual queues are transferred across time periods.

Dynamic traffic assignment - considers multiple time periods with time-dependent flow propagation, resulting in time-varying flows and queues.

The Appeal of Quasi-Dynamic Perspective:

It is essentially a static model that is able to produce outputs (traffic flows, queues, and travel times) more similar to dynamic models than standard static models. There are no time dynamics. These are the main features needing inclusion beyond static assignment.

Semi-dynamic models include time-dynamics between time periods, not within time periods.

Dynamic models include time dynamics both within and across time periods.
Example

› Consider the following route from A to B with a travel demand of 4000 veh/h

A \[\begin{array}{cccccccc}
\text{C = 4300} & \text{C = 4300} & \text{C = 4300} & \text{C = 4300} & \text{C = 3000} & \text{C = 3000} \\
\end{array}\] B

› Traditional static model:

› New quasi-dynamic model:
Computer run times for traffic assignment

- Static: x 1
- Quasi-dynamic: x 3-5
- Dynamic: x 50
Link model

Consider the following example with a travel demand of 3800 veh/h:
Link model

› Consider the following example with a travel demand of 4200 veh/h:
Link model

Consider the following example with a travel demand of 4500 veh/h:
Link model

Consider the following example with a travel demand of 5000 veh/h (4 lanes into 3 lanes into 2 lanes):

- 4km
- 2km
- 100 km/h
- 12 km/h
- 21 km/h
- 100 km/h
QUASI-DYNAMIC TRAFFIC ASSIGNMENT: How traffic tends to occur in a stream – bottlenecks etc.

Link model

› Consider the following example with a travel demand of 5500 veh/h:
## CRITICAL ASSESSMENT - SUMMARY

<table>
<thead>
<tr>
<th>Property</th>
<th>static</th>
<th>quasi-dyn.</th>
<th>dynamic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>macro</td>
<td>macro</td>
<td>macro</td>
</tr>
<tr>
<td>Realistic results</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>- stochastic route-choice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- multiple vehicle types</td>
<td>--</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>- multiple user classes</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>- strict capacity constrained</td>
<td>--</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>- queue spillback</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>- realistic link model</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>- realistic node model</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Robust results</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>- stable outcomes</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Consistent results</td>
<td>--</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>- consistent with dynamic model</td>
<td>--</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Accountable results</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>- convergence to equilibrium</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>- existence and uniqueness</td>
<td>++</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>- low model complexity</td>
<td>++</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Ease of use</td>
<td>+</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>- short run times</td>
<td>++</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>- little input required</td>
<td>++</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>- easy of calibration</td>
<td>+</td>
<td>++</td>
<td>-</td>
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</table>
The novel static/quasi-dynamic traffic assignment model has many advantages over traditional static traffic assignment models:
- More realistic delays and travel times
- Correct predictions of bottleneck locations and queues
- Traffic flows are capacity-constrained, such that calibration towards link counts makes sense
- Model outcomes are consistent with dynamic (micro and meso-level) models

The new assignment technique takes approximately 3x more CPU time than traditional static traffic assignment
- although when one allows for all the extra runs to try to see what may be wrong with output of static assignment, then the CPU time becomes very attractive!

Only infrastructure characteristics (i.e., maximum speed, capacity, number of lanes) are input, no more need for volume-delay or speed-flow curves! (just like dynamic model)

ITLS staff research: Bliemer MCJ, Raadsen MPH, Smits E, Zhou B and Bell MGH 2014 'Quasi-dynamic traffic assignment with residual point queues incorporating a first order node model', Transportation Research Part B: Methodological, vol.68, pp. 363-84.
Issues that are often Raised

- Massive forecast errors in traffic (CAN BE EXPLAINED)
- OPTIMISM BIAS
- STRATEGIC MISREPRESENTATION
- Equity partners lost their money (TRUE BUT RISKS ARE KNOWN)
- Society is worse off (FALSE)
Gold Coast (1067 zones, 9565 links)

CPU time per route choice iteration: 48 sec.
Iterations needed for equilibrium: 24
Total calculation time: 19 min.
Some applications

Sydney (3264 zones, 75379 links)

Total calculation time: 66 min.
In addition to **MetroScan (ITLS product)**

› ITLS has demonstrated the feasibility of the model on large networks

› The new quasi-dynamic traffic assignment model has been implemented in
Location Feedbacks (MetroScan – New Tesis)

- Vehicle kilometre travelled
- Synthetic households
- Residential location choice
- Tenure & Dwelling type choice
- Dwelling price
- Work location choice
- Mode & ToD choice (work and non-work)
- Arrival time flexibility
- Work pattern
- Non-work location choice
- Vehicle type choice
- Vehicle fleet size
- Road infrastructure
- Public transport service
- Network assignments
- OmniTRANS
- Travel Time

Household level

Individual level
Wider Economic Benefits (WEBS)

WEBs are the set of welfare benefits (WBs) included in a conventional cost-benefit analysis and additional economic impacts (AEIs) (often called GDP impacts) which are outside the calculation of the conventional benefit cost ratio.
Relationship of Wider Economy Impacts to “Traditional” Cost-Benefit Analysis

- Economic Impact Analysis (EIA)
- Agglomeration Benefits
- Cost-Benefit Analysis (CBA)
- “Traditional” Cost-Benefit Analysis (CBA)
## Defining Wider Economic Benefits

<table>
<thead>
<tr>
<th>Traditional User Benefit</th>
<th>Expanded User Benefit</th>
<th>Wider Transport Benefits</th>
<th>Wider Economic Benefits</th>
<th>Local Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Travel time</td>
<td>• Safety</td>
<td>• Accessibility</td>
<td>• Productivity</td>
<td>• Economic</td>
</tr>
<tr>
<td>• Operating cost &amp; tolls</td>
<td>• Reliability &amp; Logistics</td>
<td>• Mobility</td>
<td>from wider market</td>
<td>Multiplier</td>
</tr>
<tr>
<td></td>
<td>• Cross-modal</td>
<td>• Connectivity</td>
<td>access: agglomeration &amp; scale</td>
<td>Effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Social inclusion</td>
<td></td>
<td>• Relocation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>of industry</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>&amp; jobs</td>
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Transport Decision-making

- Public Policy Development
- Vision & Strategic Plans
- Project Prioritization & Selection
- Alternatives Analysis & EIS
- Funding Justification
- Grant Applications
Overview of Method Used to Estimate Benefits and Impacts of NSW Rail Investment Options (ITLS-ERDG project 2013)

Sydney Transportation Model (STM)

Scenario Inputs

Travel Characteristics

Accessibility Characteristics

Costs

“Fixed” Inputs

Travel Valuation Factors

NSW Economic Activity

NSW Input-Output Relationships

TREDIS

Travel Cost Module

Market Access Module

Economic Adjustment Module

Benefit-Cost Module

Results:

“Build” Scenario vs. “Do Min” Scenario

Economic Impact Analysis (EIA) Results

Cost-Benefit Analysis (CBA) Results
MetroScan – An example of Research Cooperation

Introducing MetroScan - A Quick-Scan Tool

MetroScan is a new and efficient tool required to assess potential infrastructure projects, service improvements and policies that use in land use and transport plans. Often, a handful of projects and policies are selected for a detailed study by planning organizations and external consultants for a whole lot of reasons. MetroScan as a strategic prioritization tool provides users with the ability to undertake a quick-scan assessment of a much larger number of potential projects and policies (including both infrastructure and service improvements) in only a few hours using a user-friendly interface. Once this first scan of many candidate projects and policies is completed, MetroScan can also be used to undertake further analyses using greater spatial detail and socio-economic representation on those projects and policies found to be of the highest level of merit, providing all the evidence required for national funding programs.

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<td>Detailed socio-economic analysis including growth and re-urbanisation of employment and residential locations</td>
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<td>Extensive number of detailed and customisable outputs</td>
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Run quick global MetroScan on projects

Institute of Transport and Logistics Studies
The University of Sydney Business School
www.sydney.edu.au/business/sites

Economic Development Research Group
www.erdgroup.com
MetroScan-TI Outputs

**Economic Impacts**
- Jobs and income
- Industry sales
- Freight impacts

**Benefits & Costs**
- Multiple measures
- Multiple viewpoints

**Finance**
- Fiscal Impact: generation of tax revenues
- Public-private revenues & costs (PPP)
Importance of Spatial Scale

Needs and Economic Consequences differ depending on the scale and region being considered.

- National industries
- Regional business clusters
- Metropolitan labor markets
- Neighbourhood land/housing markets
- Hwy or transit link performance
**Economic Goals**
- Strengthen local economy
- Reduce congestion on airport access road
- Enhance speed & reliability of travel time between airport & downtown

**Project Alternatives – Rail vs. Bus**
- Transit Link to Airport
- Park and Ride Lot
- Express service
**Present Value of Benefit Stream ($m 2011 Const dollars)**

<table>
<thead>
<tr>
<th>Mode</th>
<th>(A) Traveller Benefits ($)</th>
<th>(B) Traveller Benefits (non-$)</th>
<th>(C) Shipper/Logistics Cost ($)</th>
<th>(D) Business Productivity ($)</th>
<th>(E) Social/Environ. (non-$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicle Operating Costs</td>
<td>Business Time &amp; Reliability Costs</td>
<td>Value of Personal Time &amp; Reliability</td>
<td>Safety Cost</td>
<td>Additional Consumer Benefit</td>
</tr>
<tr>
<td>Pass Car - Business</td>
<td>116.2</td>
<td>23.5</td>
<td>0.0</td>
<td>12.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Pass Car - Commute</td>
<td>184.4</td>
<td>0.0</td>
<td>13.9</td>
<td>37.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Truck - Freight - Business</td>
<td>477.8</td>
<td>50.8</td>
<td>0.0</td>
<td>3.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Pass Bus - Commute</td>
<td>4.7</td>
<td>0.0</td>
<td>3.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pass Rail - Commute</td>
<td>0.0</td>
<td>0.0</td>
<td>14.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Air - Freight - Business</td>
<td>2.7</td>
<td>0.6</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pass Air - Personal</td>
<td>7.0</td>
<td>0.0</td>
<td>32.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Project Totals</strong></td>
<td><strong>9.28</strong></td>
<td><strong>74.3</strong></td>
<td><strong>64.4</strong></td>
<td><strong>53.0</strong></td>
<td><strong>0.0</strong></td>
</tr>
</tbody>
</table>

**Present Value of Cost Stream ($m 2011 Const dollars)**

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Startup Costs</th>
<th>Annual O&amp;M Costs</th>
<th>Residual Value</th>
<th>Net Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>49.3</td>
<td>0.0</td>
<td>0.0</td>
<td>49.3</td>
</tr>
<tr>
<td>Rail</td>
<td>197.1</td>
<td>169.4</td>
<td>0.0</td>
<td>366.5</td>
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<tr>
<td>Air</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Marine</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total for All Facilities</strong></td>
<td><strong>246.4</strong></td>
<td><strong>169.4</strong></td>
<td><strong>0.0</strong></td>
<td><strong>415.8</strong></td>
</tr>
</tbody>
</table>

**Economic Benefit Accounting**
Pricing Reform

What Type of Road Pricing Scheme might appeal to Voters and Decision Makers?

Gaining the citizen vote by staging reform

‘paying for what you do and not what you own’
However

To Make PT more Attractive Requires (at least) making the Car Much Less Attractive

SO ACT NOW

Road Pricing Reform is Needed
What we all know

› Road pricing reform is *needed*, because just investing in more roads is too costly, too unliveable, too polluting
› Road pricing reform is an *emotional* topic
› Road pricing reform is a *political* problem
› Road pricing reform requires *strong leaders*
What we currently pay (average per car per year)

› NSW – for using the roads
  - Annual registration fee (approx. $300)
  - Road tolls (approx. $220)

› Commonwealth – for driving
  - Fuel excise tax (approx. $720)

› My observations:
  - Annual registration fee is low (in global comparison)
  - Fixed registration fee is unfair to people who drive little
  - Toll system is unfair to people who live close to toll roads
Many different strategies

› Annual registration fee
› Toll roads
› Fuel excise tax
› Cordon charges
› Accessibility pricing
› Peak avoidance
› Kilometre pricing
› Workplace parking levy
Main objectives of road pricing reforms

1. Finance maintenance of current infrastructure
2. Increase revenues for new infrastructure
3. Increase efficiency of current infrastructure
4. Decrease externalities (e.g., emissions)
What are the key Road Blocks?
A typical political response

› “We will not introduce a congestion tax for motorists … due to the lacklustre standard of the state’s public transport system. … The Minister … has ruled out imposing a tax on motorists entering the CBD similar to a system used in London.

› There cannot be a congestion toll if there is no public transport, and the one thing that [we] … have not got is proper public transport,” he says.

(Comment- PT tends to be defined as rail)
To what extent are you aware of what road pricing means?

- 45% of respondents are aware of road pricing.
- 4.5% are moderately aware.
- 2.5% are slightly aware.
- 7.5% are just aware.
- 5.5% are not aware at all.
- 92% of respondents are aware of road pricing.
Citizen familiarity with the debate on road pricing

How familiar are you with the debate on road pricing?

- 42.5% familiar
- 10% respondents
- Familiarity percentage
What is Real Road Pricing Reform?

› It MUST involve **dropping some charges** as we add in some new congestion-related charges,

› **AND**

› **importantly** showing how the revenue raised is put back to **useful causes** that can/will be supported by society.

› It is possible to design a system in which many users of the roads are financially **better off** with a congestion charge (and even an emissions-related charge)

› where the cost of using the roads is lower when congestion is absent and vehicles are environmentally cleaner, **which will also ensure govt. gets its needed revenue**
How can we start the reform journey for the entire network?
Simple Rule: begin with what is in place at present and see how that might be modified in line with a longer term objective.

What if we can modify the current registration fee to signal real opportunities for individuals to reduce their road use charges?
Start targeting the *specific* peak vs. off peak kilometres

Begin by assuming that all annual kms are peak kms.

If the driver wants to have a subset of kms recognised as off peak kms, they must purchase an on-board vehicle meter box (OBVMB) that will record the kms by time of day.

The **off peak kms are not charged**, but peak kms will be charged at either an agreed cents/km. or a fixed peak surcharge for bands of annual peak kms.
The challenge is to identify an appropriate adjustment quantum in the annual registration fee.

**Full Reform Plan:**

- **Adopt a simple discount rule** e.g., a flat reduction in the regn fee (e.g., 60%) linked to the acquisition of the OBVMB
- **A distance-based charge per peak km**

**With the condition that:**

- **Treasury is no worse off and**
- **Drivers in total outlay less money**
Identifying a DBC and Discounted Registration Fee that makes Motorists and Treasury Financially No worse off

<table>
<thead>
<tr>
<th>Regn fees halved and DBC for peak kms only C/km</th>
<th>ALL SSDs</th>
<th>Positive = gain, negative = loss</th>
<th>Car driver</th>
<th>Treasury</th>
<th>change in peak km</th>
<th>change in off-peak km</th>
<th>change in total km</th>
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<tbody>
<tr>
<td>2</td>
<td>130</td>
<td>-113</td>
<td>-102</td>
<td>0</td>
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<tr>
<td>3</td>
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</table>

Cost Implications for Drivers

Change in Total SSD Annual User Outlay's under System Wide DBC (Peak 5c/km) and Registration of $185 per annum (Positive = Savings)

- Annual $ all drivers outlay change Peak DBC
Education
Gaining the Necessary Skills: How academia can contribute

Traffic, Transport and Land Use is a good start

› Partnerships
  - ITLS and the RTA Jointly designed (Paul Forward) ACTTM and Grad CTM articulating to MTM
  - Continuing to this day but numbers and quality are declining

› Briefing sessions
  - Research Dissemination Program with TfNSW (monthly seminar sessions)
## ITLS Graduate Program

### Quantitative logistics & transport
- Foundations of supply chain management
- Supply chain planning systems
- Warehouse & inventory management
- Contemporary procurement
- Value chain costing
- Green operations & reverse logistics
- Disaster relief operations
- Global value chain networks
- Airline strategy & supply chains
- Airport management
- Global freight logistics management
- Maritime management & logistics
- Ports management
- Cases in global transport & logistics

### Transport & infrastructure foundations
- Infrastructure appraisal
- Sustainable transport policy
- Strategic transport planning
- GIS for transport & logistics
- Traffic & mobility management
- Public transport
- Decision making on mega projects
- Infrastructure financing
- Infrastructure management case studies
- Transport & infrastructure systems
“The Key Centre is now well placed to be a major player nationally and globally in providing an intellectual overlay to the debate on societal priorities that can guide the future prosperity and well being of societies. While we see our broad role as engaging at all levels of inquiry, be they the very practical studies to assist government and industry, be it at the strategic, tactical or operations levels, we must not lose sight of our more pure academic ideals of informing the debate in ways that are not constrained by political or commercial interest. This is often a delicate balance, but if we are to make a difference then our role must be one of moving the boundary of debate and decision making rather than reinforcing prejudices and biases that so often result in decisions that are not in the long term interest of a society that we so aspire to be part of.”

Extract of David Hensher’s Directors Report for the ITLS Annual Report:

ITLS Video on graduate program
Challenges: What are some key Road Blocks?
Some Key Challenges

› Challenge #1:

Will we ever be able to attract enough car users out of their cars by any amount of injection of investment into public transport (PT) to relieve congestion on our roads?
› Challenge #2:

If yes to Challenge #1, what sort of infrastructure investment will make a difference?

- Hint: Many large cities are a City of Cities with a complex network that is crying out for connectivity, coverage, frequency and visibility
Challenge #3:
What role should a revamp of the price for using the car play in a (traffic) congestion-relieved future?

- Can we really expect to reduce traffic congestion by investing in PT without a serious reform to road pricing (and I do not mean simply congestion charging)?
Challenge #4:

What we need to do in sorting out the pricing challenge is to undertake a complete overhaul of the entire charging regime.

How might we initiate this?
THANK YOU