Australian Institute of Traffic Planning and Management
www.aitpm.com

AITPM Victorian Branch Technical Forum

Transport Safety

Monday 8th November 2010, 5:15pm – 6:45pm
VicRoads Theatrette, 60 Denmark Street, Kew

Our speakers this evening are…

Terry Spicer  
Cooperative ITS – Towards Intelligent Level Crossings

Hayley Davis  
Speed Limit Enforcement and Deterrence Models

Gordon Walker  
Delivering Road Safety at the Local Level; the approach taken by the City of Stonnington
DSRC
ANTI - COLLISION TECHNOLOGY
“FIVE” APPLICATIONS

US DOT & GLOBAL VEHICLE MANUFACTURERS
BMW    Chrysler    Ford
General Motors    Honda
Hyundai
Mercedes-Benz    Nissan
Subaru    Suzuki    Toyota
Volkswagen
Smart Phone Applications

POTENTIAL RAIL LEVEL XING “ANTI – COLLISION” APP’S

1. ROAD LEVEL CROSSING APP.
2. PED LEVEL CROSSING APP.
3. TRAIN TO TRAIN APP.
4. TRAIN TO TRACK GANG WARNING APP.
5. TRAIN TO TRAM APP
6. TRAM TO TRAM APP.
7. TRAM TO VEHICLE APP.

Department of Transport
TOWARDS ZERO STRATEGY

“To Reduce the Number of Deaths and Injuries at Level Crossings and Ultimately Achieve the Aim of No Lives Lost.”

November 2009.

ITS Summit - Michael Noblett 18 November 2009
US DOT ITS Strategic Research Plan 2010 - 2014
http://www.rita.dot.gov/

http://www.intellidriveusa.org/

http://www.safespot-eu.org/

COOPERATIVE ITS – TOWARDS INTELLIGENT LEVEL CROSSINGS

QUESTIONS?

Terry Spicer
Senior Manager Railway Crossing Safety – DOT
terry.spicer@transport.vic.gov.au
AITPM Seminar

- Costs and Benefits of Speed Limit Enforcement and Deterrence Activities

Hayley Davis
email davish@halcrow.com
mobile 04 2052 7730

This presentation

- Introduction - concept
- The theory
- The approach
- The model - an example
- Findings, issues and further analysis
Concept

- Why speeding enforcement?
- Types of speeding enforcement
- Economic principles - efficient (socially optimal) resource allocation
- How much should we invest in enforcement?
- What return (benefit) should we expect for our investment?
- Is there a socially optimal level of speeding that should be permitted?
  - Ethics vs Economics

Socially optimal level of enforcement
Theoretical background

  - Addresses a firm's compliance with the law given:
    - Perceived probability of detection
    - Severity of the punishment
    - Benefits of non-compliance
    - Rational and utility maximising

- Costs to society
  - Facilitates socially optimal policy decisions

- Objective - minimise costs to society by identifying optimal levels of:
  1. Enforcement
  2. Sanction

The approach - overview

- Minimise $S$ by selecting appropriate combination of the policy weapons:
  - $f$ - severity of punishment, and
  - $p$ - certainty of conviction

- Defined by the demand curve for offending

Deterrence variables

- Equipment and police time etc
- Administrative costs of fines and sanctions
- Monetary cost of accidents
- Journey time savings

Cost of enforcement ($E$)
Cost of sanctions and procedures ($F$)
Harm to society ($H$)
Gain to offenders ($G$)
Social cost ($S$)

Number of speeding offences committed

Probability of conviction ($p$)
Severity of punishment ($F$)
The approach – demand for offending

• Impacted by the deterrence variables:
  1. Probability of detection (p)
  2. Size of the sanction (f)

• Maximum Utility Theory
  Expected Utility (EU) = pU(G·f) + (1-p) U(G)

  p = perceived probability of conviction
  U = individuals utility index
  G = gain from committing the offence
  f = cost of punishment

• Demand curve, O = O(p,f)

Enforcement and Deterrence - model example

• Three key outputs from the model
  1. Cost effectiveness of the enforcement activity
  2. Net present value of the activity
  3. Marginal analysis - using the deterrence model

• Given the data it allows us to understand
  • Responsiveness of people to shifts in the probability of getting caught (p)
  • Responsiveness of people to shifts in the severity of sanctions (f)
### Model example – assumption summary

<table>
<thead>
<tr>
<th>ENFORCEMENT ACTIVITY: Fixed Speed Cameras</th>
<th>ENFORCEMENT AGENCY: Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENFORCEMENT AREA INFORMATION</td>
<td></td>
</tr>
<tr>
<td>Total Spreading on Enforcement (p.a.)</td>
<td>$8,000,000</td>
</tr>
<tr>
<td>Marginal Spending on Enforcement per Offense Dismissed</td>
<td>$0</td>
</tr>
<tr>
<td>Data Year</td>
<td>2010</td>
</tr>
<tr>
<td>Maximum Potential Non-Compliance - Trips (p.a.)</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Non-Compliance at Current Enforcement - Trips (p.a.)</td>
<td>1,842,000</td>
</tr>
<tr>
<td>Non-Compliance Dismissed at Current Enforcement - Trips (p.a.)</td>
<td>1,200,000</td>
</tr>
<tr>
<td>Offense Rate</td>
<td>80%</td>
</tr>
<tr>
<td>Probability of Detection</td>
<td>70.5%</td>
</tr>
<tr>
<td>Total Revenue Recovered (p.a.)</td>
<td>$3,820,000</td>
</tr>
<tr>
<td>Marginal Revenue per Offense Detected</td>
<td>$3</td>
</tr>
</tbody>
</table>

### MARGINAL SOCIAL DAMAGE COSTS (PER OFFENCE)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Order</td>
<td>$300</td>
</tr>
<tr>
<td>Loss of Income to Legitimate Economy</td>
<td>$500</td>
</tr>
</tbody>
</table>

### GAINS TO OFFENDERS (PER OFFENCE)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total Gains to Offenders</td>
<td>$10</td>
</tr>
</tbody>
</table>

### DESTRUCTION

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Average Tariff</td>
<td>$3</td>
</tr>
<tr>
<td>Derivative Value of Current Enforcement</td>
<td>$0</td>
</tr>
</tbody>
</table>

### Model example – output summary (1)

<table>
<thead>
<tr>
<th>ENFORCEMENT OUTCOMES: Fixed Speed Cameras</th>
<th>ENFORCEMENT AGENCY: Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>DETERRENCE</td>
<td>TOTAL</td>
</tr>
<tr>
<td>Social Damage Avoided (p.a.)</td>
<td>$44,174,413</td>
</tr>
<tr>
<td>Loss In Claims to Offenders (p.a.)</td>
<td>$35,325,000</td>
</tr>
<tr>
<td>FINANCIAL IMPACT</td>
<td>TOTAL</td>
</tr>
<tr>
<td>General Enforcement Costs (p.a.)</td>
<td>$4,000,000</td>
</tr>
<tr>
<td>Administrative Costs (p.a.)</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Total Enforcement Costs (p.a.)</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>Revenue from Fines (p.a.)</td>
<td>$2,820,000</td>
</tr>
<tr>
<td>Revenue from Other Offenders (p.a.)</td>
<td>$3,820,000</td>
</tr>
<tr>
<td>Total Revenue Recovered (p.a.)</td>
<td>$3,820,000</td>
</tr>
</tbody>
</table>
Model example - output summary (2)

![Table of Cost Effectiveness Analyses]

Model example - output summary (3)

![Table of Enforcement Activity: Fixed Speed Cameras]

**Policy Conclusions**

This enforcement activity may not be economically beneficial. There is not a financial case for increasing enforcement. There is an economic case for increasing enforcement.
Model example – deterrence outputs

Summary

- Objective
  - Apply economic enforcement principles to help understand how speed enforcement spending can be optimised
  - A practical application for policy makers to choose between policy instruments

- Need more data!

- Extensions and other applications
  - Different categories of offender e.g. attitudes to risk
  - Reduction in second tier or repeat offences
  - Impacts on the legitimate economy e.g. professional driver loss of license
  - Application to other areas of traffic law enforcement
Delivering Road Safety at the Local Level; the Approach taken by City of Stonnington

Gordon Walker
Road Safety Officer
City of Stonnington

Aim of presentation

To demonstrate how the City of Stonnington is delivering the arrive alive strategy at the local level, using the Safe System approach.
Background

- VicRoads Saferoads initiative
- First road safety policy 2001-2005
- Position of Road Safety Officer created in 2008
- RSO position is road safety best practice; a number of LG have similar positions
- Step 1; re-develop Road Safety Policy; 2008-2017
- Strategically, policy delivers Council Plan and MPHP
- Policy aligns with the arrive alive strategy

arrive alive; 2008-2017

- By the end of 2017 aims to reduce
  - deaths by 30%,
  - serious injuries by 30%,
  - reduce the severity of serious injuries.
- Partnership between VicRoads, Victoria Police, TAC, the Department of Justice and Local Government
- First Action Plan 2008-2010
- City of Stonnington’s Road Safety Policy has the same aims and period as arrive alive
- City of Stonnington’s first action plan covers same period as arrive alive
- Both utilise the Safe System
The Safe System

Safer Roads and Roadsides

- Traffic calming devices include kerb out-stands, speed humps, signage, traffic islands, roundabouts
- Maintenance works on local streets
- All road improvements have an inherent road safety benefit
Safer vehicles

- Safe driving policies and safe vehicles policies are considered to be best practice for fleet owners
- City of Stonnington has a driver handbook (safe driving policy)
- Council’s Light Motor Vehicle Policy is due to be reviewed in 2011.
- New policy will have references to the Australian New Car Assessment Program (ANCAP)
- Combined policies demonstrate best practice
- Purchasing vehicles with high safety ratings means that Council is providing a safe work place for employees and being good corporate citizen

Safer road users; behavioural programs

Programs delivered aim to:

1) improve the safety of vulnerable road users including young drivers, pedestrians, cyclists and passengers

2) address a number of road safety issues including speed and speeding, drink driving
Safer road users; behavioural programs (continued)

Programs delivered include:

- *Fit to Drive*; year 11 workshops to all secondary colleges in the municipality
- *Looking After Our Mates; RoadSafe* drink drive awareness program delivered to year 12 students, sporting clubs & community groups
- *Responsible Serving of Alcohol* training for representatives of sporting clubs
- *Not So Fast*; speed advisory trailers in local streets
- *Years Ahead; RACV* road safety program for older road users
- *Pedestrian safety program* in entertainment precinct

Program assistance

- VicRoads *Saferoads* program has assisted program delivery; funding to deliver road safety countermeasure packages
- Young Driver package - assisted delivery of *Fit to Drive*
- Motorcycle package – consultants engaged to audit motorcycle crash locations and make recommendations to improve road conditions for riders
Additional Funding

- Funding has been obtained from TAC Community Grants Program
- *Below .05 in Stonnington*; hand held breathalysers in local restaurants
- *Chapel Vision and WalkSafe Review*
- *Watch your speed in Stonnington*; new advisory speed trailer
- *Below .05 in Sporting Clubs in Stonnington*; wall mounted breathalysers in sports pavilions

Advocacy role

- The role of road safety officer enables City of Stonnington to advocate for the safety of vulnerable road users
- This includes advocating for reduced vehicle speed in local streets
- City of Stonnington’s Sustainable Transport Officer also advocates for reduced vehicle speed / bicycle facilities
- Speed reduction also referred to in Council’s Municipal Public Health Plan
- Outside Council (VicRoads, other LG, Heart Foundation)
- Within Council (traffic engineers / town planners)
Advocacy role (continued)

Probability of fatal injury

Impact speed (km/h)
Delivering the Policy

- City of Stonnington delivers its Road Safety Policy in conjunction with road safety partners Victoria Police, VicRoads and RoadSafe South East
- A representative working group oversees the delivery of the Policy / three year action plan
- While the Policy sits in Transport & Parking a number of departments assist with delivery; “whole of Council approach” – recreation services, family services, corporate affairs
City of Stonnington
arrive alive targets 2008 - 2017; Serious Injuries

City of Stonnington arrive alive 2008-2017;
Serious Injuries in local streets
City of Stonnington is one of a number of Local Governments that is demonstrating best-practice principles in the delivery of road safety at the local level:

• Road Safety Policy and three year action plan align with *arrive alive*
• Utilisation of *Safe System* approach
• *Whole of Council* approach
• Position of Road Safety Officer
• Delivery of programs in partnership with local road safety stakeholders
• Representative working group oversees delivery of policy