Review of the role of motorcycles on Victoria's roads

VicRoads R and D Project P901

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With our thanks to those who gave us time and assistance

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With our thanks to those who gave us time and assistance

Front Cover: Traffic in Central Rome (Oxford Systematics, May 2004)

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KEYWORDS

Motorcycle, Intelligent Transport Systems, scooter, moped, powered two wheeler, road pricing, tolls, Intelligent Transport Systems (ITS), Victoria, Australia, Kuala Lumpur Malaysia, Rome Italy, London, Brussels, mode choice, travel demand, road user, information, scenario, sociology. Transport statistics

ABSTRACT

VicRoads commissioned a research investigation into the present and future roles of motorcycles (defined broadly) on the road system with a view to improving the road system and its management for motorcycle users. This is addressed by examining the current context for motorcycle usage in Australia, and the implications drawn from the present situations in Australia and overseas for their future role. The legal definitions of a 'motorcycle' are important and will require review due a proliferation of variants of bicycles and motorcycles.

As suitable motorcycle time series data for Australia do not exist, forecasting was not possible. Consequently a varied set of current circumstances were the subject of a field trip to check on the very different balances between culture towards motorcycles, enforcement and legislative approaches, patterns of charging for exemptions, and the operational aspects of widely differing fractions of motorcycles in the traffic stream in cities comparable in some way with Melbourne. Data from Australia and overseas were analysed to inform the levels of utility usage of motorcycles, the levels of scooter usage, and to confirm that most motorcycle users also had access to at least one car in their household. Visits to several cities secured a view on the levels of motorcycle usage that could be sustained, and the characteristics of such high-use cities (London, Kuala Lumpur and Rome were visited and DVDs of traffic observations from part of the present report). Consultation with stakeholders included the use of a computer aided group decision support system. One result of using this made it possible to analyse the frequency of a range of underlying topics and so get some perspective on the issues most frequently involved. While users focussed mainly on short term issues of concern, two opportunities emerged.

- Intelligent Transport Systems as an aid to motorcycles, and

- Improved data systems to permit a broader and more active perspective on all aspects of motorcycle use.

Growing use of scooters, and issues raised by hybrid vehicles on the boundaries between 'motorcycle' and 'bicycle' categorisations were emerging issues. Supporting motorcycles in their on-road role will require both tactical (traffic management and audit) and well as strategic measures (ITS, improved data systems)

Contents

1. The task

The key tasks are to:

- Examine possible future scenarios for motorcycle ownership and use in Victoria, the key factors that will underpin such scenarios, and the appropriate provision for motorcycles

- Assess and advise on how the road system and adjuncts to it need to be improved or modified to better cater for likely future changes

The assessment of certain types of current motorcycle needs has been developed over recent year to include blackspot audits and remedial measures, funded under the Transport Accident Commission levy managed by the Victorian Motorcycle Advisory Council. Summary advice on a growing number of motorcycle traffic and safety topics has been produced by Vicroads, for consultants and local government engineers, to build on earlier general advice published by AustRoads.

These initiatives address some of the current issues, but there is at present no framework for considering the interactions of different factors that may lead to future scenarios for which VicRoads will wish to anticipate and plan for effective provision.

1.1 Our approach to the task

Powered two wheelers range from electric bicycles and 'toy' scooters with motors attached up to trikes and large motorcycles fitted with sidecars. It is not possible to consider all these variants as if they were a single type, but it is necessary to review the range as a whole to consider the roles that PTWs can and might fulfil in Victoria.

The legal treatment of all 'motorcycles' in Victoria is straightforward, and considers scooters, mopeds, motorcycles etc all as undifferentiated vehicles that can be and are treated as a single

type to which Australian design Rules (ADRs), licencing and regulatory controls all apply with out distinction.

This regime has still has permitted electric bicycles to be operated under the 'bicycle' lack of licensing, type approval, registration, safety equipment, training and enforcement rules applicable to 'motorcycles' under the legal stance that these are 'not motorcycles. More motorcycles designed primarily or exclusively for off road purposes are sold than those designed or on road usage. For use on public access tracks these subject to the same regulations and type approval issues as other 'motorcycles', but must then be modified for full and safe operation off road. 'Recreational' registration has recently become available to address some of these factors, and as a result of the recent extensions to the definition of 'public road.

The sociological and regulatory perspectives within government and professional circles, and the general perspectives of the community at large, have a major influence on the ability of PTWs to deliver their comparative advantages in the various situations and ways in which they are permitted to be used. The importance of accounting for these factors became immediately evident when future scenarios for their takeup or abandonment were seriously considered.

Consequently the approach in the present report explores these factors through a range of devices, including:

• Perspectives of users,

• Legal and regulatory treatment variations between various subclasses of PTW

• Exploration of the various social and official perspectives and PTW performance aspects in cities with significant PTW usage

• Information flow impacts on perspectives, funding and strategies for PTWs

• The types of measures that could have a significant impact on the future roles of PTWs and the acceptability of these roles in what is currently a largely negative official environment

1.2 A partial summary of our findings

The present report has examined several scenarios offered by different cities overseas, which demonstrate very different approaches to licensing, enforcement, regulation and traffic provision and the motorcycle and scooter outcomes of these different mixes and cultures.

The pivotal aspects were found to be:

- Attitudes towards mobility for teenagers in particular
- Different regulatory approaches
- Government actions to alter the nature of motorcycle, scooter and moped fleets.
- General mobility culture towards motorcycles
- Attitudes towards mobility provided by motorcycles

It may be argued that these factors are largely set in Victoria, but benefits of examining such widely different views of mobility and the traffic and other aspect of high levels of motorcycle use have not only identified good work on how better to integrate motorcycles into traffic and transport planning, policy and operations, but also give an overall view of circumstances where high levels of usage of motorcycles are a part of the life of comparable cities.

Several specialised differential measures for treating motorcycles exist: dedicated motorcycle lanes (Malaysia); freedom from congestion charging and bridge tolls (UK); and footpath parking in Victoria). Unfortunately the data required to adjust and monitor polices and

operations with a greater understanding of motorcycles are largely absent, and these data gaps need to filled, albeit selectively.

It was also apparent that the growth of ITS investments by manufacturers and infrastructure managers could well provide both an opportunity to correct these lacks in information and monitoring, but also needed to be approached in a manner which ensured that not only were motorcycles full participants in the ITS managed road system – but also gained specific benefits from it.

Any reappraisal of the roles that motorcycles can, should or could be encouraged to play on the road system are hampered by the lack of a continuing knowledge base and interpretive expertise that can link the diverse areas where motorcycles are small part - but are substantially affected if not treated from the start with understanding and timeliness. The potential for negative impacts has already been demonstrated by the Australian National Road Rules where the motorcycle issues affecting capacity utilisation and movements along and between lanes have yet to be fully considered.

The operational scenarios observed in various overseas environments demonstrated that motorcycles can fulfil effective mobility roles considerably larger than they do now in Victoria, and that the scooter and moped variants have higher levels of utility to a broader cross section of the community than motorcycles have supplied in recent years - but that to secure the full potential will require road rules and other regulations to be reappraised in a broader context with mobility, safety, economic, environment, registration and traffic treatments all given balanced attention.

2. What is the present motorcycle transport situation in Victoria and Australia?

Crash involvements attract almost all of the motorcycle publicity and attention in Victoria, based on published data. The transport aspects are far less well known or understood. Before considering future scenarios, it is therefore appropriate to consider some of these less well known factors so that the present can be better appreciated.

AUSTRALIAN BUREAU OF STATISTICS 2001
METHOD OF TRAVEL TO WORK BY SEX
Census of Population and Housing

Bicycles to work Vic 2001	*Male*	*Female*	*Persons*	*f/m*
Bicycle	14,949	3,961	18,910	26.5%
Train, bicycle	882	206	1,088	23.4%
Bus, bicycle	57	24	81	42.1%
Ferry, bicycle	6	0	6	0.0%
Taxi, bicycle	13	4	17	30.8%
Car as driver, bicycle	844	298	1,142	35.3%
Car as passenger, bicycle	283	63	346	22.3%
motorbike/motor scooter, bicycle	40	7	47	17.5%
Bicycle, other	18	6	24	33.3%
	2,143	608	2,751	28.4%
Train, bus, bicycle	63	13	76	20.6%
Train, taxi, bicycle	4	3	7	75.0%
Train, car as driver, bicycle	51	13	64	25.5%
Train, car as passenger, bicycle	27	3	30	11.1%
Train, motorbike/motor scooter, bicycle	6	0	6	0.0%
Bus, taxi, bicycle	0	3	3	0.0%
Bus, car as driver, bicycle	6	0	6	0.0%
Bus, car as passenger, bicycle	13	3	16	23.1%
Ferry, motorbike/motor scooter, bicycle	0	3	3	0.0%
Taxi, car as driver, bicycle	5	3	8	60.0%
Taxi, car as passenger, bicycle	5	0	5	0.0%
Car as driver, car as passenger, bicycle	48	11	59	22.9%
Car as driver, motorbike/motor scooter, bicycle	33	8	41	24.2%
Car as driver, bicycle, other	7	0	7	0.0%
Car as passenger, motorbike/motor scooter, bicycle	4	0	4	0.0%
Car as passenger, bicycle, other	0	3	3	0.0%
motorbike/motor scooter, bicycle, other	3	0	3	0.0%
	275	66	341	24.0%
TOTAL WITH BICYCLE TRIPS SEGMENTS	17,367	4,635	22,002	26.7%
people on multimode journeys / people on single mode journeys	*16.2%*	*17.0%*	*16.4%*	
Total # who reported travel including walking to work	981,049	725,128	1,706,177	73.9%
% using bicycle for 1+ segments	**1.8%**	**0.6%**	**1.3%**	
Walked only	34,363	30,369	64,732	88.4%

Table 1 Journey to Work patterns for bicycles in Victoria 2001 (ABS Census 2001)

AUSTRALIAN BUREAU OF STATISTICS 2001
METHOD OF TRAVEL TO WORK BY SEX
Census of Population and Housing

Motorcycles to work Vic 2001	*Male*	*Female*	*Persons*	*f/m*
motorbike/motor scooter	7,611	765	8,376	10.1%
Train, motorbike/motor scooter	39	4	43	10.3%
Bus, motorbike/motor scooter	3	3	6	100.0%
Ferry, motorbike/motor scooter	4	3	7	75.0%
Taxi, motorbike/motor scooter	0	3	3	0.0%
Car as driver, motorbike/motor scooter	697	91	788	13.1%
Car as passenger, motorbike/motor scooter	49	12	61	24.5%
motorbike/motor scooter, bicycle	40	7	47	17.5%
	792	116	908	14.6%
motorbike/motor scooter, other	40	9	49	22.5%
Train, taxi, motorbike/motor scooter	0	3	3	0.0%
Train, car as driver, motorbike/motor scooter	9	5	14	55.6%
Train, car as passenger, motorbike/motor scooter	3	0	3	0.0%
Train, motorbike/motor scooter, bicycle	6	0	6	0.0%
Train, motorbike/motor scooter, other	3	0	3	0.0%
Bus, car as driver, motorbike/motor scooter	4	0	4	0.0%
Ferry, motorbike/motor scooter, bicycle	0	3	3	0.0%
Taxi, car as driver, motorbike/motor scooter	3	3	6	100.0%
Car as driver, car as passenger, motorbike/motor scooter	39	4	43	10.3%
Car as driver, motorbike/motor scooter, other	18	3	21	16.7%
Car as driver, motorbike/motor scooter, bicycle	33	8	41	24.2%
Car as passenger, motorbike/motor scooter, bicycle	4	0	4	0.0%
	162	38	200	23.5%
TOTAL WITH MOTORCYCLE SEGMENTS	8,565	919	9,484	10.7%
people on multimode journeys / people on single mode journeys	*12.5%*	*20.1%*	*13.2%*	
Total # who reported travel including walking to work	981,049	725,128	1,706,177	73.9%
% using motorcycle for 1+ segments	**0.9%**	**0.1%**	**0.6%**	
Walked only	34,363	30,369	64,732	88.4%

Table 2 Journey to Work patterns for motorcycles in Victoria 2001 (ABS Census 2001)

Motorcycles and scooters are used both for commuter and utility transport (including shopping) and for leisure and visiting friends and relations. The ABS Census data shows the journey to work patterns in some detail.

Tables 1, 2 show the combinations of modes used by individuals in Victoria reporting their journey to work patterns (JTW) as including a bicycle or a motorcycle in the 2001 Population Census. The three major Vulnerable Road User groups (bicycles, motorcycles, walkers) are shown here in detail, with all others excluded. Both bicycles and motorcycles are predominantly used by males for travel to work. The number of trips in 2001 is greatest for pedestrians, then for bicycles (1.3%) and last for motorcycles (0.6% of people making JTW trips).

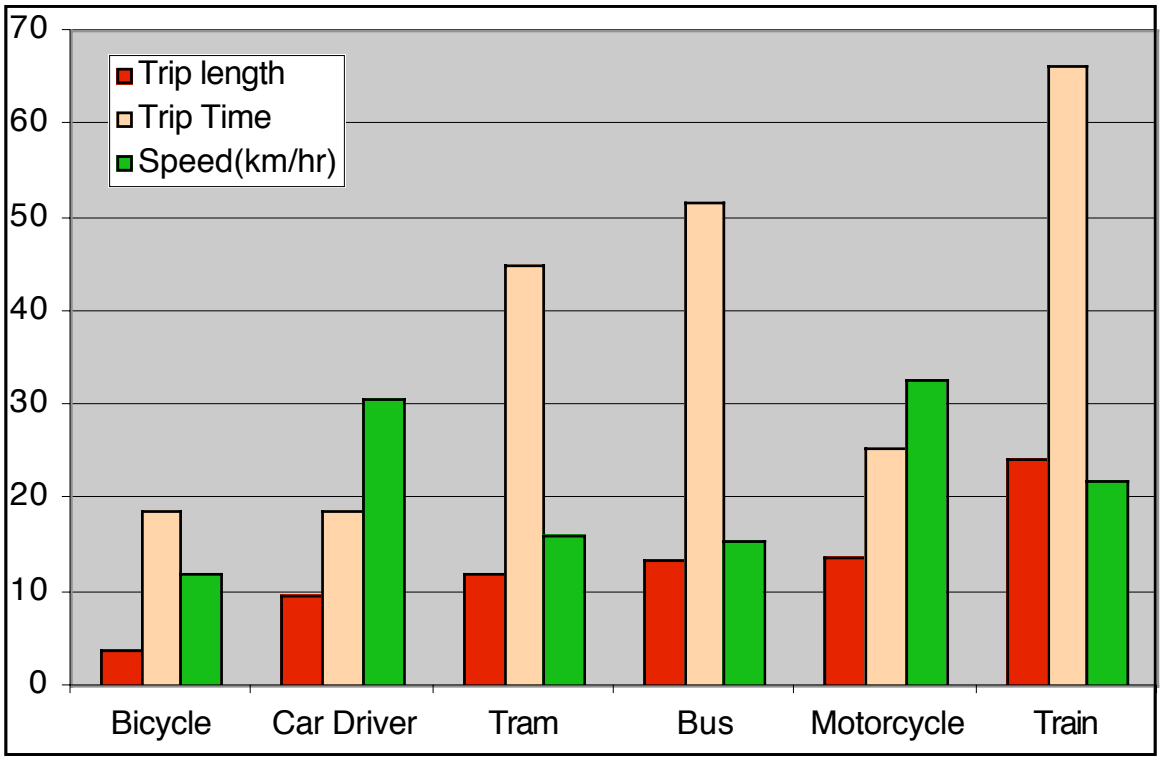

Fig. 1 Travel times and speeds by mode in order of trip length: VATS 1995-8

Surprisingly, a significant fraction of both bicycle (16.4% of single mode bicycle trips) and motorcycle usage (13.2% of single mode motorcycle trips) are part of a chain of connected

modes in journeys to work. The double counted mode chain types are highlighted in Tables 1, 2. However 'trips' or in this case 'chain of trips to work' do not tell the whole story Bicycles serve very short trips remarkably well, but motorcycles serve very long trips very well (Fig.1, drawn from Wigan (2000). As a result the Transport Task undertaken (here for the journey to work) is considerably larger for motorcycles - but this would not have been evident had 'trips' however short, been the sole measure. In fact the number of reported 'Walking' trips to work comfortably exceeds them both, even without counting the walking segments attached to most of the other modes.

There is a widespread assumption that motorcycles are essentially a leisure mode, and off-road motorcycle sales in Victoria now exceed on-road motorcycle sales. This does not mean that off road motorcycles are all leisure machines: motorcycles form a key part of the working farmers toolkit. Limiting attention to on-road motorcycles, what is the evidence that they are leisure or utility machines as they are actually used?

The best source for such information is household travel surveys, and special analysis runs were secured for the present study as motorcycle questions are rarely addressed from this transport standpoint. Household interview surveys are helpful, but contain very few motorcycle owning households or motorcycle trips. One example is the most recent Queensland survey where less than a hundred motorcycle trips were picked up from around 4000 households (Personal communication, Richardson, TUTI 2004). These most recent South East Queensland Transport Study results are not yet available, but the previous cycle of household travel survey data collection (SEQTS 1992) provides some perspective.

Table 3 (A. Pekol, Personal communication 2004). Shows the strong utility focus of the motorcycle trips. Over 70% of these are utility trips (for work, education and shopping)

SEQTS 1992	Work	Shopping	Education	Recreation	Other	Other-Other	Work-Work
Total Trips:	11073	4072	1079	2227	758	4071	709
% Trips:	46.2%	17.0%	4.5%	9.3%	3.2%	17.0%	3.0%
Avg Duration (min)	27.3	13.8	42.5	17.0	15.2	23.9	17.0

Table 3. Brisbane and region 1992: Motorcycle trips, trip lengths and trip purposes

Another such source is the first year unweighted preliminary results from the Perth household travel survey (Department of Planning Western Australia 2004). Most of this information is not available elsewhere, or is entirely new, additional information is given here in tabular or graphical form as appropriate, in order to fill out the background to the issues. As the basic data is preliminary, and particularly unweighted, these diagrams should be regarded as being of general interest and indicative of the analyses that would be worth undertaking on the final data sets.

But, in view of the general dearth of data on motorcycles, they have been included to assist this review. The next set of diagrams are based on preliminary unweighted data from the first wave of the current Perth Household Travel Survey, and gives an insight into the kinds of households and vehicle alternatives available to households in Perth, and looks at the differences between households that have at least one motorcycle and households that have none.

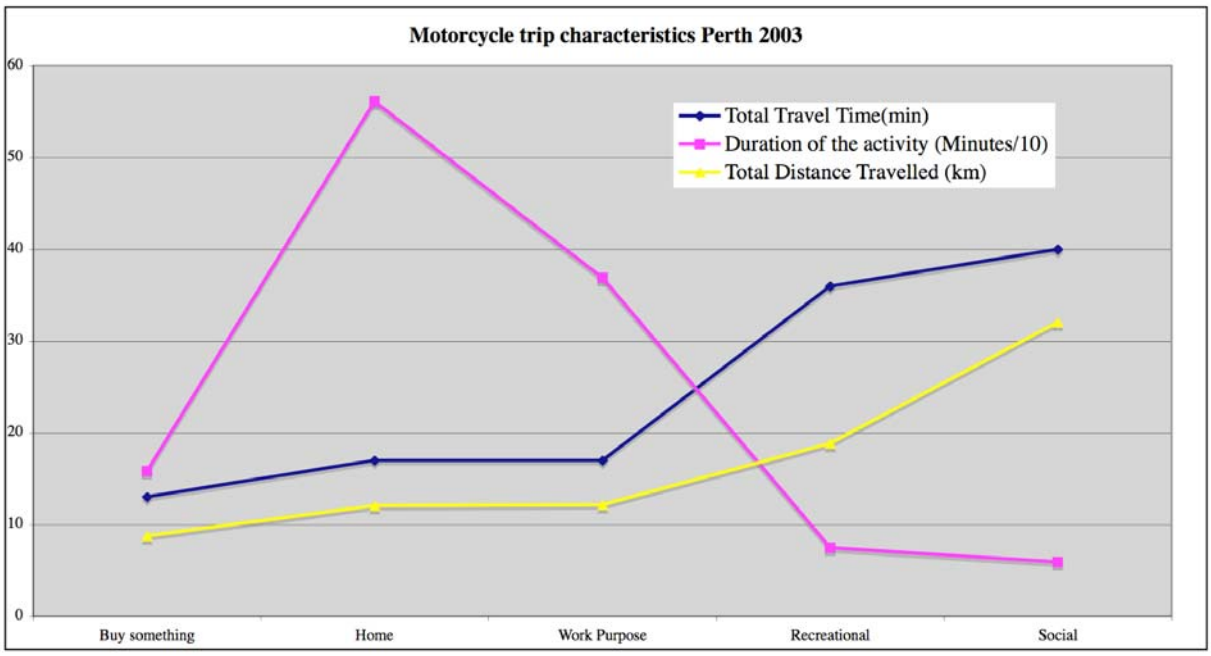

Fig. 2. Perth 2003: Motorcycle trip times, lengths and purposes

These very preliminary results strongly suggest that motorcycles are more likely to be found in Perth households with full employment. This sheds little light on the leisure **v** utility roles

of these motorcycles. The peak of motorcycle ownership lies in the model income band. This is partly due to the size of household with young fully employed adults still at home, but once again yields no insight into utility v leisure usage of these vehicles.

A view frequently heard is that motorcycles in (at least in urban and suburban) Australia are essentially only leisure vehicles. The trip purpose table from Perth suggests (given that the numbers of trips in each category vary from 6 to 14) that this may be misleading. Utility purposes account for 66% of the trips reported by motorcycle, the remainder being social and recreational. However the Fig. 2 suggests that any assumption that motorcycles are now primarily leisure vehicles may not be entirely correct.

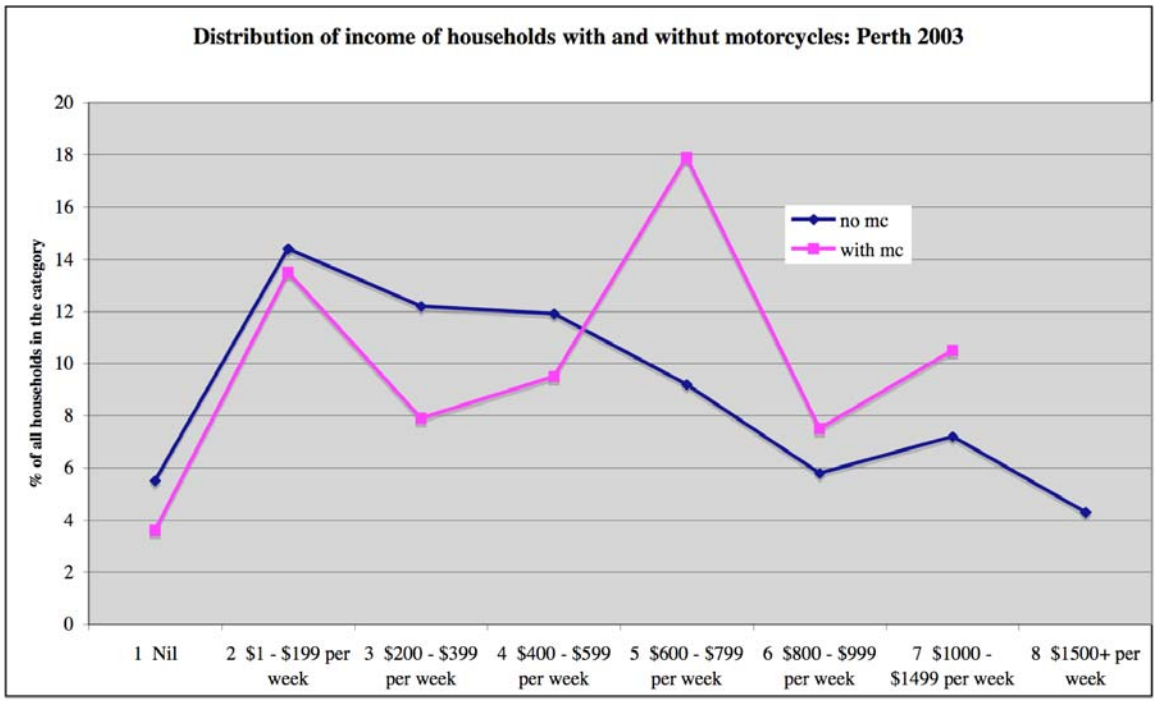

Fig. 3. Distribution of income by motorcycle ownership Perth 2003

The total distances travelled and the time spent in travel on social and recreational trips are indeed longer than work, education and shopping destinations. The durations of the activities for which the trip was undertaken provides a balance to the simpler unidimensional perspectives of travel distance or travel time alone.

Early Australian work on motorcycles showed that the best predictor of the number of motorcycles in a dwelling was the number of cars (Wigan, 1987). This finding was not adjusted for the size or income of the household, and so should be interpreted simply as a useful way of examining the mobility choices of households with a mix of vehicles, including both cars and motorcycles.

The income distributions for these two types of households in Perth in 2003 is shown in Fig. 3, and the cumulative effect of these diagrams suggest that motorcycles play both a utility role and a leisure role from the peaks in the income distribution.

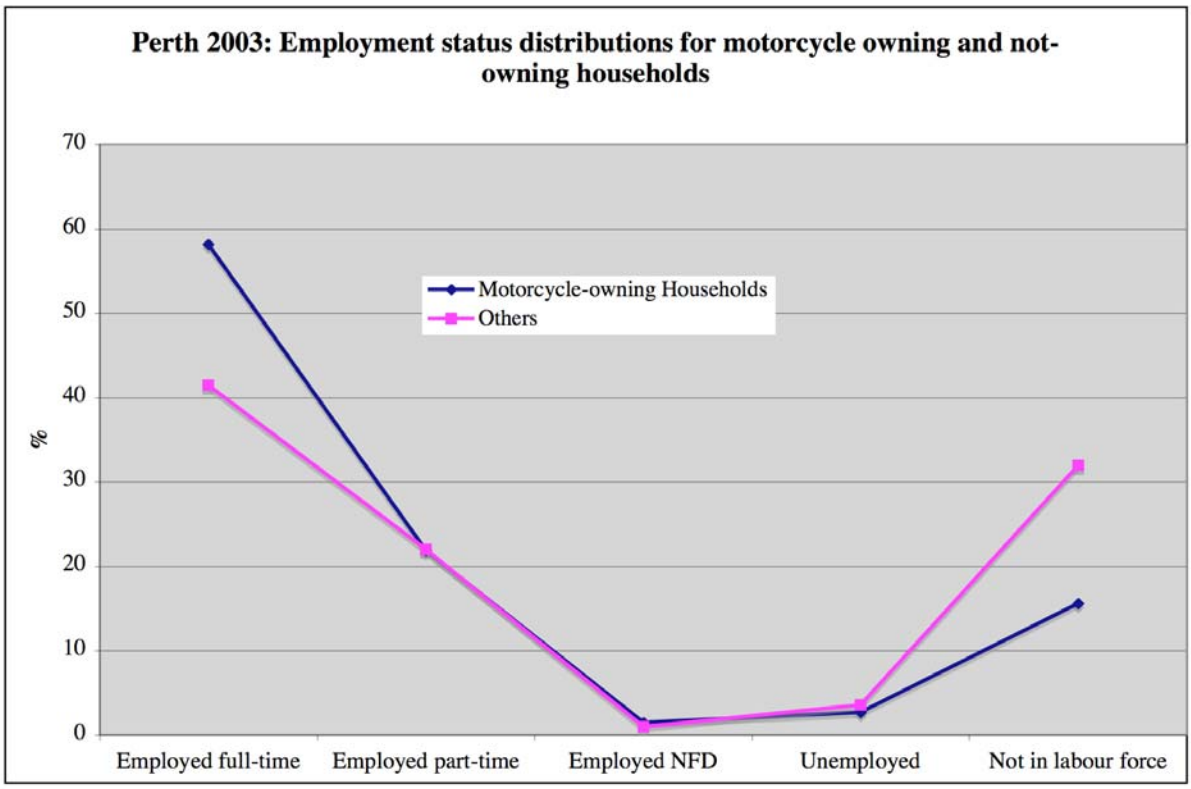

Fig. 4. Employment in motorcycle owning and other households in Perth 2003

Any expectation that motorcycles would be preferred by the unemployed or those not in the workforce (i.e. as an inferior transport good to cars), is not confirmed by Fig. 4, where motorcycles are most clearly associated with full time employment.

Households with one motorcycle are reasonably likely to have more than one, and as shown in Fig. 5, about 15% of Perth households with any motorcycles at all, have more than one.

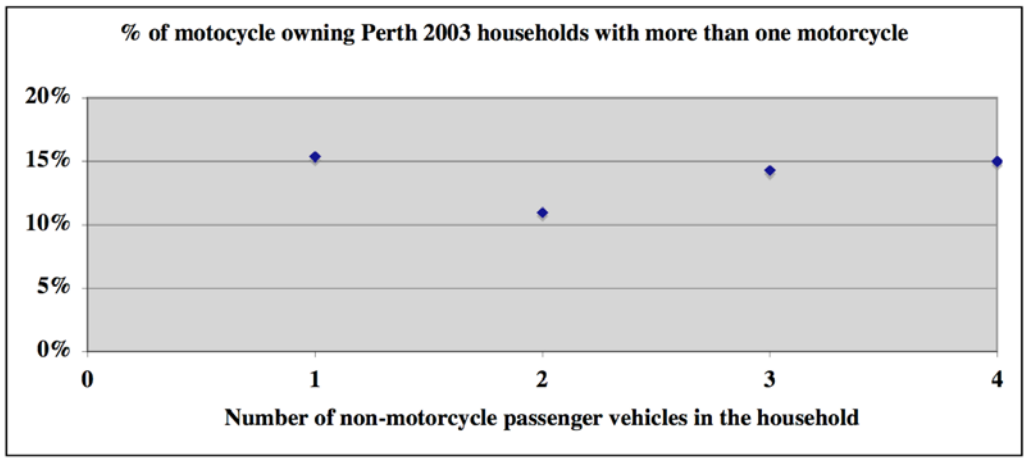

Fig. 5. Multiple motorcycle ownership in households in Perth 2003

Multiple motorcycle ownership in Perth appears to be independent of the numbers of other passenger vehicles in the household. Even for the 5% of households with no other types of passenger vehicles at all, this ratio is 20% with very poor statistical reliability due to the small numbers involved.

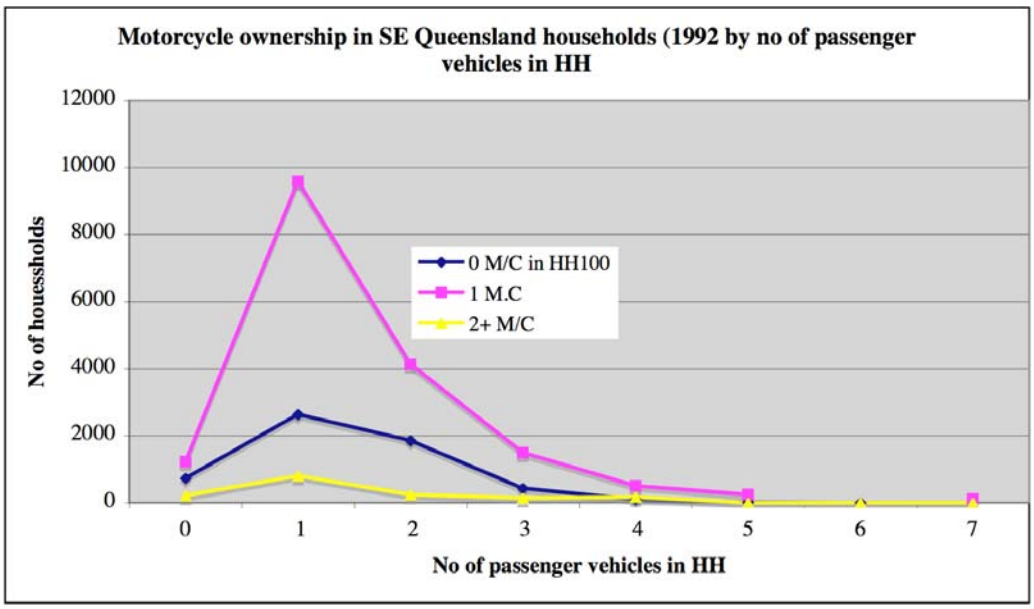

Fig. 6. Motorcycle ownership by other passenger vehicles in S E Queensland in 1992

The patterns of Queensland motorcycle ownership are not dissimilar to those in other States in Australia, all of which show broadly the same patterns in terms of the numbers of motorcycles owned by households with different numbers of cars. This two-dimensional view picks out a characteristic Australian pattern for single and multiple motorcycle ownership on households (see Fig.6). To emphasis the shape of these distributions in diagrams such as Figures 6 and 7, the number of households with no motorcycles has been divided by 100.

The picture in Melbourne is broadly similar. Preliminary unweighted household distributions of motorcycle ownership by the number of passenger vehicles in the household over the period 1999-2001 (excluding motorcycles) suggest that the peak of motorcycle ownership is in households with two other passenger vehicles. This may be associated with the age distributions in these households, but the key point is that motorcycles are not currently (at least until 2001) predominantly in households with no other passenger vehicles.

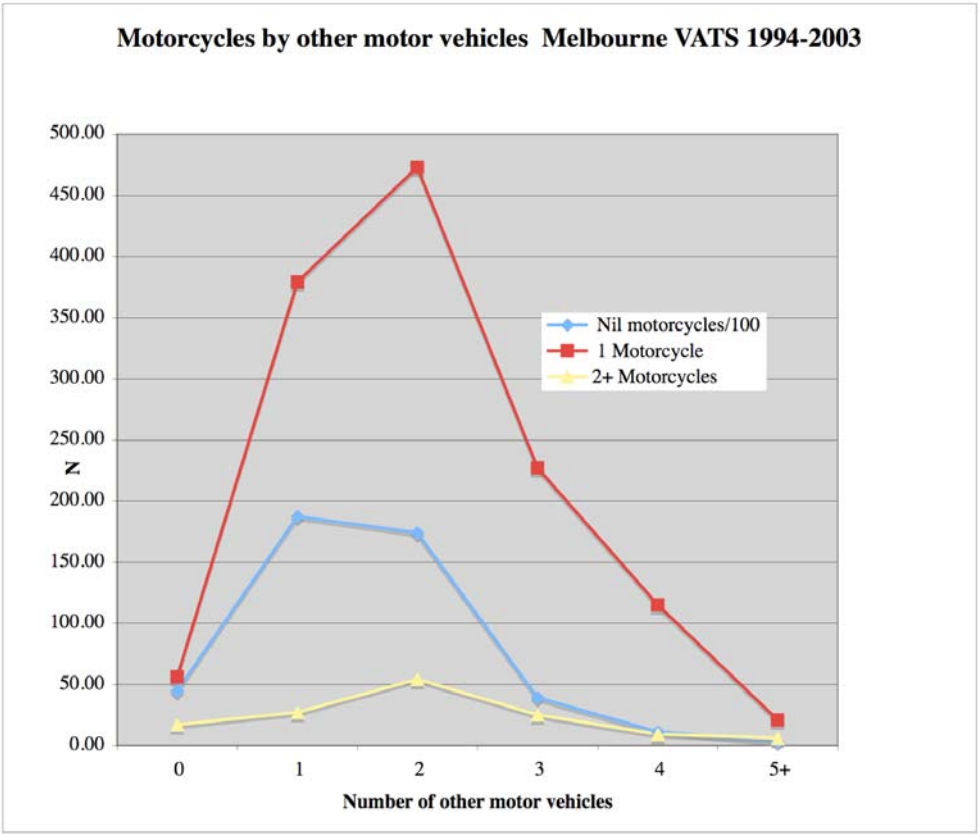

Fig. 7. Melbourne household motorcycle ownership by number of passenger vehicles

These results suggest that motorcycles in greater Melbourne are found mainly in households that already have a substantial level of potential household mobility.

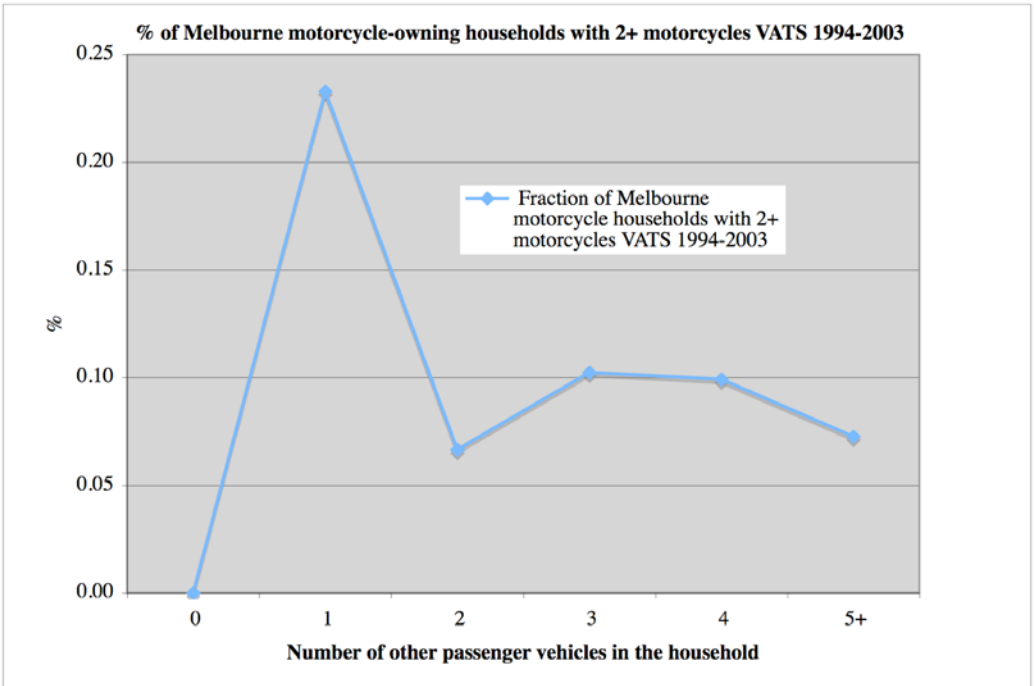

Fig. 8 Melbourne household motorcycle ownership by number of passenger vehicle

Fig. 8 shows that the fraction of Melbourne households with both more than one other type of passenger vehicle and two or more motorcycles is reasonably constant (at around 10%). The levels of mobility suggest that imposing high fixed costs on owning motorcycles (such as vehicle based registration and third party insurance, and any additional levies) has a strong likelihood of **encouraging** their use even when other passenger vehicles are readily available.

Special tabulations from the NSW 2001 journey to work population census data can be analysed slightly differently, but with very similar results. Fig. 9 shows that the relative number of dwellings with two motorcycles rather than one is highest for households with no other motor vehicle and those with three or more. This is a weak indicator of a stronger reliance on motorcycles in non car-owning households as the effects of rider age group and size household must also be kept in mind.

However the rise in fraction of dwellings with multiple motorcycles in households already with substantial mobility is notable. The number of people making journeys to work solely by motorcycle was exactly the same in NSW in 2001 as in Victoria 2001, namely 0.6%

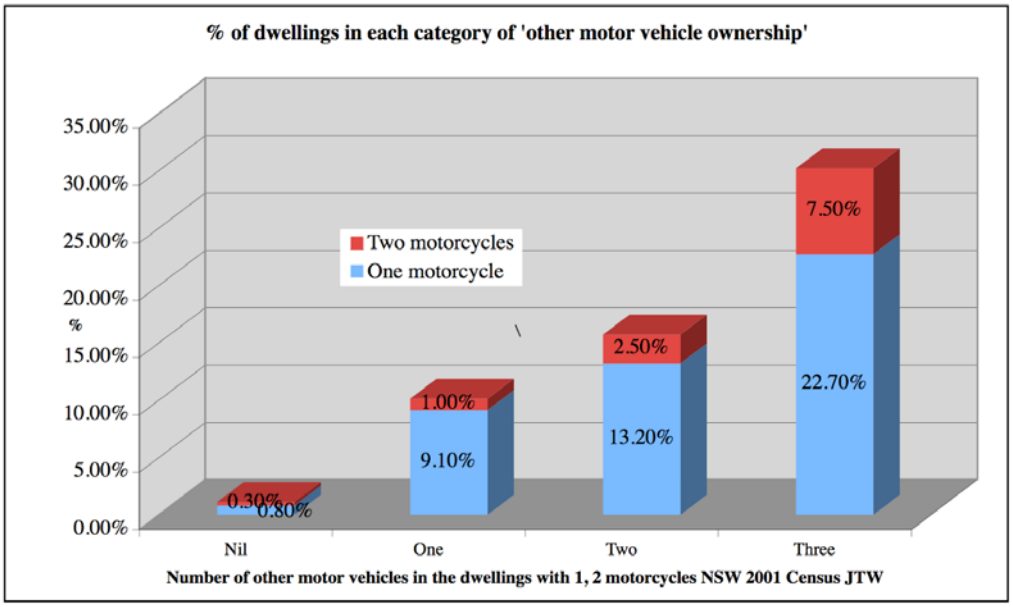

Fig. 9. Motorcycle ownership in NSW JTW data by number of passenger vehicles

These results from across Australia strongly suggest that those with motorcycles as an option also have cars – and that polices to adjust the balance between cars and motorcycle usage in congested conditions are likely to be worthwhile and effective. The impacts of vehicle based insurance (rather than personal) and the fixed costs effects of this general policy in Australia may also be encouraging inappropriate usage of motorcycles, just as there are clearly some benefits in some journeys being made by motorcycle rather than by car.

These results make it clear that mode choice models taking into account the potential choices available to riders, and analyses of actual and perceived choice sets, would be a very useful basis for both transport and safety analyses and policies. These factors are also of evident importance in assessing any future scenarios for motorcycles on the road system of Victoria (or indeed elsewhere). In view of the highly targeted impact such analyses it is more than a little surprising that safety projects alone have not addressed this important tool, let alone transport analyses. Choice set investigations have not been done very much in Australia, and

not at all on motorcycles. Furthermore, the recent round of household surveys in Perth, Queensland, NSW and Victoria[1] entirely omit the essential key revealed preference question 'when did you last use mode x' for all modes?

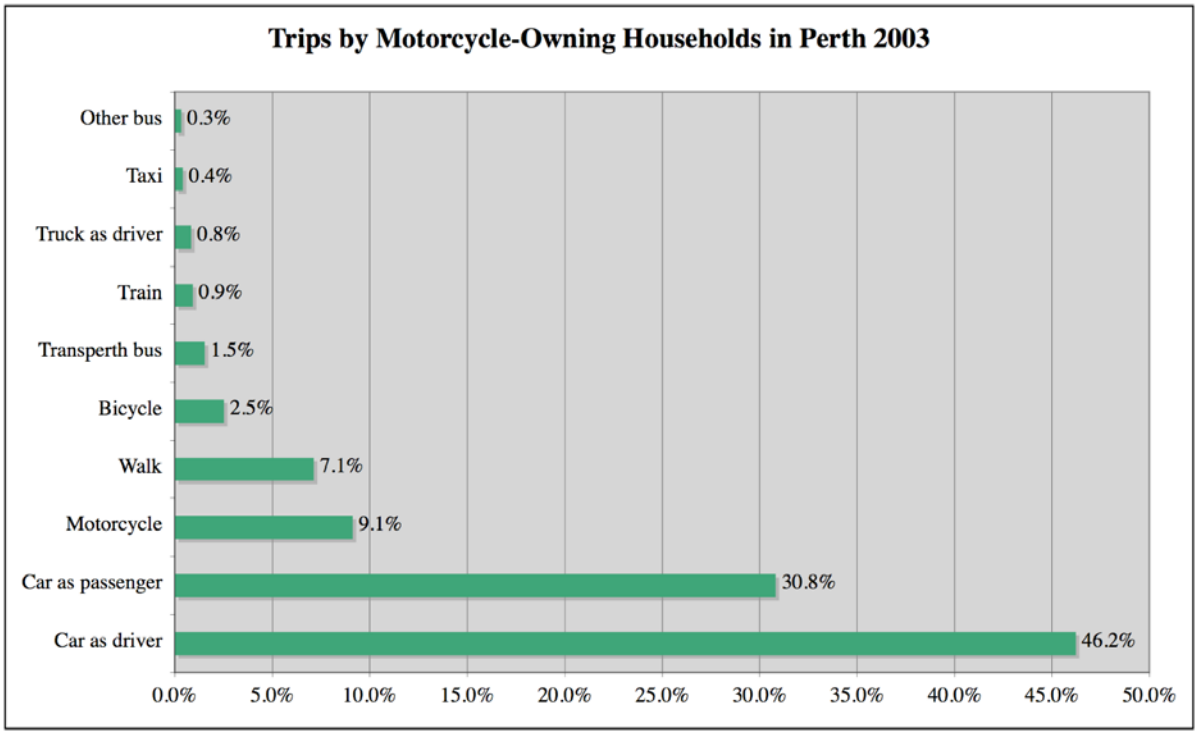

Fig. 10. Mode choices in Perth made by households that have a motorcycle available

Examining the basic mobility profiles of motorcycle and non motorcycle owning households is another way to examine the characteristics of motorcycle owners and households. Clearly motorcycles cannot be assumed to be available to all members of a car owning households, as motorcycle licences are held by far fewer people than cars[2]. Fig. 10, again based on preliminary 2003 Perth data shows that examining the trip making behaviour of household including a motorcycle is likely to be very useful in this direction. Over 9% of all trips made in such households were by motorcycle, substantially exceeding both bicycle and walking travel.

[1] A J Richardson, Personal communication (2005)

[2] This raises the question of what licences should be required for the very different types of vehicle currently lumped under the term 'motorcycle'

	TOTAL	NSW	VIC	Qld	SA	WA	TAS	NT	ACT
People who drove a motorcycle in the last year (2000 March)	1241	440	177	325	92	128	42	19	19
% of all People who drove a motorcycle in the last year	8%	8%	5%	12%	8%	9%	11%	13%	7%

	15-24	25-39	40-59	50+	**Has** held a Licence	Never held a licence	Metro Area	Non-Metro
People who drove a motorcycle in the last year	47	59	87	17	1224	17	640	600
% of all People who drove a motorcycle in the last year	4%	3%	3%	1%	9%	1%	6%	11%

	15-24	25-39	40-59	50+	Male	Female
People who drove a motorcycle in the last year	221	460	468	92	1032	209
% People who drove a motorcycle in the last year	8%	10%	9%	3%	14%	3%

	15-24	25-39	40-59	50+		15-24	25-39	40-59	50+
MALES who drove a motorcycle in the last year	174	401	381	75	FEMALES who drove a motorcycle in the last year	47	59	87	17
% of all who drove a motorcycle in the last year	13%	18%	15%	5%	% of all who drove a motorcycle in the last year	4%	3%	3%	1%

	Ride 50km+ 3+/week	Ride 50km 1+/week	Ride 50k+ last 3m+	Ride 50km_ less often
PEOPLE who drove a motorcycle in the last year	422	391	278	109
% of all who drove a m/c in the last year	16%	12%	5%	8%

Table 4. ATSB 2001 National Australian Community Attitudes to road safety survey

Household interviews are not the only kind of motorcycle data resource available. The Federal Australian Transport Safety Board (ATSB) regularly collects public attitudes on various safety issues, and has on at least one occasion (in 2001) included further questions on motorcycles. The sample is well balanced and is a reasonable overall view of the population, although the State subsets may not be as reliable. These types of surveys are valuable as there is still no national Travel Survey for all modes (or indeed even for freight) so it is essential to use all the available resources and glean them for insights. One of the key issues addressed later in the present report is securing better data sources on motorcycles.

The ATSB 2001 survey data (Table 4) indicated that up to 12% of the population had ridden a motorcycle in the previous year, and up to 8% of females had as well. Nearly twice as many in non-metropolitan areas (where household interview surveys are generally not undertaken) had driven a motorcycle in the last year than those in metro areas. There is a small but consistent body of evidence –of which this is a part -that non-metro area motorcycle riding is at a considerable higher level than metro riding. When this is combined with the emphasis towards utility purposes of riding, and the lack of public transport in most non-metro areas, this suggest that there is a significant transport role for motorcycles in both areas.

Within this broad view of the current Australian situation in terms of motorcycle ownership and alternatives, the insights that can be secured from other countries where different regulatory and other choices have been made can now be considered. This will highlight what factors affect the range of options for the roles of motorcycles on the Victorian road system – and to illuminate the roles that various special sub-segments of the extremely broad and all differentiated ‘motorcycle’ category can reasonably undertake.

There is very little usable information in Victoria - or indeed Australia- on the exposure of motorcycles and motorcyclists on road to be used in conjunction with the plentiful crash statistics. However in terms of the present and future role of motorcycles on the road system, the transport (ie ‘exposure’) aspects are the central issue. Some relevant data is available from the ABS 2001 Motor Vehicle Census, dealing with all motorcycle types aggregated together.

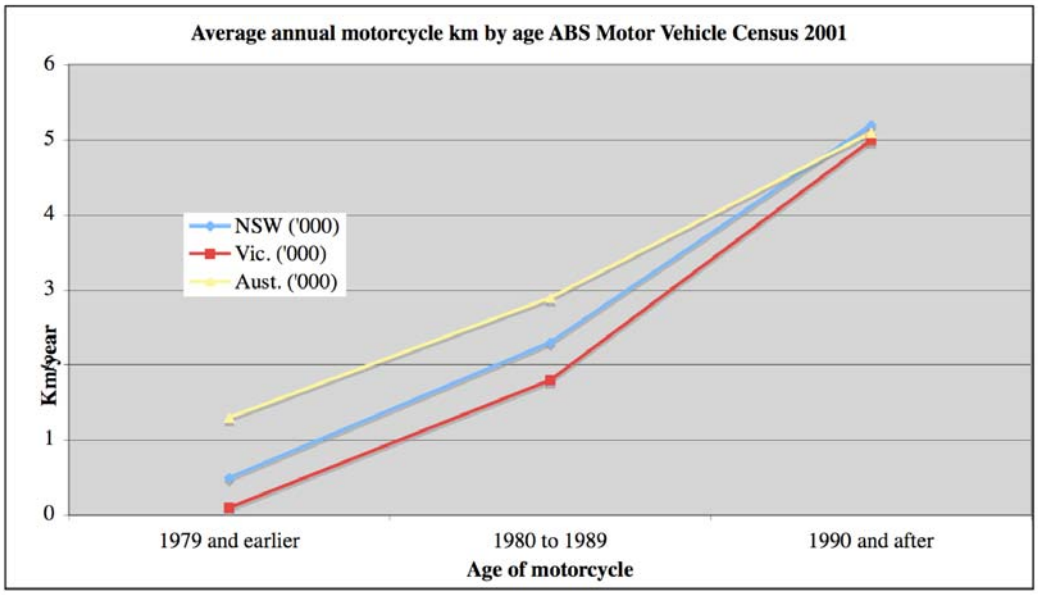

Fig. 11. ABS 2001 Vehicle Census Annual motorcycle km by age of motorcycle

Fig.11 shows that even 20 year old motorcycles travel a significant mileage, but this needs to be interpreted with a greater appreciation of the impact of multiple motorcycle ownership. The assumption that riders own only one motorcycle has already been shown to be incorrect, and the tendency to keep motorcycles when a new one is purchased also suggest that many of the older and lower vehicle kilometres of travel (VKT) machines are owned by riders with a younger and higher mileage machine as well.

This becomes important when considering motorcycle riding as distinct from motorcycles themselves, as the km ridden in a year will be distributed over a number of machines in multi-motorcycle households.

The 2001 ABS Motor Vehicle Census also allows us to examine the role of motorcycles on the road system from several different points of view. The overall VKT shares of all road travel in each State are shown in Fig. 12, in conjunction with the fraction of the overall Australian VKT for each State. point of view of urban v rural riding. Fig. 12 shows the percentage of motorcycle VKT in each State carried out in the capital city of the State. Each State is arranged in order of the fraction of the total Australian VKT. All other vehicle types are also presented in the same form for comparison. These overall figured disguise a number of factors, such as greater use of minor roads, but give a good overalls sense of perspective.

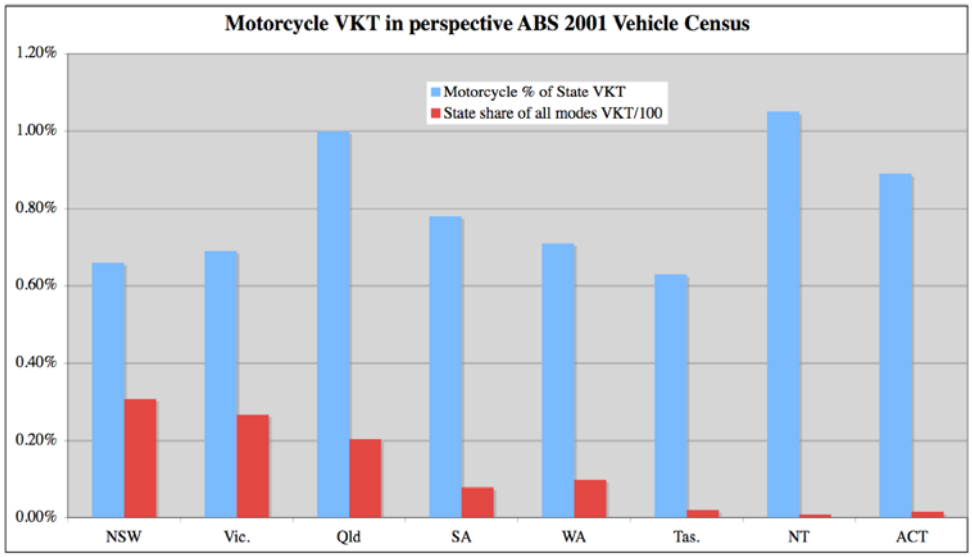

Fig. 12. ABS 2001 Vehicle Census: motorcycle percentage of VKT in each State

Motorcycles, like bicycles, are a minority mode. And, like bicycles need a clear view of their role to ensure that road service and safety support are provided in a balanced manner. If one or the other factor is given determining importance in public policy (as for a long time what is simply a negative side-effect of travel, namely safety, was for bicycles - and still is for motorcycles) then it is simply not possible to develop overall strategies for making best use of the special characteristics of either such mode as part of the overall transport, safety and accessibility system.

A preliminary examination of the role of motorcycles in the road system of Victoria was used most of the data available in 2000 (Wigan 2000; Wigan 2000), and found the case Control Study on motorcycle crashes complemented the travel data with traffic flows:

> "Traffic counts and case control components of Case Control studies indicate that motorcycles comprise about 1% of the traffic flow on the roads where counts are taken and where crashes occur. The ABS motor vehicle usage surveys suggest around 2% overall in Victoria and slightly higher in other States. These are small figures, although the average distance travelled on motorcycle trips are on average longer than car trips. Ironically the most usable data comes from the case control exposure aspect of the Victorian case Control study on motorcycles" (Haworth, Smith et al. 1997).

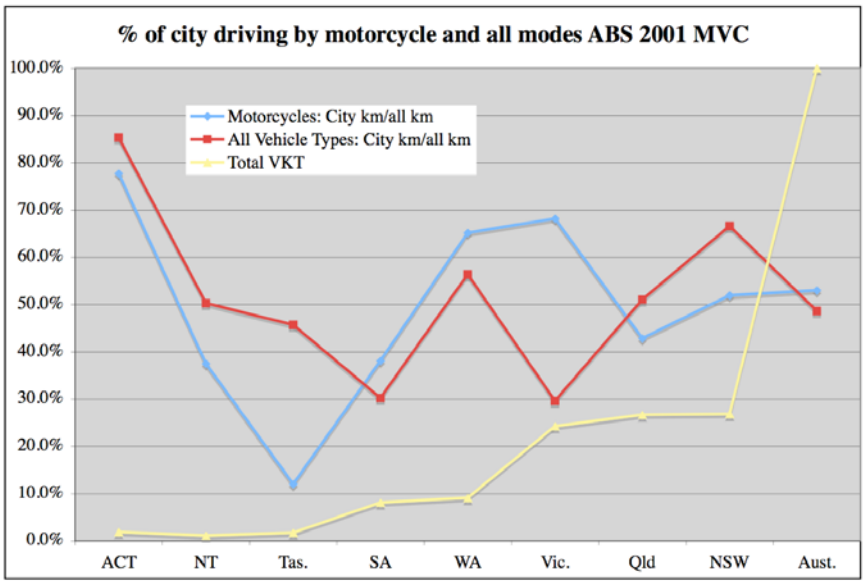

Fig. 13. ABS 2001 Vehicle Census: percentage of motorcycle VKT in each State capital

As an overall average, city VKT is about half of overall motorcycle VKT. The State variations show Melbourne and Perth have a significantly higher fraction of city travel, in approximate accord with the large 'utility' component of motorcycle usage in Australia.

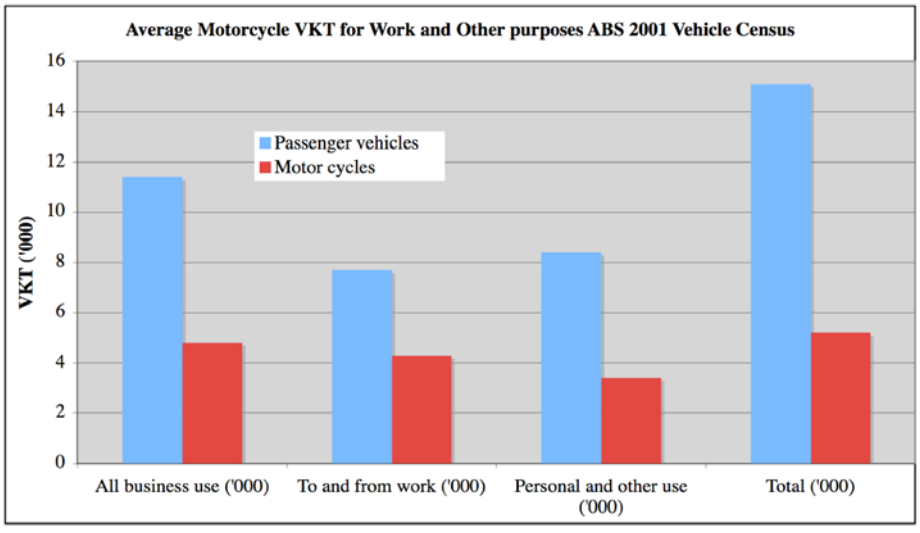

Fig. 14. ABS 2001 Vehicle Census: Average per-vehicle VKT by travel purpose

The implications for the role of motorcycles on the Victorian road system is that the largest use is in the area with most congestion, and as almost all the motorcycles are owned by households with at least one car, the revealed rider vehicle choices are directly contributing to

reduced congestion. Each motorcycle undertakes less in-business use and travel to work VKT (Fig. 14) than other passenger vehicles, but it must be noted that most motorcycles households that already have a car, and so in a general sense are replacing car trips. The tendency for motorcycle trips to work to be longer than all other road based modes (see Fig. 1) also affects the interpretation of these values.

Fuel consumption is also measured by the ABS Motor Vehicle Census, and shows the effects of varying average sizes, types and usages of motorcycles across the States. The variations in fuel consumption within motorcycle types is extremely large, varying from as little as 2 Litres/100km for small machines of up to 250cc, to as much as 11 in extreme cases. All these effects average out a little under 6 L/100km (Fig. 15), as compared to 11.3 for all other types of vehicle: a remarkable reduction is fuel consultation for the same functional task. This is also conservative as all freight vehicles are included in the 'other vehicle' category.

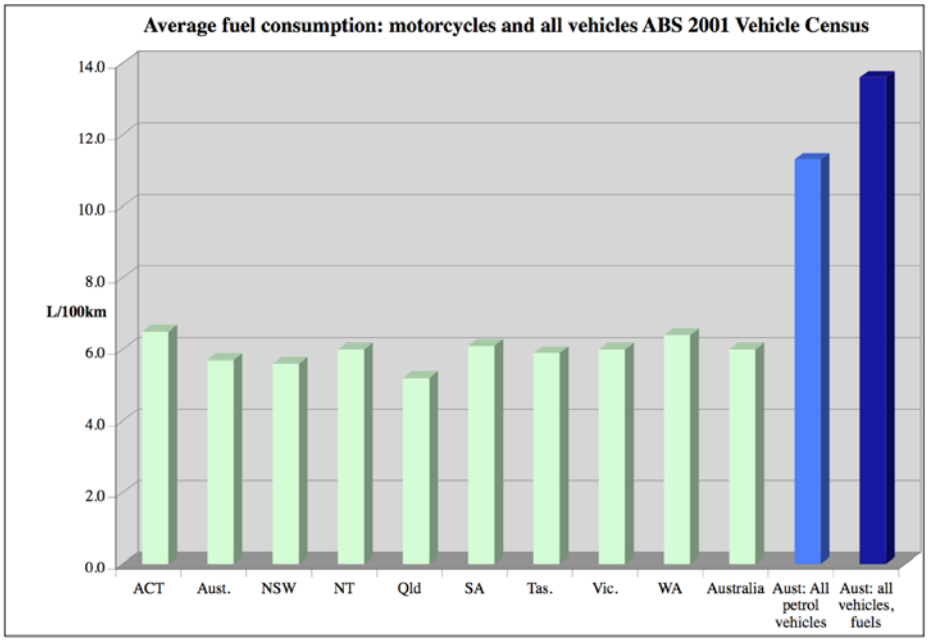

Fig. 15. ABS 2001 Vehicle Census: Average motorcycle fuel consumption

Fig. 15 supports the general view that motorcycles are on average about twice as fuel efficient than other passenger vehicles. The actual figures are 1.9 time for petrol vehicles and 2.3 for all vehicles, making 'twice' a reasonable working approximation for most purposes. Clearly this benefit is one that society needs to make effective use of and is just one of the many trade off factors for this mode (rather than the still far more common univariate

approach to use safety aspects as the sole planning criterion) required in designing whole of Government strategies for the role of motorcycles on the road system.
It is notable that in many current Victorian government publications, often with logos designed to show inclusiveness of all modes of transport, that motorcycles are the only one omitted. The DoI TravelSmart logo is but one example. However this is worth of special note as this program is designed explicitly to give people authoritative and extensive information about their full range of available travel modes, and shows the lack of availability of well balanced and widely understood information about this very capable mode.

3. Overseas motorcycle markets and trends and Government action influences

There are severe limits to the analysis of the role of motorcycles on the road system if it is limited to the current Victorian context. Other countries have other cultures and approaches, and these can result in very different patterns of motorcycle use. A common factor in all jurisdictions is the framework used by Governments for interventions. Some of these factors are explored in this section. The scenarios offered by other major cities are covered in a later section.

3.1 UK

Overseas information can be useful both to explore some of the characteristics of motorcycle usage and roles undertaken, and to examine some of the interactions between motorcycle use and government regulations and social attitudes, and to consider these with Victorian circumstances. As these environments for motorcycle use are very different, they provide some insight as to what mixes might lead to in Victoria, and thus clarify the future roles of motorcycles in Victoria as well as the impacts of the current regulatory and social environment.

Recent UK data also suggests that there is still a heavy utility orientation in the usage made of motorcycles there as well. Although there is a very evident ‘leisure’ marketplace in the UK, at an overall level, the 2002 National Travel Survey found that motorcycle travel is 2% of all business travel in the UK and 1% of all the travel for other purposes.

The nature of motorcycle usage on the road (the majority of motorcycle sales in Victoria are now for specialised off-road and unregisterable motorcycles) is a key factor. The generally cyclical nature of motorcycle ownership as whole is neatly summarised in Fig. 16, a diagram from the UK (Crowther and Brown). This illustrates the shift from the mobility boom of the early postwar austerity/utility era, the shift to cars and the new peak of the leisure era ("you meet the nicest people on a Honda" being a key marketing positioning tool of the time), and a recent hint of slight upturn, possibly associated with a mobility and fuel price response thrust. This feast and famine long term cycle is typical of the motorcycle market (and indeed the many submarkets) over the longer term. The types of motorcycles making up these numbers also change from peak to peak: scooters and mopeds being just two of the submarkets that have had their own dynamics over time.

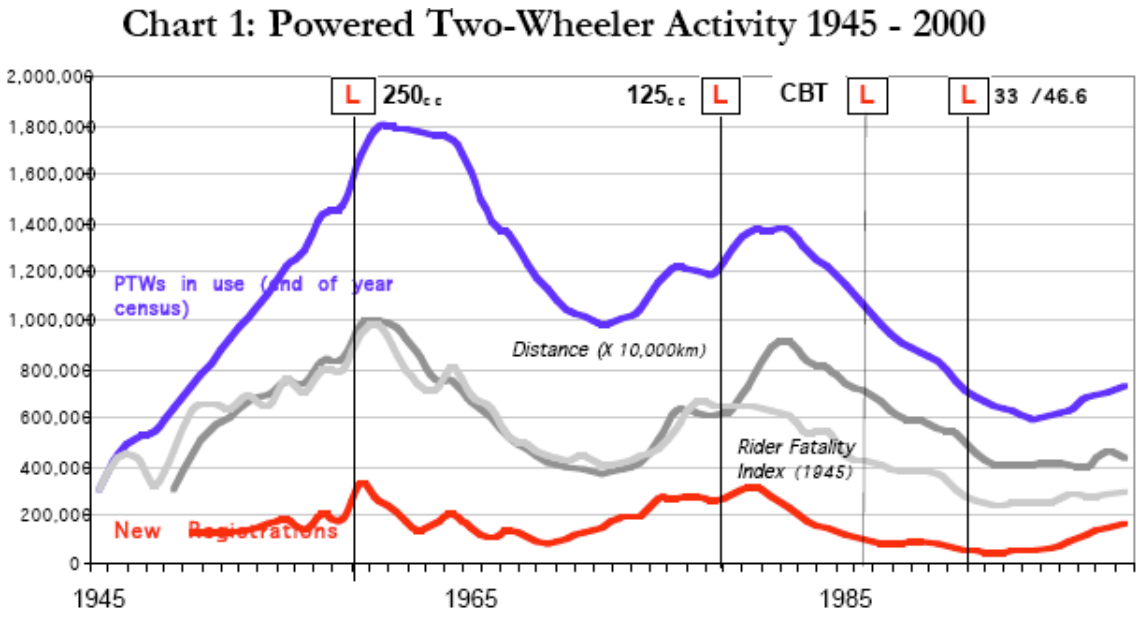

Fig. 16. Motorcycle trends and government actions in the UK (Crowther and Brown)

The motorcycle market as a whole is highly segmented and made up of many smaller markets. The tribal nature of the distinctions between these submarkets is more marked than for other forms of passenger vehicles. The distinctions between SUV[3] users and passenger

[3] Sports Utility Vehicles, often referred to as 4WD (Four wheel drives): another vehicle type frequently cited on safety and environmental grounds

cars are far less marked than those between electric bicycles and cruiser motorcycles, strongly marketed lifestyle brands such as Harley-Davidson and high performance sports bike riders, or scooters and almost any other form of motorcycle.

Fig. 16 shows some of the links between government action and registrations, with crash involvements superimposed. Some of the impacts of several specific UK policy and regulatory interventions are included:

> "As casualties approached record levels in 1960, an engine-size limit of 250cc was introduced for 'Learner' riders - prior to this, unqualified riders could use a machine of any engine size and continue to ride indefinitely without the need to qualify for a full-licence. The introduction of the Learner limit altered the balance of choice between the motorcycle and car, many riders consequently took to four-wheels. However, it was not until the early 1980's and again early 1990's that further regulations, based on the European model, were introduced requiring novice riders to take some form of practical riding test before taking to the road. These regulations also reduced the engine-size limit to 125cc and required new riders to achieve a full licence within two years of starting to ride" (Crowther and Brown)

The market structure interactions are assessed by these authors as follows:

> "There has been a steady shift away from motorcycles as everyday, universal transport, toward leisure and recreational use. This does not mean that powered two-wheelers of all types are no longer regarded as practical transport, simply that the emphasis has changed overall. Thus, during the period since 1993 when [UK] motorcycle activity by any measure hit an all-time low point, the strongest growth in sales and use has been witnessed in both high-performance sports bikes and small-engined scooters". (Crowther and Brown)

This commentary (illustrated by Figure 18) is complemented by UK National Travel Survey (NTS) data summarised in Table 5. This illustrates a progressive change in the UK market that is both associated with government actions and to the changes in market preferences observed in a number of developed countries across the world. This UK data illustrates these points, and data suitable for the same purpose for Australia has been unavailable. However the steady growth in the UK in scooters from 1996 is now clearly evident in Fig. 18, and after a long lag, in also emergent in Victoria and Australia as a whole.

	Work, Business and Education	Shopping	Other personal business and escort	Visit friends	Other leisure	All purpose	Average Annual Mileage
50cc or less	56	8	9	21	7	100	2,270
50-125cc	67	10	4	13	5	100	3,000
125-500cc	46	9	7	20	18	100	3,210
500cc and over	37	6	6	16	35	100	4,290
All size	46	7	6	17	23	100	3,440

Table 5. Aggregated UK motorcycle use by size and journey purpose 1992-99 (Huang and Preston 2004)

The DfT study of motorcycle commuting (WSP 2004) undertook a number of nationwide analyses, and so was able to determine the distribution of car ownership in households containing a motorcycle commuter. Over 50% of the households without a car used a motorcycle to commute, while over 60% did on households with two. The latter type of household contained almost all adults (85%)

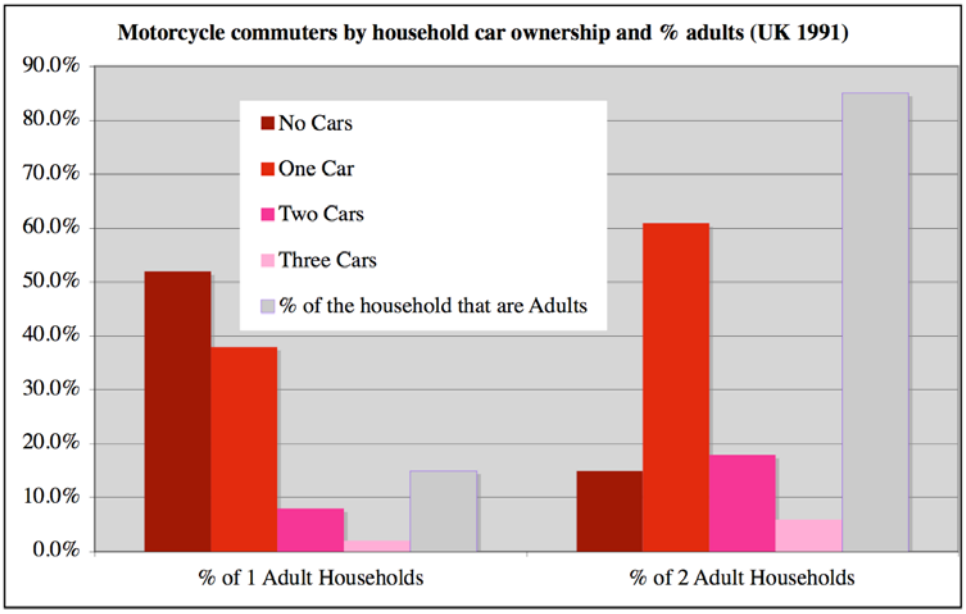

Fig. 17. Motorcycle commuters by household car ownership: Uk 1999 (WSP 2004)

The steady growth in mopeds in the UK follows the same pattern as scooters in UK but similar moped usage growth has not occurred in Victoria, probably due to the regulatory barriers to their use. To put Crowther and Brown's comments in context, the UK data derived from the National Travel Survey are summarised by Huang (Huang and Preston 2004), who

quotes the results of aggregating over many years of the NTS to give a picture of the travel purposes of UK motorcycle riders, (Department for Transport UK 2001). The utility purposes of work, business and education are by far the most important: only for the largest machines does leisure use (35%) approach utility transport (37%) by the same size of motorcycle. This is not the whole story, in a randomised 600 telephone interview survey, the OMNIBIKE (Sample Surveys 2000) survey executed for the UK Motorcycle Industry Association (MCIA) reported that 300 used motorcycles 'mainly for pleasure', 149 mainly for transport and 150 for both purposes. These figures are not inconsistent with the NTS data, simply give a different perspective. The dual use aspect (business and pleasure) is also consistent with the clear identification of 'enjoyment' being a consistent and important factor in choices to use a motorcycle for a given journey, reflecting the Australian findings that this was a major distinctive feature in Melbourne (Wigan 2000a,b).

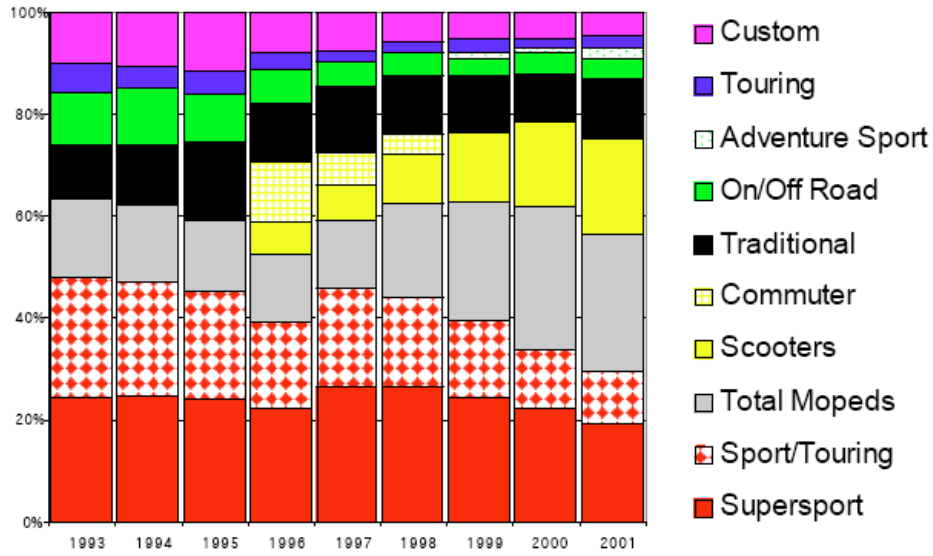

Fig. 18. Changing composition of UK registrations by style (Crowther and Brown)

New scooter registrations in the UK had already reached 38% of all new motorcycle registrations by 2003 (UK National Statistics 2004). The expansion of the scooter market observed in many countries, including Australia, started sometime after the UK, but the general patterns that should be observed are the connections between market/lifestyle factors (and the manufacturers response to them, and government actions, and the market and manufacturer responses to these in turn (Crowther and Brown).

3.2 London

London has the highest motorcycle mileage of all areas in the UK (UK National Statistics 2004), and also the longest average trip length (14.4km). This is substantially longer than medium urban areas (the area with the shortest average motorcycle trip lengths, of 11.2km). London was a major focus of a DfT sponsored study of motorcycles and congestion (WSP 2004), and a wide range of data was analysed in connection with this work. Relevant items include:

- There are higher levels of motorcycle commuting in congested areas
- Motorcycle commuting is highest in two-adult households owning at least one car.
- There is some suggestion (from London and Cambridge) that there is a higher tendency for professionals to use motorcycles in congested areas.

Figure 19. London congestion charging zone signage

London also provides a further example of government actions changing motorcycle behaviour and demand. Exempting motorcycles from the tolls for the Cordon Charging Zone (Fig.19) in central London was associated with a 20% increase in motorcycles allied to a 20% drop in crashes. (Transport for London 2004). This initial report after the first six months was followed up with more ambiguous results (Transport for London 2004), but still showed that

the trends in motorcycle usage were upwards and the crash involvements were going down (Transport for London 2004)Toll exemption policy is a case where motorcycle access to infrastructure has been deliberately improved, and has led to increased in demand at lower crash involvement, both in terms of numbers and of rates: a situation of considerable importance as previously the only mode offered the preferential access to infrastructure has been bicycles – another vulnerable transport mode requiring positive discrimination in the interests of a sound safety-mobility balance.

Toll exemptions are also provided at other major UK tolled tunnels and facilities. This strongly suggests that to secure the best overall benefits from motorcycle use in the community, that preferential treatment should be encouraged to ensure greater use of dedicated and restricted access facilities such as toll roads instead of congested and more dangerous urban roads. This is a strategy of special importance to motorcycles as they (and the community) suffer high costs in crashes with other vehicles.

One of the areas where the role of motorcycles has not been clearly assessed in a general policy arena in this multifactor manner is in preferential or uncharged access to urban tollroads. In general these are high capacity limited-access routes though areas of congestion and considerably safer than urban highways. Other urban highways present a high risk for motorcycles due to the frequency of conflict points such as intersections. The reductions in risk from transfers to limited access highways are a factor that does not seem to be given proper and public weight in decisions to charge motorcycles or not– but clearly should be. The operational practise of the CityLink tollway in Melbourne not to impose tolls on motorcycles[4] is therefore likely to be a community safety benefit provided by CityLink, but for which it does not currently gain recognition. Such a policy could therefore be considered for EastLink.

This risk balancing factor needs to become part of the Government policy portfolio for tollways in urban and suburban areas, as charging motorcycles to use these facilities is quite likely to cost the community more in terms of safety and crash costs incurred by the transfer

[4] The CityLink Act specifically permits such charging, and such rates are gazetted each year.

to congested urban streets. This is an aspect of motorcycles' role in the road system that has previously been given little or no serious analytical attention in Australia.

In addition to the central area charging scheme, a three year trial is being run, monitoring legal access to bus lanes by motorcycles in parts of London. Bicycles are already permitted to use bus lanes in this area. Currently the results are not clear in either direction, and so if the perspective were to be 'it does not harm' then a positive policy outcome could be expected, if however the evaluation criterion become 'only if it proves to be of some positive and significant safety benefit' then this would have another interpretation and no action would be seen to be necessary.
Once it was established that the sole evaluation criterion on which the decision is likely to founded is the crash involvement record, with no consideration of capacity or travel time costs, then the importance of the professional culture as well as the community culture in the framing of different vulnerable road user needs becomes quite apparent. This issue of professional culture and norms related to motorcycles recurs in other lines of investigation in this report, and clearly has a substantial influence on the roles that motorcycles are perceived (and therefore enabled) to play on the Victorian road system.

There is evidence, from the monitoring work in and on either side of selected London bus lanes outside the current charging area, that motorcycles tend to move along major London roads about 10% faster than the average car and other traffic. This is a by product of bus lane monitoring, in the control sections outside the shared lane sections, and is awaiting further verification from additional measurements over the three year trial period for bus lane usage.

Work has also been done in North London on the sharing of Advanced Stoplines with bicycles (Tilly and Higgins, 2004). The results have been generally satisfactory, but further work is continuing. This one of several positive measures being investigated by the London Motorcycle Advisory Group set up by Transport for London (TfL) and which has had three trials operating as direct result of the recommendations of the UK Government Advisory Committee on Motorcycling. The final report of this body this has recently been released

London has a large scale transport survey system, the most relevant of which is the LATS (London Areas Transport Study).

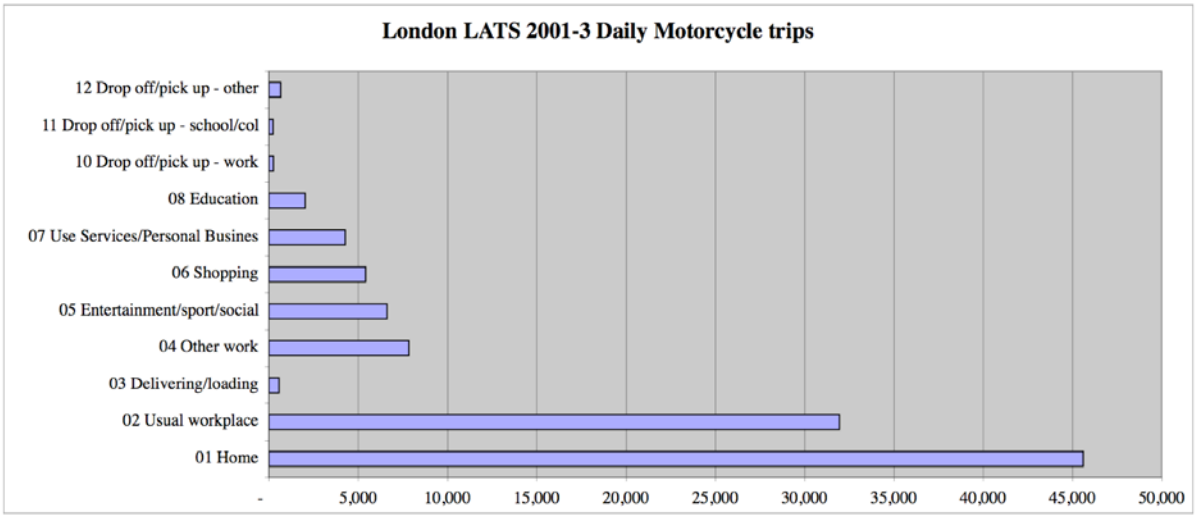

Figure 20. London: motorcycle trips by purpose of travel

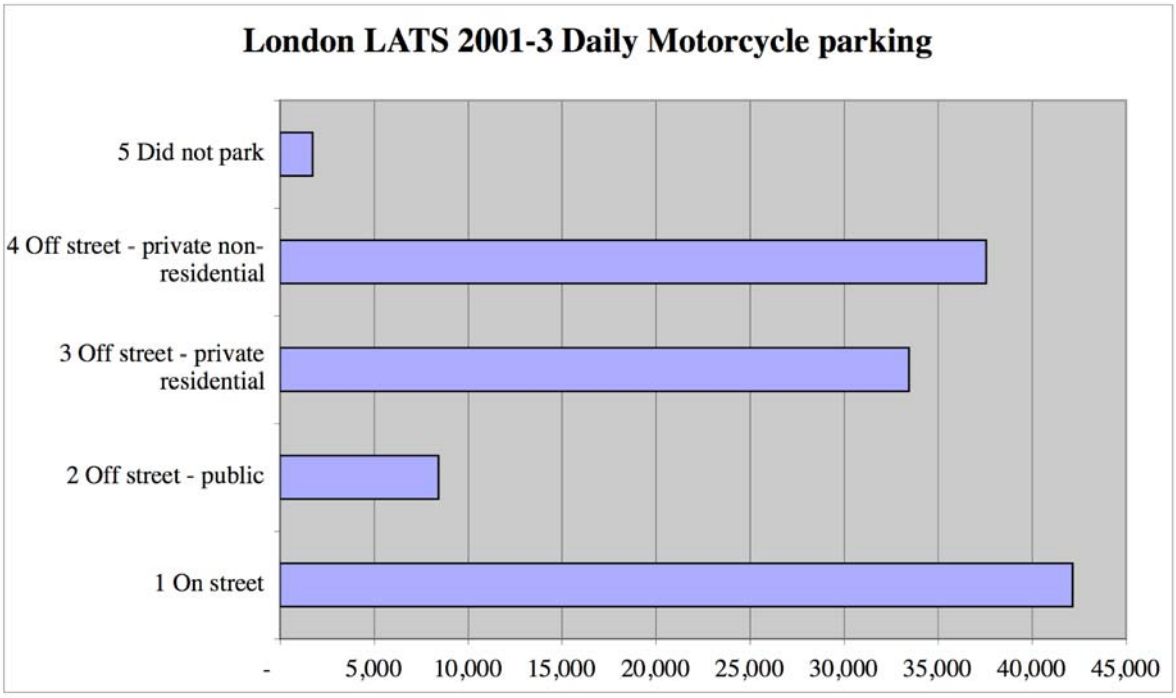

Figure 21. London: motorcycle parking patterns under constraints

Data from this study was extracted by TfL (Transport for London) at the request of this project. The two key areas of information were on the trip purpose distributions for

motorcycle trips, and the parking decisions made in a city with severe limitations on motorcycle parking and no provision for legal parking on the footpath[5].

The pattern of utility usage of motorcycles in cities being widespread and important is reaffirmed by these results (Fig. 20). The utility usages (work, education and shopping) make up 80% of all trips other than back home. This becomes 87% if personal services travel was included, as it usually would be. The definition of these trips is 'at least one leg of the trip was made by motorcycle'.

One limitation on this extremely high level of utility is the severe constraints on parking for motorcycles. Most parking areas designated for motorcycles are overflowing, and parking on the footpath is not legal. Also some councils charge for motorcycle parking, which is possible due to the limitations on available spaces. Given these constraints the patterns of motorcycle parking are given as Fig. 21.

Parking issues are a key factor in utility motorcycle usage, and the demand for this in London is high enough that some Councils charge for motorcycle parking places. However the substantial residential parking fraction in conjunction with the very high utility transport purpose fractions shown in Fig. 20, suggest that the usage of motorcycles for utility travel may be constrained by the parking limitations. This is a further area of policy review when considering the role of motorcycles on the transport system in Victoria where there is a current policy of permitting non-obstructive footpath parking in Victoria. The impacts of negative cultural norms affecting the provision of appropriate safety and transport support to motorcycle riders was also highlighted in the final report of the UK Advisory Committee of Motorcycling (DfT 2004).

The area of use of motorcycles affects the safety levels and crash causation factors. Two substantial studies summarise these findings in the UK and in Scotland (Sexton et al 2004, Sexton and Hamilton 2004). Sexton et al used a 30,000 subject survey to examine a range of effects, and included very minor incidents as well as serious and fatal crashes. The first round

[5] Unlike Paris and Melbourne Australia

of analysis suggested that there was no strong link between engine size and crash involvement for non-minor and serious injury crashes, and that for very minor incidents small machines (<125cc) were over involved, with little variation from 126cc upwards. Closer analysis using GLIM (a powerful statistical analysis tool) showed that there was a non-linear relationship between mileage ridden and accident liability[6], so that higher mileage riders were exposed to lower risks as their mileage increased. There was no evidence for a 'returned rider' effect in these exposure corrected analyses.

These results are useful for Victorian consideration in view of the exposure corrections and very large sample size on which it is based, although the parameters will undoubtedly be different in Victoria. The inclusion of the 'minor incident' category is valuable, as it allows a better balanced perspective of the involvements of riders of different ages and on different machines that the serious injury patterns cannot provide.

The Scottish work (Sexton and Hamilton 2004) is of greatest relevance to Victoria as Scotland shares many of the characteristics of Victoria with a central (lowlands) urban area, and a huge rural hinterland attractive to tourists and sports as well as touring motorcycle riders. The Scottish work is based on official statistics rather than a very large sample survey. It reflects most of the overall UK findings, but makes a clearer distinction between the urban and rural situations. Overall in Scotland the motorcycle casualty numbers are rising – but the **rates** are **not** rising. Fig. 22[7] is from Sexton and Hamilton (2004)

[6] Accident liability =0.0013* Miles $^{0.403.}$* **o**ther factors

[7] This and related diagrams may be accessed at www.srsc.org.uk/files/kevinhamilton.pdf

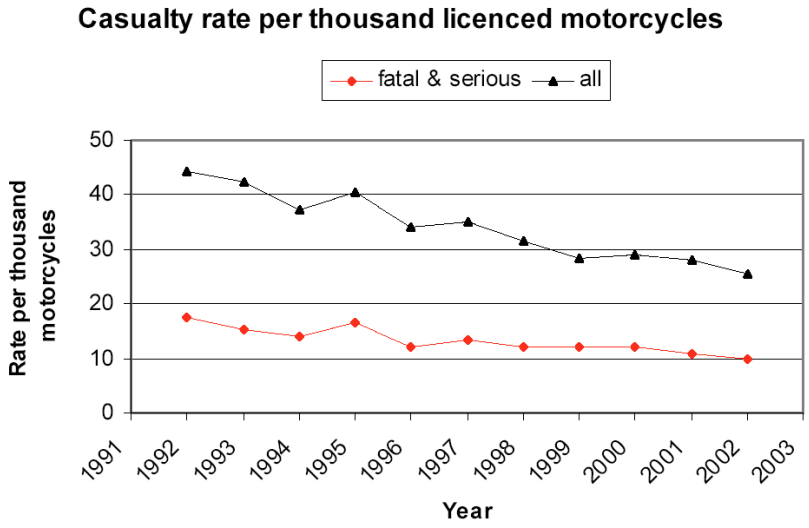

Figure 22. Scotland 1992-2002: Motorcycle crash rates over time (Sexton et al 2004)

The increases are due solely to there being more motorcycles. Built up areas are characterised by slight accidents or incidents, likely not to be the fault of the rider. Scooters and light motorcycles are found mostly in such urban areas. Outside built up areas the pattern changes to larger machines, and more serious and fatal crashes – and more likely to be due to the rider losing control. These patterns are generally similar to Victoria, and the greater detail on these two papers can provide further helpful insights to the trends in Victoria.

3.2 Italy

Scooter usage in Italy provides further examples interactions between government policy and sales. A systematic effort was made to reduce pollution from older style motorcycles and scooters was backed up by a subsidy of 250 to 500 Euros, payable when trading in a scooter over five years old. This was very successful, and the fleet changed markedly as a result (Fig.23)

The impact on the large motorcycle fleet was smaller as the trade-in subsidy was a less impressive fraction of the residual value of the machines. The effects are evident in Fig. 22, which illustrates aspects of the Italian motorcycle market over the last decade, during which the current mobility scooter wave became established.

A broader sense of perspective is probably appropriate. It is not just government action that is changing and affecting the various motorcycle market segments, there is also a combination of environmental factors and rising pressures for greater efficiency and sustainability.

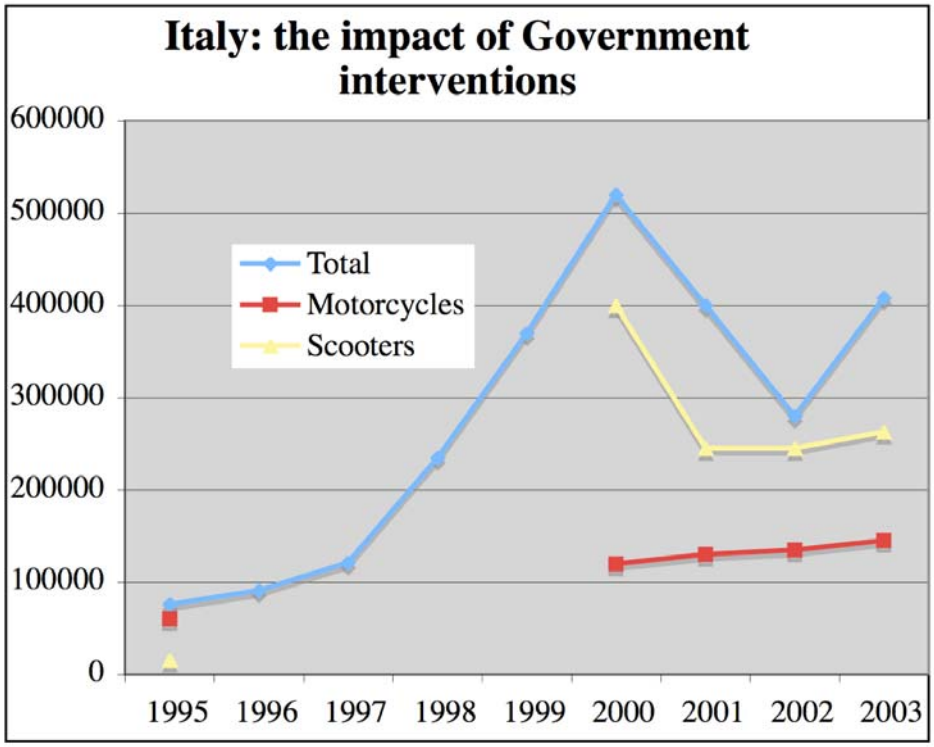

Figure 23. Impacts of government actions in Italy

Italy provides another view of the impacts of government actions on the levels of polices for motorcycling. A surtax of 500 Euros was proposed for all motorcycles over 500c in 1991. This stimulated uncoordinated motorcyclist reactions in the form of many spontaneous demonstrations. Subsequently to the formation of the Coordination of Motorcyclists (CoM), who then became a member of FEMA.

The current CoM President was interviewed in Rome on the project field trip. The 500 Euro surtax proposition was withdrawn and a completely new (but unfortunately regressive) new annual taxation system varying by number of cylinders and engine type was introduced, varying by local government region, was brought in. This varied from 124 Euros in Trentino

(a rich region in the north of Italy) to 260 Euros in the less rich region of Calabria – and only 159 Euros in Rome

The taxation polices mobilised the Italian riders, who expressed concerns over the licensing system and lobbied for over a decade for a graded licensing approach. This now starts at 16 with 125cc machines <11kW of rated power and progresses from there. Also any car driver[8] can ride a machine of up to 125cc <11kW, which in the EU generally means people of over 18 years. This provides a wide range of accessibility to small motorcycles and scooters.

Below the 125 cc <11kW level is the moped. Currently mopeds are accessible from the age of 14 years and need no licence at all. From July 2004 young moped riders were required to first get a certificate from a school (free) or a driving school (at a fee). From July 2005 this applied to people of any age who wished to ride a moped.

After these changes mobility by some form of motorcycle or moped will continue to be available from the age of 14, and with progressively larger capacity limits to 125cc at 16 – and to any licensed car driver. Italy provides access to such personal transport for younger riders, but the independent mobility that motorcycles provides is now subject to regulated access. These new Italian moped certificate requirements are unlikely to have much impact on the demand levels, as the requirements are reasonably readily met. The gender balance of the users is also far closer to an equal male female balance. This appears to be associated with the several countries where mobility factors are allowed to emerge and are positively treated. Accessibility to powered two wheelers will probabaly remain substantially higher than in Victoria.

The high levels of motorcycle (including scooter and moped) usage in Rome can give a good idea of the on-road levels (Fig. 24) that can emerge when access to powered two wheelers is permitted four years earlier than in Victoria (18), and broad access to moped mobility is permitted both at a young age and to all licensed car drivers. Small mopeds and scooters

[8] In the EU this is generally a guarantee that the person is 18 years of age or older

(<50cc) are also permitted to be driven by people holding only car driver licences in several Australian States, including Queensland and Western Australia.

Fig. 24 Traffic mix of cars, scooters and motorcycles in central Rome: May 2004

The utility roles for motorcycles are not limited to personal transport. Several public services continue to use them for their special features, including the police.

Scooters have also been used in successful trials as fire fighters on Italian motorways. This application take advantage of the ability of the 400c Suzuki Burgman scooters shown in Fig. 25 to carry a substantial load and to penetrate congested traffic - a major public asset provide by motorcycles, and widely exploited by police forces everywhere – the load carrying capacity and ease of access and dismounting that is also one of the practical and attractive features of the 'scooter' design profile that also appeals to women.

Specialised roles such paramedics have also been successfully deployed using motorcycles as the basic vehicle. This is another form of public service motorcycle also takes advantage of their ability to penetrate traffic quickly and safety. This has also been a role for motorcycles adopted in London for similar reasons.

Figure 25. An Italian Austostrada scooter firefighting team (Source: Riccardo Forte)

There are very large numbers of 150-250cc scooters in Rome. This is evident in the video clips taken and recorded on a DVD[9]. A reasonably even male female balance is evident, and a substantial number of professionals with briefcases using these vehicles (see front cover for an example).

3.3 Other Cities

In the less pleasant weather (but equally congested) conditions in Brussels, scooter sales were in decline and their numbers were fairly few. The riders interviewed were all professionals, one bank official preferred to leave his BMW car at home and use a small scooter due to congestion, footpath parking and the greater reliability of scooter travel time. This was reasonably typical of all those interviewed in central Brussels, although mention was occasionally made of the greater enjoyment to be had from riding in to work than driving.

Italy and Rome therefore provides what is probably an upper limit on the levels of motorcycle/moped usage when considering the roles of motorcycles/mopeds/scooters in Victoria, and shows that a high density of motorcycles and scooters can perform well in an urban environment where heritage areas, parking and congestion [problems are all acute.

[9] Delivered to Vicroads in August 2004. The full contents of this DVD are detailed in Appendix A6

3.4 International small motorcycle developments

The vast majority of motorcycles are now manufactured and used in Asia, and not in Europe, North America or Australasia. This has had the effect of placing a great deal of pressure on manufacturers to address pollution issues, and the orbital engine (a two stroke with remarkably low emission and high efficiency) is now being licensed for the huge Chinese and Asian markets.

It is no accident that it has been launched into the motorcycle market in a scooter in the first instance (by Aprilia of Italy). The assumptions made about current technologies are likely to have to be changed quite quickly as these economies of scale in the introduction of new technology feed back to what are now the minority markets of Europe, America and Australasia. Innovations in small motorcycles - be they electric bicycles, scooters, mopeds or small motorcycles - are rapid and spread quickly. This has implications in assessing the policies, road environments, regulations and conditions suitable for their use.

Asian governments, like Italy, have also undertaken substantial buy-backs and financial inducements to upgrade their existing light motorcycle fleets. The combined effects of these influences ensures that we can expect from the innovation and other pressures for these huge markets that a steady flow of environmentally sound and economically priced motorcycles meeting a host of niche mart segments to continue to appear.

The already good fuel economy of many motorcycles will also improve as a result of measures already in place to improve the engine technology. Electric scooters are already available. The prototype Aprilia Atlantic Zero model (based on their 125cc model) scooter powered by a Swiss MES-DEA fuel cell (Fig. 26) offers silent and totally pollution free transport, with a range of 145 km at 85km/h. Korea has also produced the Kymco fuel cell moped. Further updates on fuel cell powered bicycles and scooters are given in Appendix A8.

ACEM in Europe have recently undertaken that equally rapid improvements in silencing and in the introduction of anti lock brakes will also occur on a broad basis across models – and before 2010. Commitments have also been made to rapid advances in emission controls.

Figure 26 Aprilia Atlantic Zero prototype Fuel Cell powered ZEV Scooter

The UK Advisory Committee on Motorcycling (Dft 2004) summaries the current position as one where motorcycles are better than cars on a range of pollutants including carbon dioxode, and worse on others but that overall motorcycles were about one Euro cycle behind cars in the overall emission profile, and that by 2007-9 motorcycles were on track to be ahead of cars in emission standards performance.

The combination of effects summarised in this section suggests that road managers will increasingly be able to allocate resources in terms of space and provision, as well as regulatory variations, in recognition of the sustainability contributions that can be secured by motorcycle use. However, like bicycles and pedestrians, targeted measures to protect them are needed to secure the maximum benefit for their potential contribution to the transport system. It is not likely that these benefits will be achieved without wider and deeper knowledge of motorcycles (in the broadest sense) is held within government and policy bodies.

It is in these wider areas within transport organisations that some of the roles of motorcycles need to be better understood, and is easier to recognise the wide range of measures needed to ensure that this is secured for all parties, not just motorcycle users. The formal encouragement, education, engineering and evaluation approach of sophisticated bicycle analysts now needs to be applied to motorcycles.

3.5 Victoria and the small 'motorcycle' issue

In many ways the return of the mobility scooter reflects the reactions to the moped mobility boom in the 1970's. In counties where two wheeled transport was very familiar and widespread after the second world war, this boom led to extremely large numbers being sold and provision being made for these new generation mobility devices on protected routes in Holland, and favourable treatment in licensing and other regulatory constraints. Some countries and Australian States, including Victoria (but not Queensland), placed the regulatory emphasis on treating all the different types of powered two wheelers not designated 'bicycles' in an identical way.

When assessing the future range of roles of motorcycles, it would be appropriate to re evaluate the treatment of these smaller machines, and perhaps to place some weights on both the mobility aspect for young people and on the very different controllability and low performance aspects of several of the smaller subcategories of 'motorcycle'. Significantly, the major takeup of moped mobility in Australia, even in locations where younger age access was available, was by older people (Wigan and Carter 1980). There is some suggestion that this might also be the case for the scooter wave now being observed.

A series of interviews of scooter retail outlets in Victoria confirmed that a 60/40 split of male/female purchasers is reasonably widely observed. Interviews in the UK also corroborated the view that women (and particularly scooter riders) preferred non-motorcycle outlets to view and purchase from. Mobility is also a primary goal in all these regions when scooter riders are addressed.

The scale of the future role of smaller motorcycles depends largely on the levels of reappraisal and adjustment of both regulations and access to road space. The mobility/safety balance is a key factor. A segmented approach can be taken to small motorcycles (which include mopeds, scooters and electric and power assisted bicycles and tricycles) and also to the major cultural differences between moped and scooter users - as opposed to the 'motorcycle' tribes. The use of ethnological (Coxon, 2003), sociological and marketing

methods is suggested, as these reflect the perceptions and stereotypes of the groups concerned, and affects both their behaviours and how they are viewed.

In Australia there is still a negative stereotype associated with motorcycles. This is successfully promoted as a marketing tool by Harley Davidson: a world market leader in the field lifestyle branding and promotion). The community image of these modes is therefore a major factor in the process. It is unfortunate that in connection with the phenomenal success of Harley-Davison marketing[10]

> " as one Harley-Davidson executive said: "What we sell is the ability for a 43-year-old accountant to dress in black leather, ride through small towns and have people be afraid of him." (Gettler 2004)

With this as an underlying marketing theme for one of the best selling models aimed at mature riders, it is less surprising that a negative image of motorcycles still endures in the Australian community, while, at the same time the ageing and maturing and increasing penetration of professionals amongst motorcycle riders is actually growing. This type of community projection behaviour is simply not evident at all in Italy

The impact of this policy on updating the scooter fleet was very marked, and its timing was good. Many of the current (early 21st century) wave of two stroke scooters are powered by advanced orbital engines and injection systems with extremely low emission rates and excellent fuel consumption levels.

These have been marketed first in the smallest scooters, and now Aprilia (for one) has developed this technology to suit larger machines with very good performance – and quite remarkably low emissions and fuel consumption rates. The same technology is now being licensed for the huge markets in China, where the current assumption that 'two strokes are noisy and polluting' will be turned on its head by the rapid take up this new advanced engine

[10] http://theage.com.au/articles/2004/07/20/1090089154970.html?oneclick=true

technology. These small scooters are no longer followers but leaders in the takeup of sustainable transport innovations.

A second type of government intervention is to increase licensing complexity- and especially age controls, limiting access to the powered two wheeler modes of transport at all. This is an area where Australia has very high age limits before driving or riding is possible. These now coincide with the legal drinking age in Victoria, although both Western Australia and Queensland have provided much easier access to small mopeds and scooters to young people and car licence holders.

4. Scenario planning processes

The process of determining the role of motorcycles in the future on the road system is one hobbled by lack of data and limited experience in planning, research and government in dealing with this mode as a mode of transport. As a direct result the data required to monitor, assess, evaluate and forecast usage and ownership in the future is largely lacking.

The time trends cannot be established in a usable form for most aspects of motorcycles in Victoria, as motorcycles (including scooters and mopeds) are a highly non homogeneous group with varied designs, targeted at small and often rapidly changing segments of the various markets. A finding from the present study is that the influence of licensing and usage regulations can be very substantial. As a direct result, manufacturers rapidly adapt their designs (within reasonable limits) and distributors tailor their choices of models to import to the market segments that then emerge.

These broad ranging issues *can* be addressed, albeit effectively only by special studies, but many aspects of more detailed impacts are bereft of the necessary monitoring processes. The resources devoted to public 'motorcycle' data are minimal, and shrinking. Even the simple sales and registration numbers required for basic information about these modes are no longer collected by the ABS, and are done now instead by the Federal Chamber of Automotive Industries (FCAI).

The obvious way of proceeding would have been be to project ownership and usage, and interpret what the expected range of levels of usage would then imply. This 'obvious' route is one that simply does not work for the Australian 'motorcycle' market as it has, in addition to substantial and growing shortages of data, been subject to many small scale variations as well as some long term cyclical demand peaks as the roles and niches that motorcycles fill change with lifestyle and purchasing patterns as well as alterations due to regulatory or social factors.

Many of the dominant sales segment (off road PTWs - which include four wheeled ATVs) are simply not distinguished in the public statistics of various types. However, one of the benefits of the FACI undertaking the collection of motorcycle sales statistics is that details of individual models can be secured – and the important fact has become visible that in Victorian over half of the new sales are of machines designed to be used off road.

Given this gap in public sector monitoring and information, it is clear that the types of data available do not yet permit either informed monitoring of the transport aspects of this mode, or provide suitable foundation for either simple projections or causal based forecasting.

The marked imbalance between the dearth of standard mode and travel specific information with the ready availability of crash-related records goes far to explain the tendency for many official bodies to continue to treat motorcycles essentially as a safety issue. The absence of adequate exposure-corrected information severely limits the capacity to develop and manage an informed overall transport debate covering the range of travel, accessibility, safety, environment, social exclusion factors. This lack of information is a major contribution to the lack of balanced understanding. The lack of well targeted and continuing data on which to base predictions or policy assessment is equally important.

The key initial tasks are to set the scene for the range of futures that may emerge. Data on motorcycles is very scarce, and the Australian Bureau of Statistics has discontinued collection registration and sales data, thereby making time series information particularly difficult to secure. Trend analysis is therefore of doubtful value, and the autoregressive techniques used by RAND Europe for the UK Department for Transport (DfT) cannot yet be considered for Victorian – or indeed Australian – conditions. Even in the UK, which has

some limited time series data on motorcycles, the first project to attempt to look at the overall transport context of motorcycle ownership and usage and estimate models on ownership and choice was able only to tease out a first cut choice and demand model.

There is no continuing National Travel Survey for Australia, although repeated quality assessments in the UK have verified the wide utility and good reliability of the NTS in the UK (recently leading to a large increases in both budget and sample size on a continuing basis subsequent to a formal quality review). As there is no similar source for monitoring, policy, planning or evaluation of Australian travel by any mode, let alone motorcycles, quite different techniques are essential for the present project. The mechanism, required is a variant on scenario forecasting.

Forecasting frameworks cannot be built on foundations that do not yet exist. We must therefore look towards alternative approaches, if we are to secure realistic perspective on the possible range of roles for motorcycles in the road system in Victoria (or indeed Australia).

As the objective is to consider possible futures which encompass the future roles of motorcycles (broadly defined) on the road system, one approach would be to create a series of scenarios and explore the implications of the roles that were included. However, due to the lack of present data on which to ground such scenarios, these well tested methods of developing a self-consistent picture of future situations (and then consider the pathways to them) are neither practicable nor credible.

An alternative approach is to recognise that the world today provides a range of scenarios including motorcycles, in all sorts of environments, and these comprise not only a set of possible future – but they are all available for present study. This was the approach adopted.

The disadvantages of such an approach is that the constraints and circumstances peculiar to Victoria cannot be covered explicitly. The advantage is that each city offers a different culture, level of motorcycle usage, and has a definite history in terms of regulatory and other actions taken along the way to reach the observable present. Clearly cities that have a fair

measure of similarity to Melbourne on at least some dimensions are needed to make this approach most effective.

There are many different ways of doing scenario planning. These fall into several categories:

1. Creation of a future situation that might be sought, with the assembly of the factors that would then operate in that scenario
2. Projection of single key trends, with the development of critical factors of interest consistent with this future
3. Backcasting, where a full framework of a future situation is assembled, and then backcast to the present to determine what factors would be required to make this scenario emerge
4. Iterative or dynamic scenario planning, where backcasting is combined with identification of critical events, and the consequences of each such critical event occurring or not occurring is built in. This process is desirable for active policy use of scenario planning processes: a point that has only recently been identified. RAND has summarised one of the variants of this emergent approach (Walker, Rahman et al. 2001).

None of these variants could be handled within the current project due to a combination of both the resource limitations, and limited context in terms of policy decision making as currently undertaken within Victoria. Approach 4 is entirely appropriate for a process of continuing reassessment and reappraisal of the far more complex and far reaching Victorian Government strategies exemplified by the Department of Infrastructure's "2030" (Department of Infrastructure 2002). These subsume all modes of transport and accessibility, and a formal iterative scenario process such as this could be beneficial for the current implementation stages of this ambitious strategy. Any such initiative could include different motorcycle scenarios. However it is only strategies at this sort of strategic scale that permit both the data collection and the policy initiatives required for the monitoring and responses required in such interactions between policy and progress.

While such a sophisticated approach would be extremely useful for many modes, it proved to be necessary for the present project a quite different approach. This required neither the existence of monitoring data flows nor a history of the application of policy instruments, yet can provide adequate variations to allow scenario critical event and factor dependencies to be identified, while keeping within the range of experience currently observable today.
This practical approach to scenario assessment will now be described.

Take a limited number of dimensions, such as national culture, road and parking space supply, levels of demand and enforcement and regulatory intensity. Taking four of these (let us omit national motor vehicle culture for this illustration) we have a cube where the three major dimensions describe variations along these three axes.

If we now identify cities or metropolitan areas where there are extremes in each of these directions, and make the basic reference point the conditions obtaining in Melbourne, then any point within the space defined by these three dimensions (a cube of possible variations) is a space within currently observed situations. This does not mean that any of the points in this space will actually arise, as the variations in enforcement/regulation, demand and supply may not be operating in any specific location – but all such points lie within the space of possible occurrence as in each case the limits observed in appropriate cities will be more extensive than at any point within the cube.

This approach can be extended to encompass further dimensions (such as national culture) without altering this logic. Our argument is that any point within this cube is a practical and feasible point in terms of the degrees to which each factor could arise—and is firmly grounded in a currently extant city where one can make such observations. This approach is actually extremely conservative, and does not assume that any future scenario would lie outside this restricted domain. Equally it does not assume that any specific combinations of factors will actually exist, simply that they lie within the observable range.

The limiting cases to be verified are:

1. Kuala Lumpur (a limit case in terms of supply, as the levels of motorcycle use have justified dedicated lanes)

2. London (a case where differential pricing and access for motorcycles has led to increased demand and improved safety at the same time)

3. Rome (where demand is extremely high, and also regulatory and cultural factors combine to allow this to arise)

How were these locations chosen?

The method adopted was to pick on three dimensions where the target city had a major distinctive motorcycle feature, so that a notional three dimensional space could be implied wherein it was clearly feasible to see the emergence of situations with combinations within those three dimensions. If one city has extremely high levels of motorcycle use, another has tight regulations, another has electronic road pricing with exceptions for motorcycles - then we have three such dimensions – and these three are perhaps the most interesting for assessing the roles that motorcycles could (or indeed may even now discharge) in Melbourne and Victoria.

The full range of regulations in Europe alone are substantial, although they have recently been synthesised into a database as part of a project for the European Commission (DGTREN: European Commission 2003), but reference to this large resource and its intrinsic diversity is not needed for the present work.

In addition to the cited cities, although some opportunistic observations were also made in Vienna, Bologna and Brussels, these are not the primary scenario choices and so the effort and time was spent on London, Rome, Kuala Lumpur and of course Melbourne itself.

Kuala Lumpur and Rome were selected for having high flows of motorcycles, but of very different types. The enforcement regimes in Kuala Lumpur and Rome are comparatively light compared to London and Melbourne. The development densities of Rome and London are

higher than Melbourne or Kuala Lumpur, but the riding weather conditions in Rome and Melbourne are very similar.

London has recently been the subject of several valuable reports. (Halcrows and Centre for Transport Studies University College London 2001) examined some of the motorcycle movements within traffic streams, while Rand and WSP (DfT 2004) analysed the modal choice behaviour of motorcyclists travelling to work in London, while other studies were ongoing on different aspects of motorcycling: almost all of these were stimulated by a UK Government Advisory Group on Motorcycling, who recommended that these were necessary fundamental pieces of work.

One segment of the present project was to make brief visits to the three key cities selected, meet with those involved in the areas, and assess other factors such as how high motorcycle usage in daily traffic flows were working.

This was possible in both Kuala Lumpur and Rome, where motorcycle flows were substantial across large areas of the two cities. The vehicle dynamics on the congested road systems were remarkably similar. The filtering behaviours and the intersection performance characteristics were strikingly similar as well. The levels of traffic flow in central London, where the central road user charge was in operation, with exemptions for motorcycles and scooters, were far lower. The visual appraisal did not add anything to the range of situations observable daily in Melbourne, and so in London the emphasis was spent on assessing the available data held by different parties on the effects of various motorcycle related management policies, in addition to the central area road user charge.

There are surprisingly few sources of motorcycle movements and parking behaviours in any city, and the collection of pictures and short video sections taken on this preliminary research foray have been collated on to DVD[11] in menu driven slide show and video clip formats suitable for viewing. The original high resolution digital pictures are also stored on this DVD.

[11] Delivered to VicRoads in July 2004

When played back these clips and progressive slide shows give a contextual feel for the three cities visited, and a perspective on the three usage level situations that is hard to communicate in any other way (further details are given in Appendix A6).

There are two consistent observations:

1. The traffic flows at intersections and stoplines show a consistent three-phase behaviour in both Rome and Kuala Lumpur.

As a pedestrian crossing or traffic light requires the flow to stop, the cars appear- briefly- as the traffic queue. A stream of motorcycles and scooters then percolate through the stationary vehicles and fill up the road capacity around the cars at the front of the queue, making full use of all road space both for movement and to position themselves for the traffic to restart flowing.

When the traffic is permitted to flow again, in the first few seconds a large number of these motorcycles clear the intersection, well before the cars have moved more that a few feet. The car flow then belatedly gets under way, mixed with a lower density of motorcycles, and lastly this mixed stream traffic clears and the flow become a car-only traffic stream.

Once one has watched this process for a while, it becomes clear why even large numbers of motorcycles at once do not appear to use any of the capacity at saturated intersections, as they are using a time–spaced interval immediately after the lights go green that is simply inaccessible to cars.

Although several hours were spent observing these high-density flows in both cities, no incidents or even near incidents were observed. However car drivers in both cities appeared to display more tolerant and responsive behaviour towards motorcycles than in Melbourne. This observation would require quantitative study to be taken further, but as one of the factors of cultural acceptance of motorcycles it would be useful to explore if this might be related to the larger numbers of motorcycles in the traffic stream, and may simply be a

response to higher levels of awareness of motorcycles that their more frequent visibility provides.

2. A tendency for motorcycles to create an advanced stopline in front of the cars and buses.

Bicycles were observed to simply ignore both stoplines and traffic control devices, not very different to behaviours to be seen in any other major city centre. However there were very few bicycles in Kuala Lumpur, and barely any more in Rome in the central area where the video camera was used. Few were observed during the several hours that inspections and visits were made on the back of a large motorcycle driven by a Roman citizen, or when video clips were taken from within the traffic stream as part of this exploration of a high-usage density motorcycle city environment.

It is clear from the experience of Rome that high levels of scooter and motorcycle use can be accommodated in city traffic with considerable effectiveness – and what would appear to be general benefits to the congested heart of the city as a result. It should be notes that these observations were carried out prior to the main tourist season, and before the high levels of heat and air pollution encountered in high summer. These are factors in the Italian government moves to accelerate the early retirement of older PTWs, and encourage their replacement by modern and low emission powered PTWs.

The culture of Italy as well as its weather is favourable to motorcycles, and there appear to be no social class barriers or stereotyping to reduce this take up of the parking and accessibility offered by motorcycle and scooters. The attitude towards motorcycle parking even in the central core of Rome is very tolerant. In both Rome and Kuala Lumpur a higher percentage of the riders were females riding than one observed in Melbourne. Extensive dedicated (and informal) parking facilities were available for motorcycles in both cities. Once again, parking on the footpath was permitted: in several areas in Rome, one adjacent to a commuter railway station near the Vatican, were so heavily packed with scooters and a few motorcycles that pedestrian traffic was impossible. Examples of parking densities and motorcycle movements

in Rome, London and Kuala Lumpur are included in video and format on the project DVDs supplied to VicRoads.

Figure 27. Motorcycle parking examples in Rome: heritage and central business areas

It is unlikely that Melbourne would tolerate the extreme levels of footpath occupation and parking behaviours by motorcycles and scooters evident in central Rome. Fig. 27 shows a small scooter parked in a narrow pedestrian-only zone in central Rome, and the parking over pedestrian crossings and on street in an area near the Coliseum, also in central Rome

The very expensive central city terraces and flats have scooters and motorcycles parked inside the pedestrian core of Rome, often directly under the signs. The in traffic behaviour of motorcycles and scooters was observed to reasonably orderly, although stop line behaviour of some motorcycles (evident in the DVD Video footage) are often more aggressive in moving ahead of stop lines or anticipating the green light phase than is usually observed in Melbourne, and in reasonable accord with these bicycle behaviours often observed in both cities. In addition to the motorcycle neutral culture apparent in Rome, the low levels of enforcement observed would also have some effect.

These factors have had their impact on the high levels of motorcycle usage evident in Rome and in Italy as a whole.

- An expensive high density living area very close to the Vatican in central Rome, beside a railway station, where the residents left virtually no space on the pavements for perhaps 100 yards on both sides of the (quiet) road:

- A very expensive area in central Rome near the Coliseum (visible at 180 degrees from the second picture in Fig 27) where resident and visitors to the equally expensive shops were doing the same. Motorcycles, both parked and in use, were very evident throughout the pedestrian and controlled access central heritage area, again as shown in Fig. 26.

Rome has many similarities to Melbourne, and can be taken as an example of a city where very high levels of motorcycle use have been found to be compatible and acceptable to its population. As a scenario, it shows that this is a viable future situation to consider in the future roles of motorcycles on the road system. It implies higher levels of usage, parking and provision that at present – and is predicated on a shift in acceptability of the mode – especially to women. The large fraction of scooters (many of 250cc) is a feature of the Roman scenario that could also emerge in Victoria, under the right conditions. Certainly the growth in Victorian scooter sales has been very rapid and sustained for some time, but from a very low base.

Very similar patterns were also observed in the central region of the Italian city of Bologna, where heavy motorcycle flows and parking densities were matched by dedicated parking areas for motorcycles in the central (also a heritage and tourist) area.

Malaysia has very high levels of small motorcycle use, and has made investments in dedicated motorcycle lanes on motorways with positive results on crash rates. The Research group led by Professor Radin Umar at the Universiti Putra Malaysia (UPM) has undertaken a continuing program of motorcycle research, and is regarded as having contributed substantially to motorcycle safety and effective regulation in Malaysia by the Ministry of Transport (Umar Undated).

In addition to safety research, the UPM group has also done research on traffic capacity of motorcycles, with results in general accord with those found in Indonesia for intersection

flows (nil impact on capacity for the first six seconds), on the flows of motorcycles in dedicated lanes in live trials, and on mode choice models between public transport and motorcycle usage (Sh, Kadir et al. Undated).

Although Sh et al. used a straightforward binary logit model, the results are still in advance of anything currently available for motorcycle policy or planning in Australia. Conventional multinomial logit tools[12] with a stated preference survey and analysis were used, which could readily be replicated in Victoria. Many of the methods and results are pertinent to other countries where such investigations have not yet been done. Only in the UK has such a study been done (WSP 2004).

The relevance to Melbourne and Victoria of Kuala Lumpur is that the behaviours in traffic of the predominantly small machines were almost identical to those observed in Rome. This suggest that the traffic developments that can be done to ensure that motorcycles have the most effective role in Victorian road transport can be assisted by using research results from Malaysia. The emphasis on motorcycle use is in part due to the limited capacity of public transport in the Kuala Lumpur region, and the interactions of public transport and light personal transport (as exemplified by motorcycles, as the distances are too large for bicycles) are relevant to Melbourne.

The London scenario is important as the fundamentals of road space allocation and charging have been shown to produce good results from favourable treatment of motorcycles, and the protection thus provided raises the question of how and where this might be applied out in Victoria. Polices could be built to take advantage of such pricing differentials. Preferential access could be given to pedestrianised and limited access central areas of Victorian cities, as practiced in Rome, Bologna and London.

[12] Econometric Softwares' widely used LIMDEP and NLOGIT package

5. Perspectives on Australian perceptions of motorcycles and their role

The confusions in view between different parties as to whether motorcycles are a 'green' mode are all too often conflated with safety issues and other arguments. Consistency is at a premium. A systematic assessment of motorcycles is a scarce commodity to encounter both in the literature or direct discussion. This is due in part to the limited number of people with access to adequate information to assess all aspects of motorcycles, and the lack of a clear and consistent strategic approach to mobility, transport and externalities.

There are at least two different areas that need to be expressed.

1) If we are to take all modes as meeting the needs of different groups of people (or the same people at different times), then:
2) Government and the community have a responsibility to make all these modes work in such a way that they are operated and provided for in infrastructure design, planning, maintenance and operations so that they can perform as safely as possible.

This is consistent with the Vision Zero perspective on safety policy (Tingvall and Haworth 1999), but this balanced and coherent approach is not the usual way in which the issues of powered two wheelers are addressed – nor for purely human powered vehicle in many cases.

Once these principles have been considered, then the second step is to assess what is needed on an informed basis. This was very difficult for bicycles until comparatively recently, and is still hard. For motorcycles it has only started recently, as the work of VMAC[13] with TAC and VicRoads has begun to make real advances. Previously safety evaluations (which have a record in the case of powered two wheelers of relying on limitations to and regulation of access and usage for their effect) have been undertaken on the basis that any encouragement (or indeed positive provision for) motorcycles might attract people from public transport or cars and thus increase safety costs to the community[14].

[13] The Victorian Minister of Transport's Motorcycle Advisory Council

[14] A 1980's study for the Director General of Transport in South Australia by the Travers Morgan Consultancy.

This is a very likely outcome, given that the overall utility and mobility aspects of such ownership are not included in the equation, not least because the necessary ownership, purchase and mode choice models are yet to be developed to allow this to be done in context.

Perceptions by public and government of a mode as being sustainable or 'green' can also have its effect, and has the potential to significantly alter the resources allocated and the levels and nature of regulatory action towards it. Numerate data on motorcycles is thin, but is not the only type of information relevant to the future of motorcycles on the road system. The impact of social attitudes plays a major role in how such vehicles are treated and what support of regulatory controls are applied.

For example, bicycles, which fill a small but invaluable short distance transport market segment now attract millions of dollars of infrastructure investment as a result of positive social views of this mode. This does not occur for motorcycles irrespective of the major financial inputs that they make to their own costs and the higher levels of road rule compliance.

The basic attitudes that allow baseline investment in encouragement, road space and regulations to protect cyclists have not yet emerged for the motorcycle mode with its similar (if not greater) vulnerability. It is simply not possible to assess future usage of motorcycles without recognising that a double standard is operating, and that the motorcycle user community as whole is now pressing to change it. The sociology and ethnology of motorcycling is a key factor in its marginalisation as a legitimate transport mode, and this is a factor which has often been under estimated. In the relevant sociology literature there is a safety emphasis (Bellaby and Lawrenson 2001).

The marketing literature contains a wider range of perspectives, but the publicly-available literature in this area related to motorcycles is very restricted for commercial reasons. The impact on the present research is to increase the likelihood that investments in motorcycle facilities will not be as easy as for bicycles, and if the hypothesis is correct, then one might expect that new modes of motorcycle would try to be differentiated from the stereotyped 'motor cycle' role.

There is some limited evidence that this is the case. Sociological studies of motorcyclists in Australia (Natalia 2001) and UK (Crowther and Brown) have concentrated on the negative images that this would predict would be initial focus on this generally negative stereotypical view of the mode and its users and new modes such as powerful electric bicycles and scooters would be presented as 'quite different' and would attract different populations of users.

Figure 28. Enclosed and conventional scooters in Rome traffic

An Australian ethnological study suggest that this might well be the case (Coxon 2003), where an 'enclosed' light motor scooter (see the white device on the left hand side of the lane in Fig.28 for an example – one of many variants emerging in this growing segment of the motorcycle market) was used to catalyze views. It is also evident from discussions with powered two-wheeler dealers that scooters appeal to a market roughly equally divided been males and females (instead of the male domination of motorcycle usage and ownership) and in some countries are sold in segregated shops. Scooter riders are reported to have little or no

intention of progressing through larger machines and on to motorcycles, but regard a scooter as a utility or lifestyle mobility vehicle that is an end in itself. There are several studies such as those cited that suggest that the sociology of 'motorcycles' and the definitions thereof may well be one determinant of social and professional attitude, regulatory control or support and targeted investment.

Dealer discussions in UK and Australia gave similar pictures, and the far higher female purchasing rates (from around 30% upwards) for scooters, with many machines bought jointly by couples, suggest that this market segment avoids the negative social stereotype on motorcycle, and that this has a real effect on the range of riders who will consider and buy a motorcycle (motorcycle in the sense of a powered two wheeler). This trend is one that can expected to continue as market segments continue to splinter and appear.

This segmentation of image trend is apparent in Australia through several channels. The deeming of electric bicycles with more than 200 Watts of power as 'bicycles' is a categorisation being strongly pursued to be retained as more realistic powers of 250-500 watts (the latter being the threshold in Canada) or even greater are being advocated by electric bicycle users and other interested parties.

These are only legal now if designated 'motorcycles' and subject to all the stringent requirements of a motorcycle in terms of design Rules, helmet use, training and licensing. Retaining the friendly and largely unregulated 'bicycle' categorisation is very important to the groups with an interest in this mobility variant, and these groups are careful to avoid the association with a 'motorcycle' that comes with power rating of over 200 Watts as this moves them into a stringent and demanding access and usage control regime. Recent work in Leeds UK found that electric bicycles would draw most of their patronage from cars (Guthrie 2002), and would be used for utility purposes.

Other tiny wheeled footboard only scooters (of the type more usually powered by feet) until recently had a special categorisation in Victoria that permitted them to bypass many of the 'motorcycle' categorisation limitations. The licensing and use regulations for motorcycles in Victoria are stringent and present a real barrier to many users from access, thereby creating a

powerful pressure to avoid such a categorisation. Similarly a category of miniaturised motorcycles emerged – variously termed 'monkey bikes' or 'paddock bikes' which also exploited the exceptions in the Victorian regulations, now closed. It may well be unwelcome to users and retailers of these specialised 'motorcycle's (as they are but for legal descriptive loopholes) – but they are unlikely to be a part of the future of motorcycles on the road system.

This mechanism (of restricting access to 'motorcycles') has progressively removed this generic type of mobility option from people in Victoria under 18, one of the highest entry ages for mopeds (regulated as motorcycles in Victoria) in the world. Interestingly, the recent MAIDS study of 931 in depth investigations of motorcycle crashes in five European Countries suggest that once exposure corrections are made, much younger riders may fare as well as far more experienced riders. The results of the MAIDS study are now available on the web[15], requiring only registration before access to the report and data.

The pressures for personal mobility go a long way towards explaining the electric bicycle and powered foot scooter phenomenon. In many countries, access to small motorcycles (which in this report specifically includes mopeds) allow access through far less stringent regulatory structures, and offer personal mobility at a considerable earlier age that is now applied to young Victorian adults. Italy is an important example of this, and the impacts of the rapidly changing regulatory climate towards motorcycles over the 1990s illustrates the importance of viewing the full spectrum from >200 Watts electric bicycle through mopeds and scooters to large motorcycles as a single category with graduated requirements- rather than as completely different modes.

It is now timely to review and overhaul the mix of 'bicycle', and 'motorcycle' categories, and develop a clear set of performance, usage, definitions so that regulations can be adjusted (not necessarily in a negative direction in all cases) to encompass the electric bicycle, the electric scooter, the tricycle and the classic bicycle and motorcycle modes. The pressure on the boundaries between these categories has become very strong, and needs to be resolved.

[15] http://maids.acembike.org/

Clearly this will have a major impact on the range and types of roles of such crossover vehicles as 'motorcycle' or as 'bicycles' on the road system in future – and also a real impact on mobility of many people.

The major problem in this area is the extensive training and protective clothing regime applied to motorcycles. Now that the use of helmets in mandated for bicycles, albeit a less robust standard of helmet, the major barrier in protective clothing has long been breached. The training, regulation and insurance issues are now likely to prove the most difficult to handle in a better structured progression form bicycle through these intermediate 'bicycle' and 'motorcycle' types to larger machines of various types. From the experiences in most countries, and specifically London, he largest barrier of all is the perceptions (and indeed mutual perceptions) of the various vulnerable road user modes

A point often overlooked is that bicycles (and the many variants of powered machines permitted to be termed 'bicycles') offer the only mode of transport to those barred by youth, age, infirmity or loss of motor vehicle license withdrawal for personal transport. The range of such mobility options is expanding, and debates on which variants are appropriate for use on nonmotorised (and of course also motorised) facilities are emerging (Litman 2004). Consequently this issue will also have to be faced in a less piecemeal manner than it has been to date.

It should not be assumed that Italy (cited here as an example of heavy motorcycle sue of all kinds) is entirely consistently or positive towards motorcycles. On many Autostradas motorcycles are charged the same toll rate as for cars - and are not permitted to have electronic tags to ease the movement through toll points. As it can be quite a complicated process to stop and extract money or wallet from motorcycle clothing, this not only appears to fail to recognise the capacity benefits that a motorcycle offers on such highways – but also the imposition of delay costs on all parties.

This is another case where the electronic identification aspects of many ITS technologies is seen as a customer benefit in one culture (Italy) yet a disbenefit in another (see the consultation responses to electronic number plates for motorcycles in Victoria (Wigan 2002).

This also illustrates that the overall culture towards automated data collection can have a powerful effect on the acceptability of many of the new ITS technologies.

This once again contributes to the picture of a mobility mode available in a household with other alternatives. Shifts towards motorcycle use are therefore most likely to be shifts from car travel, given the high levels of attractiveness and convenience of cars. Policies encouraging an appropriate shift to motorcycles (which are clearly available to many with cars also available) from cars has mobility, capacity and emissions benefits to be secured. The UK Integrated Transport Policy of the last few years placed motorcycles in a neutral or positive category for these reasons, while drawing attention to the need to make positive provision for the safety of these road users.

This is a policy position entirely in accord with the vulnerable pedestrian and bicycle modes, where protective measures to enable mobility by these other sensitive and crash severity prone mode choices are put in place to ensure that the performance envelope of these modes are available to the community.

The largest study carried out in broadly comparably developed countries in Europe, the MAIDS study (ACEM 2004), suggests that there are still not enough designed-in protection on the road and transport system for motorcycles. The MAIDS study has not yet been opened up for independent analysis, and the initial analyses by the University of Pavia which form the basis for the brief summary report currently all that is available, have been essentially preliminary. However the results of the study so far have been generally well received,[16],although the involvement of the motorcycle manufacturers has delayed the full acceptance until independent review has been completed. New resources (June 2005) have recently been devoted by ACEM to servicing the backlog of requests for specific analysis extending back to the data of the release of the summary report, and the UK Department for Transport recently issued an Expression of Interest (EoI)[12].

[16] http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_037953-07.hcsp

The project flowing from this EoI is due to start in September 2005, and will undertake a parallel assessment of the MAIDS results and the finding from the 200 motorcycle cases now available in the UK continuing in depth crash studies (referred to as the On-The_Spot (OTS) study, where the accident investigation team arrives in the same time frame as the emergency services). OTS[17] is a methodology being applied to all types of road crash. This project is likely to be the first overall appraisal that will bring MAIDS into the mainstream of resources, and ACEM has indicated that they will be cooperating with the eventual successful tenderer. It had originally been envisaged that the OTS results would be fed into the MAIDS study, but the early completion of the crash investigation stage of the MAIDS study was complete by the time the OTS was under way.

The MAIDS study database includes over 60 cases involving barrier collisions, and has wide coverage of small and large motorcycles, urban and rural environments, as well as an extensive list of other items describing the crash participants in five countries. Once a few studies such as programmed one planned by DfT have been done, then effective ways of utilising this data base for wider applications and locations will then be well founded. The significant numbers of scooters; light mopeds and other machines less common in Australia suggests that this database is likely to be of material assistance to current and future reviews of the safety impacts of various types of motorcycle variants.

One of the factors that make comparisons between countries difficult is the mix of utility and recreations or at least other- usage. Work in both Australia and UK has shown that the intrinsic enjoyment of riding is a key factor in the population that chooses to ride motorcycles, and that the also enjoy driving cars as well. This suggests that greater use of non traditional market segmentation approaches would be valuable if motorcycles are to be fully integrated into transport planning in future. The segmentation emergent from studies by the Dutch Ministry of Transport (Need 2003) offers such an alternative, and includes the “Goal oriented: and the “Pleasure seekers” as clearly defined segments. Unfortunately motorcyclists were omitted from this work.

[17] www.ukots.org).

Many rider behaviours also need data and understanding, and the work done in areas such as what makes a 'good' or a 'safe' rider is still very limited , although evidence is emerging that motorcyclists are better at hazard perception when driving cars than other car drivers (Brown 2001), and other hints from various disciplines that non traditional market segmentation approaches to motorcycle users travel would be valuable, there is still little work in this area to fill out the picture of motorcyclists as road users of many other modes as well.

Closer attention to the sociology of vulnerable road users and the professions dealing with them are clearly a determinant of the future roles of motorcycles (and indeed 'motorcycles') in the road system in Victoria.

Professional culture has also a role to play in more balanced treatment of motorcycles. It is a delicate area, but one that simply cannot be ignored in a report of this type as it has had - and appears likely to continue to have - a major impact on how motorcycles and motorcyclists are treated by government bodies – and this in turn affects the roles that motorcycles of all varieties can play in future.

It must be recognised that if safety **were** to be the **sole** arbiter of such choices, then pedestrians, cyclists, SUVs and motorcyclists would all have far a far smaller role in transport. Alternatively the positive investments to reduce the consequences of the vulnerability of these road users would gave secured a far higher profile and level of expenditure for motorcycles in particular. This is demonstrably not the case.

6. Consultation processes

One of the important requirements of this project was to consult with users, and secure their views. It has been found repeatedly that securing survey or consultation responses from motorcycle users is not straightforward, unless the issue is perceived to be urgent and likely to have a direct and early impact.

This has been found repeatedly in Australia and elsewhere, and in previous work in Victoria (Wigan 2000,a,b). Motorcyclists tend to respond to proposals regarded as negative and immediate. Even for the consultation about compulsory front number plates (Wigan 2002), a subject which has proved to be a contentious issue with motorcyclists, required assiduous personal chasing up of almost every consultation response. Admittedly this eventually yielded an extremely high level of informed and considered responses, but at the cost of substantial additional time and sustained and repeated personal contacts, follow ups and reminders.

Similarly, motorcyclists do not respond in any great numbers to survey of their travel – around 10-15% of those contacts responded in a survey done in 2000 through the VicRoads Registration and Licensing hotline. However in that case the response numbers were eventually enough to enable the results to be regarded as a pilot study for future work, identifying the effective and ineffective aspects of the survey instrument used and several large and successful motorcyclists surveys have drawn upon this experience since.

It was quite clear that the somewhat fuzzy questions such as 'what do you want from the road system, now and in the future?' were very unlikely to get much response unless special and focussed efforts were spent, and some more innovative approach was adopted.

The approach taken was to set up a structured interaction process, with voluntary anonymity of contributions, and using a common screen and multiple keyboards for input. The software system used was Zing, and the facilitator (Bob Ayton, EduTech Concepts) was also a participant (as a Ulysses member). The session was convened in a small terrace house, and the numbers filled the double room and gave a good sense of community. The objectives of the study were outlined by the project Director, emphasising that VicRoads had responsibilities ranging from road design and operations to safety, and then the process was picked up by EduTech Concepts and managed through the six basic questions and the additional emergent question (Smart Technology/ITS).

The full session of keyboard entries were recorded, but, although the verbal overlay of the discussion was also recorded on to hard disc at the same time, it was not approved for use in

the consultation wrap up. The processes of assembling multiple views on a single screen, with a reiteration and review process was effective in creating a positive and constructive atmosphere[18] - and a substantial number of points were captured. The transcript in included in this report as Appendix A2.

The results of using the Zing process with good facilitation and a well informed chairman has proved to be successful in many environments, from central government to schools and community groups, and certainly proved to be an efficient and constructive framework for securing a wide range of views – and in a short time. As is normal practice in such processes, all participants were emailed the transcript once prepared the same evening and any comments were included. In this case there were none, which EduTech Concepts advised was not unusual when a group gains a common view of the varied approaches to many issues that this technique allows to be systematically secured in a single session.

Although efforts were spent on securing consultation inputs from the various interest groups both before and after the session, only three responses were received after the Zing session, two from Victoria and one from the Motorcycle Council of NSW. Although the invitation to comment (reproduced in the Appendices) was sent to a wide cross section of motorcycle groups and interested parties. The Victorian responses are given in the Appendix, while to NSW contribution focussed more on the items **not** mentioned in the thought starter reproduced in the Appendix.

The items emphasised were the 'congestion buster' aspects of motorcycles, already relied upon by "Rural Fire Services, NRMA, Police, Australia Post and the Ambulance Service". This emphasised the utility role (or at least niche) that motorcycles meet effectively, and presumably will continue to offer the same unique package of benefits in the future. NSW also raised the roles of motorcycles with respect to tollways and congestion and that allowing young people in Italy to ride mopeds was related to the more motorcycle aware population.

[18] A DVD showing the process was supplied to VicRoads in August 2004

Each response in the Zing record was categorised into one or more categories. For each question the primary response identified in the analysis were

- Q1: What futures? Concerns over professional skills in the motorcycle area
- Q2: Riding what? Scooters
- Q3: Who? Utility travel and older riders
- Q4: Where? Attitudes of cars drivers and of motorcyclists
- Q5: Current problems? Regulations and licensing/SRA organisational factors
- Q6: Do what? Proactive motorcyclists/SRA organisational factors
- Q7: Change regulations? Licensing ages/permitted machine size

The overall responses for all barring the Smart Technologies question were then aggregated into the results as shown in Fig. 29. The most important issues were, in order in the interpretation applied:

1. An emphasis on the Utility role of motorcycles,
2. A range of perspectives on licensing and regulatory restrictions on their use.
3. Scooters appeared in the next highest number of responses,
4. Concerns over the levels of professionalism available in and to the Government sector to be able to treat motorcycles professionally and with a sufficient basis of knowledge and specialised skills in their various traffic, transport and safety roles.
5. Recreational aspects of motorcycle use
6. Issues where State Road Authority (SRA) responsiveness was a key factor
7. The attitudes of different road users (including motorcyclists)
8. Issues involving Older motorcyclists
9. Issues involving the culture within which motorcycles and motorcyclists operated and were viewed
10. Issues involving the structure or mode of operation of SRAs
11. Issues involving shortages of data to appraise motorcycles on an informed basis
12. Issues involving road surfaces

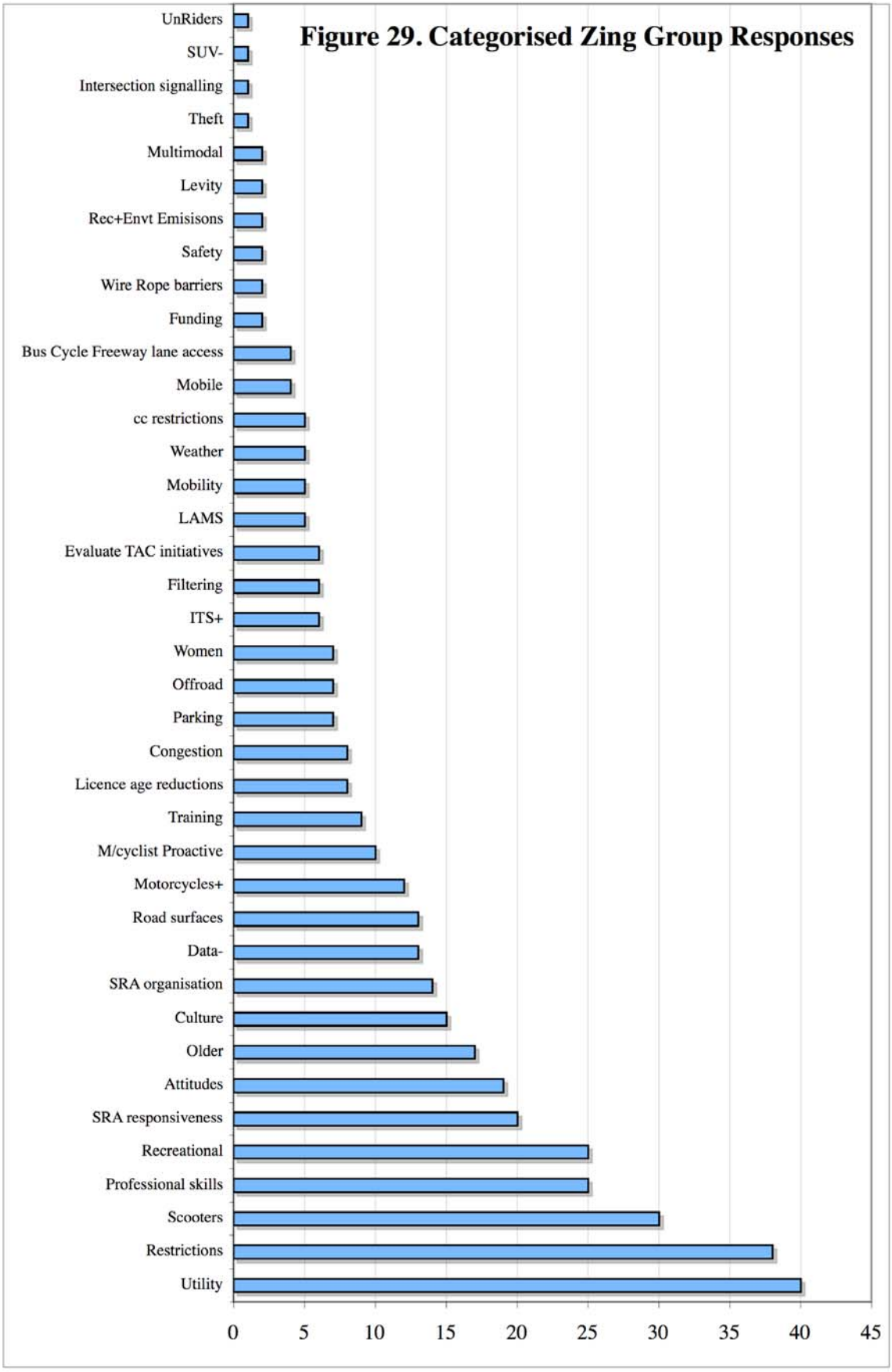
Figure 29. Categorised Zing Group Responses
UnRiders
SUV-
Intersection signalling
Theft
Multimodal
Levity
Rec+Envt Emisisons
Safety
Wire Rope barriers
Funding
Bus Cycle Freeway lane access
Mobile
cc restrictions
Weather
Mobility
LAMS
Evaluate TAC initiatives
Filtering
ITS+
Women
Offroad
Parking
Congestion
Licence age reductions
Training
M/cyclist Proactive
Motorcycles+
Road surfaces
Data-
SRA organisation
Culture
Older
Attitudes
SRA responsiveness
Recreational
Professional skills
Scooters
Restrictions
Utility
0
5
10
15
20
25
30
35
40
45

This mix of issues on the predefined questions for debate (Appendix A1) brings out several points. The utility role of motorcycle has a greater share of mind than recreational in the consultee group: this is reflects the usage patterns of motorcycles overall. Issues of research, data and professional skills shortages affecting the area appear to command more attention than even road surfacing problems for this group. The relationships with the State Road Authority and the professional and social culture and attitudes with which motorcyclists have to contend form another major group.

The additional comments on the first seven questions received after the Zing process reflected a similar pattern (see Appendix A3), possibly due to patterning on the Zing summary results made available to the parties who later responded.

The responses to Smart Technologies and motorcycles (a term used to avoid any stereotyped assumptions there might be about the phrase 'Intelligent Transport Systems) are considered in elsewhere in this report, together with the discussion of ITS systems.

Motorcycle organisations have consistently expressed concern over the use of wire rope barriers, and the issue did come up in the Zing discussions. This illustrates the positive role that closer Government body cooperation with motorcycle organisations could offer as the role of motorcycles in the Victorian road system develops. Professional research commissioned by motorcycle organisations in Australia (Gibson and Banartos 2000) indicated that impacts with such the mounting posts of wire rope barriers were associated with higher levels of injury to motorcyclists than collisions with concrete barriers.

These issues are attracting wider attention in the UK (Macdonald 2002), and the UK Highways Agency (2005) has already issued an Interim Advice Note indicating a likely change in policy to installing rigid concrete barriers for central reservations on motorways and dual carriageways carrying over 25,000 vehicles a day, albeit on the grounds of lower lifetime costs that wire rope barriers. Once again the potential of the MAIDS study to help frame road environment strategies in support of motorcycle safety becomes evident. Sixty cases of barrier impacts were recorded, and the distribution of injury locations and severities is shown in Fig. 30. Continuing awareness and use of both local and international in depth

motorcycle crash studies is an important in which the role of motorcycles on the Victorian road system can be supported and their safety improved.

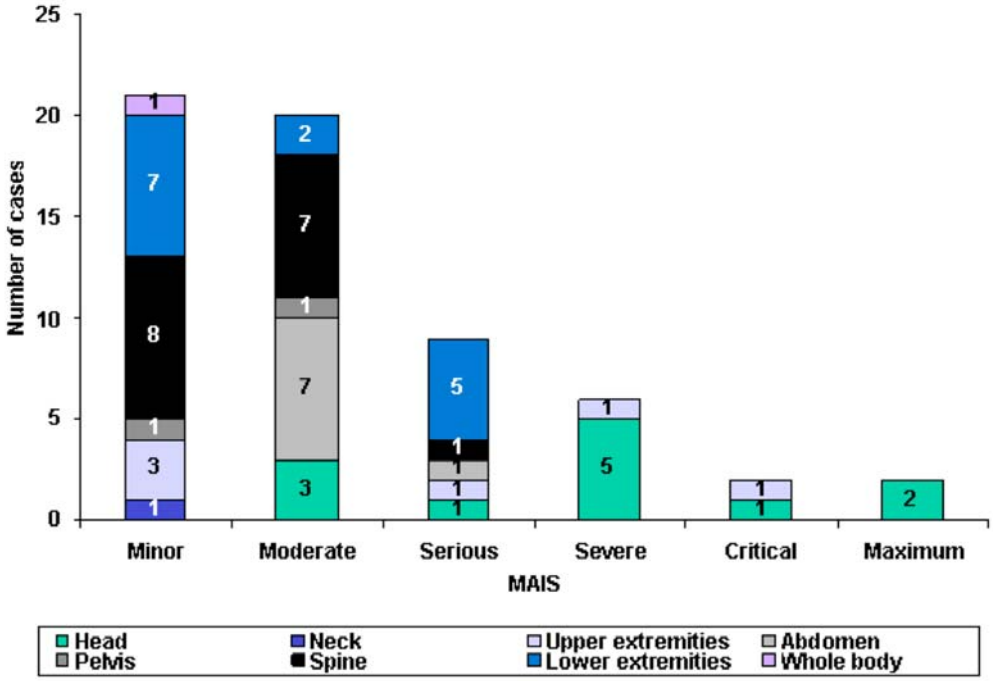

Figure 30. Injury locations and severity in barrier impacts in the MAIDS[19] study

The second arm of the consultation process was to seek out the views of the motorcycle community involved in training, as one complementary aspect to the riders and industry perspectives. One aspect of the role of motorcycles on the road system is how the riders interact with the road system and other road users, and of course, the other way round. Training provides one of the means of adjusting rider and car behaviour to make safer and more effective use of the road system.

While physical measures (advanced stoplines, lane bypassing of heavy traffic or tollgates are just few examples) can reduce the vehicle and driver conflicts between vulnerable road users and others, education, training and regulation provide further opportunities to make the overall system work better and more safely.

[19] Reproduced from the online MAIDS Final Report version 1.2 by permission of ACEM

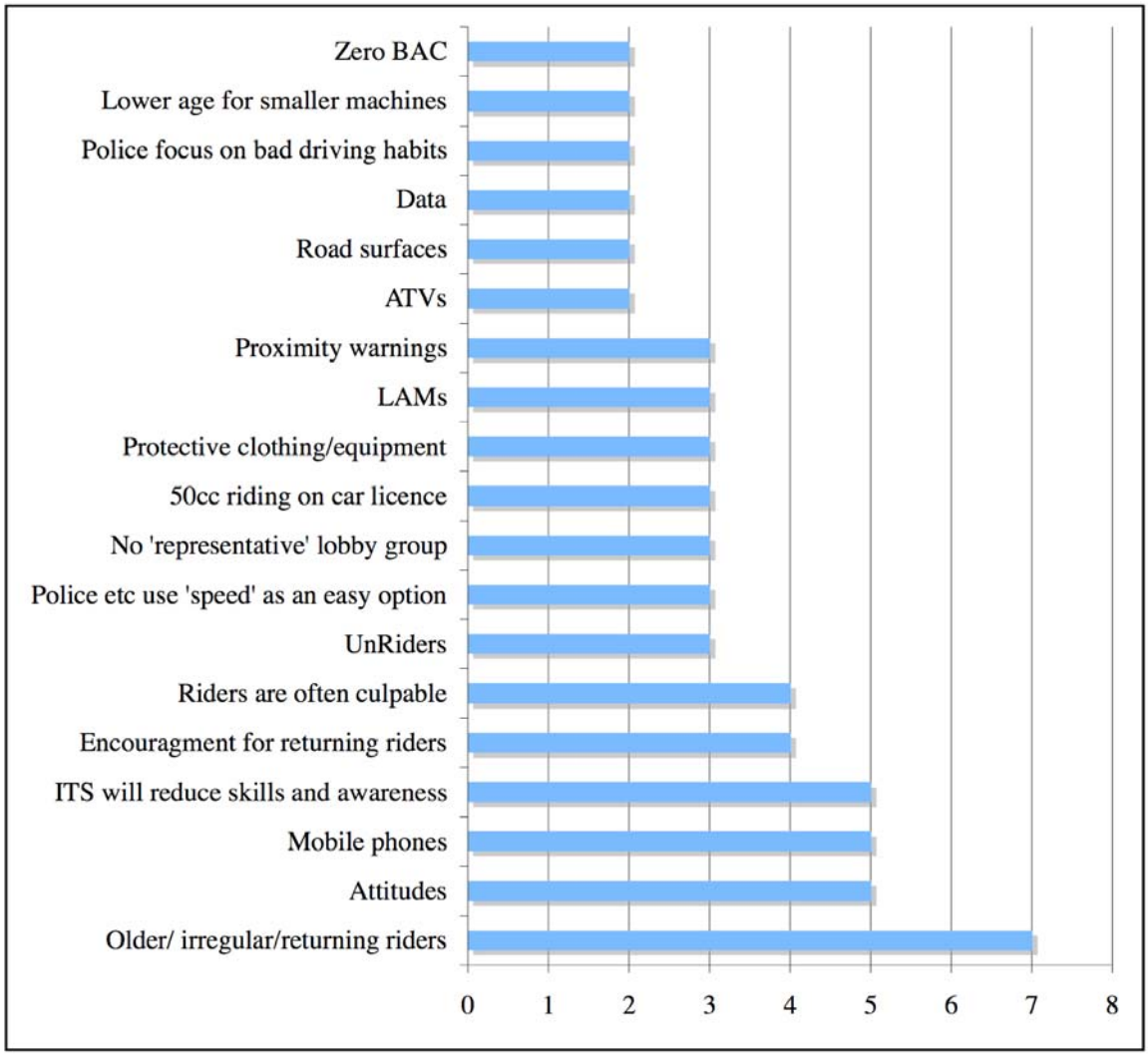

Figure 31. Summary of rider trainer consultations

A specialist organisation[20] was commissioned to secure the perspectives of this group as the principal of MCS has experience both in this area and in the road factors involved in motorcycle risks and black spots. The responses reflected the same experience as with other motorcycle groups, and requests for input on these positive potentials yielded no result. Interviews were necessary in most cases, with follow ups to secure email details if possible.

The major issues that emerged from the diverse views (Appendix A5) of this small group were (Fig.31):

[20] Motorcycle Safety Services P/L

- Riders returning to ride after a break
- Mobile phones
- Attitudes of riders and car drivers
- Concerns that ITS would deskill riders and reduce car driver awareness of other road users.

In general the longer term perspectives on the role of motorcycles on the road system were of secondary interest to this group, who focussed on issues of more immediate and substantial concern in their current experience.

The professional skills issue was the fourth most frequently alluded to in the more broadly based (Fig. 29) Zing consultation process. There still appears to be a perceived lack of a authoritative focal point to assemble and communicate a broad cumulative expertise in motorcycle issues

Small voluntary organizations and groups in the motorcycle area are not well set up or resourced to generate this for themselves with out direct support. There is as yet no broadly based continuing VicRoads, Academic or government resource on which to draw, and, while working on generating such a pooled resource themselves[21], necessarily have to devote considerable effort to react to 'threats' to their preferred mode when consultation input can be secured from the galvanised communities and individuals (Gindt, Decker et al. 2004; Voldset and Wanvik 2004).

This pattern recurs in many places, and it takes a large critical mass to sustain the levels of professional skills and input that are at last available for bicycles. The British Motorcycle Federation and the Motorcycle Action Group in the UK are both very large organisations - but still need to combine with others all across Europe for the small professional secretariat of the Federation of European Motorcycle Association in Brussels. This organization, FEMA, was visited on the project field trip and provided a range of examples of informed and

[21] A typical examples is the list: mcresearch@yahoogroups.com . This originally Australian initiative hosts posts of copies of research reports and other resources for general access to interested parties across Australia and the world

positive consultation, in addition to copies of some of the most recent formal European Government reports responding to the need to design and manage roads better for motorcyclists. FEMA was also a formal partner in the large scale MAIDS in depth study of over 900 motorcycle crashes in Europe.

Transport for London, one of the locations where interviews were undertaken on the project field trip) provides another example of effective government funded and hosted centres of specialised vulnerable road user expertise. TfL has a highly regarded Bicycle Advocacy Group of about ten people, but unfortunately no dedicated specialist staff resources at all for motorcycles. This lack makes it difficult, if not impossible, to build a cumulative and continuing knowledge base resource, and makes it considerably harder to achieve a balanced and well-informed treatment and support system for both vulnerable modes.

Umbrella motorcycle organizations in Australia and elsewhere demonstrate that significant effort has been spent on formulating policies (de Rome and Stanford 2002) (MRAA 2004) (Czajca 2004) and safety strategies (FEMA 2004) to structure more positive and forward looking engagements with government bodies and the community.

This activity includes commissioning professional reports to fill gaps left by limited of government investment in the motorcycle area (Gibson and Benetatos 2000)). These are aimed primarily (but not exclusively) at where the need for defensive or immediate (or even technical information provision) actions were needed. As a result these are focussed on safety issues and usually directed towards proposing positive proposals for improving the situation.

The NSW Motorcycle Council consultant[22] had collected enough data (796 interviews) to indicate that from their sample (de Rome and Stanford 2002) that utility riding (work/commute/education) was the sole purpose of only 8% of their respondents, mixed work and leisure 48% and leisure only 47%. Females were more likely to report utility riding than males. The consultants point out that the sample bias towards club members (64%) would have effects on the conclusions, and as many of the utility riders and scooter riders are

[22] Work commissioned from planning consultant LDER Consulting of Alexandria NSW and cited in various NSW Motorcycle Council public documents

less likely to affiliate with clubs and this may need to be taken into account. However, the high levels of utility riding reported indicates that motorcycling still has a substantial utility transport role in Australia within this group.

Motorcyclists are deeply concerned about their own safety, and it would appear that they feel that insufficient professional attention and interaction is currently available to enable them to contribute adequately, or that insufficient resources are available within government or elsewhere for adequate positive progress to be made. This was apparent in the Zing consultation (Fig. 29), which formed part of the present project, as well as in feedback from motorcycling organisations.

However when seeking comment directly from individual riders a several responses were often encountered. Each time the question was raised of "what positive measures could be undertaken to assist motorcycles in their travel over the road network", the first response was a general defensive concern over the heavy emphasis on greater levels of restriction and enforcement pressure (or as it was repeatedly expressed, raising revenue not investing it, or 'blame the victim' was also mentioned on a number of occasions) on this vulnerable mode seemed to overcome the positive ways in which safety could be improved by investment. This defensive orientation may go some way towards explaining the limited responses to requests for input of positive measures. It is an issue that would probably justify further investigation, but is outside the framework of the present report.

Contrasts were frequently made in the consultation responses to the heavy infrastructure and protective investments made by governments for bicycles. This was not to denigrate this expenditure (many were cyclists as well as motorcyclists), but more in puzzlement as to why the very high profile vulnerable mode of motorcycling did not appear to justify at comparable level of government commitment. However continued work on – and using - mechanisms for the active involvement of motorcyclists in policy formation, review and communications is a clearly a key component of the future role of motorcycles on the roads of Victoria.

Broad community consultation processes involving minority modes often contain a large element reflecting assumed or real attributes ("green" attributes, health, fear etc associated with these modes. This appears to be at least a factor within the user groups themselves.

It is clear from the consultation that motorcyclists have - at least potentially - a good level of trust in public professionals to look after their interest, but are concerned at the lack of such professional in most areas other than safety and regulation. There is evident potential to catalyse and gain momentum from the current positive moves of user groups to form and develop strategies for motorcycling and strategies for motorcycle safety at State and National level. It would be constructive to continue to develop closer collaboration as the roles of motorcycles on the road system are planned for and emerge.

7. Monitoring and investment assessment data needs

The planning and provision of supporting measures to assist motorcycles and motorcyclists on the road system requires information and monitoring processes that are able to identify problems, changes and benefits. There are few methods of effectively monitoring usage and ownership in Australia. This is especially the case for on road exposure, largely due to the costs of monitoring such a small fraction of the road traffic using conventional survey techniques. As a result the recent Exposure Survey carried out by VicRoads excluded motorcycles.

A basic framework of data acquisition on aspects of motorcycles and motorcyclists is needed, with integration into the planning and policy process. A basic requirement for assessing and planning for motorcycles on the road system is to be able to monitor both transport and safety outcomes. Currently only the latter are reasonably well covered. It is necessary to monitor the transport and traffic aspects as well as we now invest in monitoring the safety aspects. This needs to be implemented to enable proper management of the future role of motorcycles on the Victorian road system. Unless this is done there is no practical way of assessing initiatives, or identifying the success or failure of different measures, other than special

before and after studies on each issue. This is a problem shared with bicycles, as are so many other policy areas[23].

The demonstrably distinctive cultures (and of course the projections, assumptions and attitudes towards both negative and beneficial aspects) by non users of either mode in the community are a factor in the slow recognition that this should form part of a more coherent and properly assessed investment and regulatory program that encompasses all the various balances between risk, cost and benefit associated with all our available transport modes.

The strains evident in stretching the 'bicycle' category evident in electric bicycle area, and the problems encountered by local government in the plethora of alternative small wheeled (and now also gyroscopically stabilised single-wheeled vehicles by Segway and Bombardier) modes of personal mobility each time one emerges shows that steps are needed to enable the full range of mobility variations to meet the varied needs of an increasingly non-homogeneous population.

These different stereotypes and framings of the different modes have produced very different investment strategies and policies for each vulnerable mode. Pedestrians have one set of targeted behaviours and protective measures and investments, and little or no regulatory measures with any sustained impact.

Change is perfectly possible, and motorcycles could well become a well respected contributor to travel, traffic, parking and congestion – but clearly will continue to require targeted safety support measures to deliver this. This has been achieved for bicycles, a very similar mode in many ways. It was not always the case that bicycles were an accepted part of the Victorian transport system until professional analyses created a sound basis for engineers and planners to recognise this.

Major reports on travel aspects (Wigan 1981) and road surface conditions (Wigan and Cairney 1986) were contributing elements of this process in Victoria, largely as result of

[23] This is another example of the increasingly important area of Integrated Information and Modelling Strategies to support transport policy.

special investments by the Victorian State Bicycle Committee. Many other contributions to bicycle transport and traffic work subsequently have become part of operational practice since the 1980's. Bicycles now attract large, well-justified and continuing infrastructure investments and specialised facilities, still with limited enforcement[24] effort. Motorcycles attract virtually no infrastructure investment at all, tight regulation and strong enforcement.

These patterns of social attitudes may be argued to be predominantly 'safety' based, but the philosophies towards protective investments and regulations do not support this view, and there are substantially differing philosophies applied to each mode. Ironically the points being made here for motorcycles are almost identical as those made for bicycles nearly 20 years ago (Wigan 1987; Wigan 1987).

Possibly the current lack of personal chips and ID cards, which would enable detailed tracking and monitoring of both pedestrians and bicycles, or of RFID identifiers on bicycles, which would permit the current regulations to be effectively enforced for all modes, might then create a level playing field, on which consistent treatments could be founded.

Until this occurs - and it is not so very far away in technical terms - the information and monitoring flows need to be adjusted to permit a more balanced assessment of the measures for each vulnerable mode – and also to modify the negative stereotypes applied to motorcycles by providing a balanced picture supported by reliable and more broadly based information flows. The breadth of the data sought out to illustrate this report is one small contribution, based on what can be gleaned from the limited data resources currently available.

There are therefore two different types of measures needed to assess and act to improve the handling of the role of motorcycles on the road system. These are:

1. More broadly based information flows into Government and out to the community, covering a broader range of information than the current crash data releases.

[24] Analysis of police records in NSW in ANBI (Australian National Bicycle Information Base) (Wigan and Smith, 1997) showed that helmet enforcement was in most cases the only aspect that was consistently pursued

These are needed to create a less imbalanced and better informed and information based perspective on the motorcycle mode for all parties. To achieve this will require modified information strategies by Government departments, and also the creation of at least some focus of critical mass knowledge resource for all parties to translate these information flows into policy and perspective. So far in Victoria the VMAC and VicRoads (with the present report and the Motorcycle Notes series of documents) have been virtually the only parties in Victoria to examine and assess motorcycles from anything other than a safety-focussed standpoint.

There is no suggestion here that the investments in safety have been unjustified, and indeed they need to be maintained, simply that they need to be complemented by traffic and transport and other factors which are needed to assess and treat all other modes in an informed and professional manner.

2. Use of ITS (Intelligent Transport Systems) to improve the information about motorcycles.

The data acquisition for motorcycles (and for bicycles) is currently very limited, difficult to do, and expensive. This has led to the exclusion of one or sometimes both of these modes in Government data collection both in Victoria and also nationally. The next section, on Smart technologies, addresses the new possibilities to make this process economic. There is little doubt that it is needed, but the costs have in the past proved to be a major barrier.

The rapid developments in communications and electronic devices in all types of motor vehicle are swiftly changing this situation, and ITS and motorcycles is a key emergent area.

8. Smart technologies: ITS and motorcycles

Measures to deal with motorcycles as such a small fraction of road flows require either very specific or very broadly based and generic measures (such as raising riding age or specific enforcement programs), which are blunt instruments – but all that we have had for many

years. Collecting data to evaluate even such broad measures has been difficult, and major investments such as the Victorian Case Control Study of motorcycle crashes (Haworth, Smith et al. 1997), the MAIDS study in Europe (ACEM 2004) and the ongoing UK OTS (On The Spot) fast response in-depth accident surveillance program in the UK) program are all examples of essential components needed for the design and review of future safety measures.

The steady development of Intelligent Transport Systems has led to a great increase in both computer and sensor-based equipment in vehicles and on the road system- and in the communications between them. This section is a brief summary of a separate paper on this area of transport and its impacts and applications to all the vulnerable transport modes (Wigan 2004), targeted for presentation at a January meeting of the Transportation Research Board. The aspects important here are that ITS allows:

1. Better information to be gathered economically about travel behaviours of motorcycle riders
2. Higher levels of road-rider information exchange on conditions and potential risks
3. Improvements in the currently very poor responses of other road users to motorcycle near them on the road system. These are unfortunately termed 'motorcycle conspicuity' issues, rather then 'driver lack of response' issues.
4. Improvements in interactions with fixed roadside components of ITS
5. Black box crash recording
6. Active speed information communication, aurally or head up display
7. Theft and recovery facilities
8. Parking and pricing system facilities
9. Vehicle personalisation (suspension settings etc) with active suspension interactions, engine management etc
10. Dynamic sound and emission monitoring and feedback
11. Higher quality GPS and route advice integration
12. there are many other examples emerging

These are a short list of features that are already available, under development or in prospect – but the implementation of many for only on type of vehicle would be a real concern for motorcyclists if the specific motorcycle interaction aspects were not part of the original development and implementation process.

Interest in the motorcycle safety potentials of ITS has been expressed in a report commissioned by the RACV (Regan, Oxley et al. 2000). It is also encouraging that a recent UK DfT motorcycle safety advertisement ("Perfect day"[25]) has been applauded by motorcycle interests as accurately indicating some of the fantasy wishes of rider for such intelligent road warnings and interactions in an accessible way - and which are in many respects at least potentially deliverable in the reasonably near future.

Analysis of the Zing Consultation debate on Smart Technologies showed that proximity detection was the most remarked upon benefit that ITS was perceived to be able to provide to motorcycles. The next was GPS (already available as a standard option on several machines owned by consultees), and then a negative issue of potential losses of driver control (from a speed management intervention perspective) and surveillance aspects.

It is likely that wider knowledge of ITS and its potentials and the trends towards new systems and how they will work on the road will steadily increase both awareness of a wider range of applications and also the positive aspects of some of the systems currently commented on without sufficient detailed knowledge.

The Zing consultation spawned a follow up discussion on Smart Technologies, which raised a number of very different points to the responses to the basic questions summarised in Appendix A1. Fig. 31 is a visual summary of the Smart Technologies Zing debate. Clearly this was conditioned by the information then available to the respondents, but a substantial range of options quickly emerged in the discussion.

[25] The 18mb .mpg file can be downloaded from
http://www.thinkroadsafety.gov.uk/campaigns/motorcycles/perfectday.htm

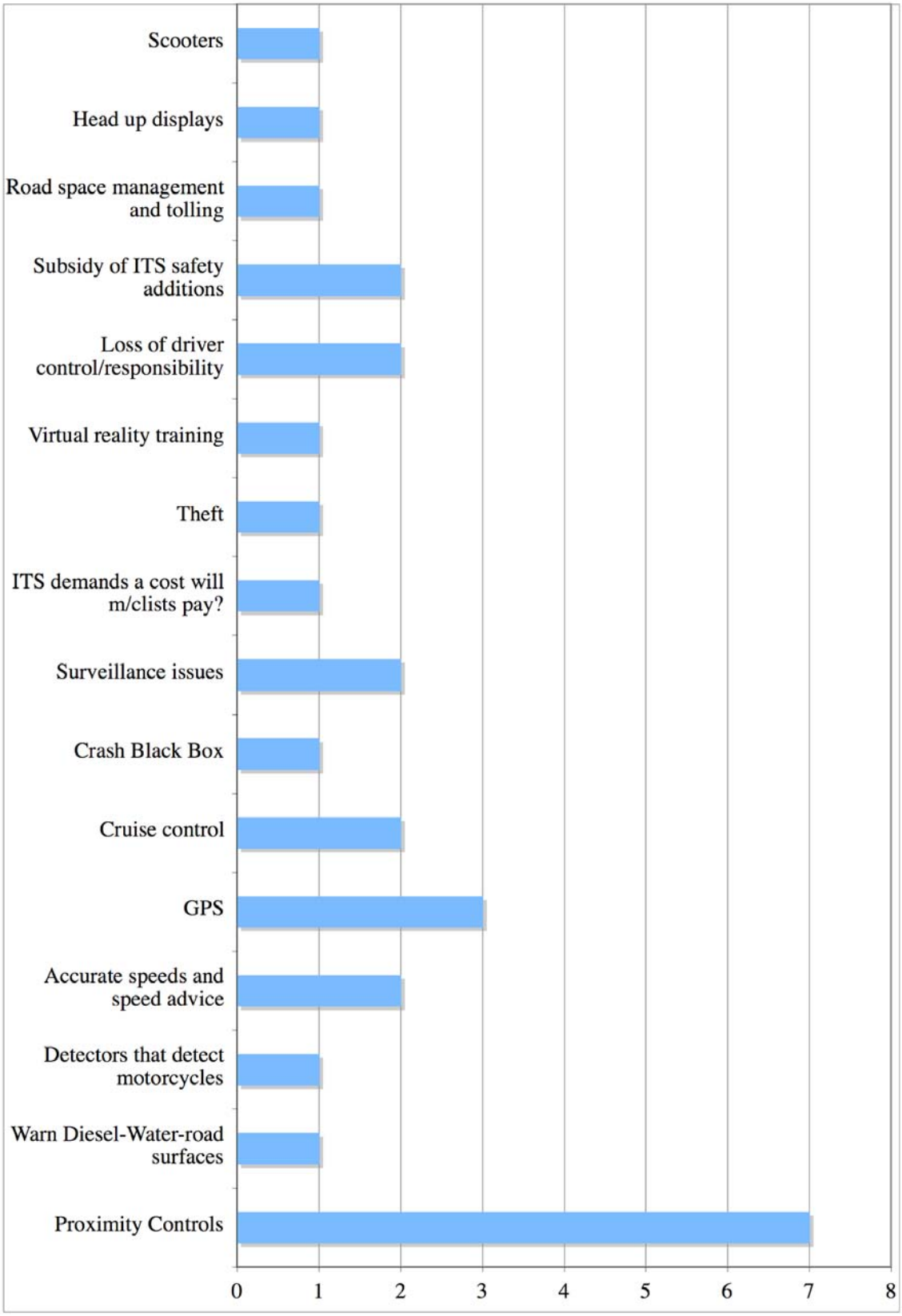

Figure 32. Summary of Zing Consultation responses to 'Smart Technologies'

While the literature on motorcycles from standpoints other than safety it still sparse, a number of papers in ITS specifically on motorcycles have been identified. One dealt with the problems of identifying a motorcycle using image processing (Mitsui and Aoki 1993) - invaluable in collision awareness warning for car drivers to be made cognisant of the presence of motorcycles (and potentially to record information automatically to ensure that the any rights of way violations by cars notified to the driver are verifiable in the case of an accident).

Some safety oriented ITS work has continued in the international experimental safety vehicles programs (Aoki 1997). Others (Huang 1999) have addressed the broad potential for an active positive approach to ITS for motorcycle safety as a whole from Taiwan (Hsu 1997). Taiwan has both very large numbers of motorcycles and scooters, and the necessary high technology research development and manufacturing capacity to be able to implement appropriate sensors and communications technologies - and then bring them to market. It is therefore likely that Taiwan will become an important player in these developments.

There has to date been only limited professional attention paid to motorcycles as equal players in ITS systems in the overall transport system. An early example where this has been done was cited by the New South Wales Motorcycle Council in an emailed consultation response. This was the focus group work done by the University of Leeds (Comte, Wardman et al. 2000) for the UK Department of Transport on intelligent speed control and adaptation.

Unfortunately little of this perspective is as yet evident in this or any other publications that have been published by the UK DfT programs (also being done by ITS Leeds (Carsten and Fowkes 2000)). NSW MCC in their submission to Staysafe (a NSW Parliamentary Transport Safety Committee) emphasise the UK focus group findings as follows:

> "Motorcycles however present the largest challenge for a future EVSC (External Vehicle Speed Control) enabled environment. The acknowledged difficulty of transferring the passenger car concept and function of EVSC to motorcycles suggests that an alternative and complementary speed control strategy should be perhaps be considered." (Carsten and Fowkes 2000).

This does not mean that motorcycles should be exempt. On the contrary, their special features, needs and characteristics should form part of the design and implementation of speed control strategies and equipment deployment.

Motorcycles have much to gain from ITS – based information based warnings and advice on prevailing speed limits and road conditions, both of which form part of the forward perspective in this area of ITS, as motorcycle riders must devote so much attention to detecting and avoiding risks from the road environment and other vehicles.

9. What kinds of future should we plan for?

There are many steps that can be taken in the short term, most of which are at a small scale individual impact but of larger importance in cumulative effect. Much of the future is already here, and can be addressed at a micro scale as well as through longer term strategic investments in ITS etc.

The current situation is one where a number of first such steps have been taken, many as a result of the formation of the Victorian Minister of Transport's Motorcycle Advisory Council, which forms a focus for formulating what needs to be done – and the Traffic and Transport Integration Division of VicRoads which has the responsibility for initiating the Motorcycle Notes series of Traffic Engineering notes on motorcycle issues, and developing the motorcycle-specific black spot program under the special three-year levy imposed by Transport Accident Commission on motorcycle registrations of machines over 125cc.

Other positive initiatives have included safety-driven changes to such popular leisure routes as the Black Spur and the Great Ocean Road. In each case these were initiated by local Government and VicRoads as a result of safety concerns. It is significant that the points made in Murrindindi Shire (where several of these more attractive motorcycle leisure routes are located) was to also point out the economic importance of these routes and these riders. This is one of the very few 'transport' related perspectives to emerge in the programs designed to cater for motorcycles to date.

The current scenario views afforded by the different cities assesed have made it clear that very high levels of motorcycle use and parking can be accommodated effectively within urban areas, and that such conditions do indeed occur in at least one city comparable to Melbourne (ie Rome). It is equally clear from the history of this high level of motorcycle use in Rome that generous licensing and limited enforcement practices have had a substantial effect on the usage and ownership of motorcycles. This lends some force to the safety argument that one of the most effective ways of limiting crashes and injuries is simply to restrict the usage and discourage access to motorcycles in the first place.

This philosophy is at variance with the original Vision Zero approach to road safety, where the design of the system should play a far greater part in ensuring that transport can take place in a safer environment (Tingvall and Haworth 1999). This key basic component of Vision Zero appears to have somewhat slipped from view. It is, however, peculiarly appropriate for motorcycles in that the design of roads and traffic management devices could and should be done with some recognition of the fact that some errors can have major consequences, and comparatively minor design and policy adjustments can reduce this risk.

This is an area where State Road Authorities can have substantial direct and indirect impacts. Such small scale traffic management issues may appear to be somewhat removed from a future role of motorcycles in Victoria, but the motorcycle fleet uses minor roads somewhat more than major roads (Wigan, 2000), and so attention to this area forms an intrinsic part of the pattern of measures and influencing factors for motorcyclists in their use of the road system – and how it can be tuned to ensure that this is done as safely as possible.

Regulatory Impact Assessments are well established in Government, and motorcycle specific aspects (in traffic transport, mobility and safety terms) should form a routine component of any future regulatory impact template. Unfortunately, there are still areas that do not yet get adequate scrutiny from a motorcycling standpoint. Inter alia, these include the splits in planning and execution between Road Authorities and Local Government - and between either level of government and their maintenance contractors.

These widespread administrative and execution coverages appear to leave gaps in transparency. An overall positive gain for motorcyclists could be achieved through improved auditing and monitoring processes for obstruction clearances, and the adjustment of those offering higher risks to motorcyclists than to cars.

Systematic surveys and treatments of minor road hazards such as signage restricting motorcycle pathways through constrictions and local traffic management devices therefore play a role in how the role of motorcycles on the road system can be enhanced. Often any corrective treatment would substantially benefit the far more numerous cars as well. This is not unusual: many of the measures that would assist motorcycle in their safe use of the road system also benefit car users. The key is to include motorcycle specific awareness, guidance and sensitivity to many existing programs in a systematic manner.

A similar conclusion has been reached in the UK, and a cooperative venture between several bodies, the motorcycle industry and user groups, the Institute of Highway Incorporated Engineers, Transport for London, the County Surveyors Society and the Department for Transport has produced a set of guidelines for motorcycles to assist this process (IHIE 2005). This document is on some ways a successor to the AUSTROADS Guide, and indicates the directions of cooperative development to address motorcycle traffic and safety issues. The awareness and selective adoption of findings from different countries in the IHIE Guidelines is a general trend.

There are any other examples in the road system of what one might summarise as clear zones issues with a motorcycle twist, but most are concerned with similarly potentially problematic maintenance or design decisions carried out several steps away from the responsible engineers and policy settings. A broader audit process of these sorts of obstacle harm minimisation strategies offers a positive way of reducing overall costs to the community: one where car drivers would benefit as much as motorcyclists, albeit only financially, as the motorcyclist can pay heavily in terms of injuries as well.

This suggests that a broadly based major and minor road strategy be further developed with Councils to address many of these issues. The road safety audit process developed to identify

motorcycle black spots for funding under the program[26] to apply the Transport Accident Commission $50 Motorcycle Safety Levy has provided a starting point for this process, which should be built upon. This is a movement that implies a shift in professional culture across the various organisations, and could be materially assisted by ensuring the active participation of Road Safety Councils and motorcycle organisations, once a template had been developed for the identification and monitoring of such factors and locations.

One form of future to plan for is one where access to and usage of motorcycles is made increasingly difficult, in the interests of community safety. This neglects the transport and other utility of such usage, and takes no account of capacity, fuel effectives, road space utilisation- and simple driver/rider choice utilities: all of which play a part in the societal balance, but do not as yet appear to do so for motorcycles.

The global policy standpoint in all administrations is to balance mobility and accessibility and safety costs to individuals and the community, but this goal is approached from very different perspectives in different locations, and with very different weights on these components. The current emergent policy direction expressed in interviews in Kuala Lumpur was to 'encourage leisure and non-work travel to use buses'[27], and 'keep the motorcycle for the work journey'[18]. The implied balances are quite different to London or even Rome, and are clearly based on factors including the safety costs and the limited capacity of the public transport system, which runs on working days in greater Kuala Lumpur at an extremely high level of overloading.

A similar observation on the inhibitory characteristics of some professional and social UK culture factors made evident in the UK as a result of the research and other consultation, and contained in the in the recommendations of the multi-year UK Government Advisory Group on Motorcycling.

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26 The application of these funds to motorcycle safety issues is the responsibility of the Minister of Transport'sVictorian Motorcycle Advisory Council: details are to be found at: http://www.vicroads.vic.gov.au/vrne/vrninte.nsf/alldocs/B591FDF8AFE4EF16CA256E6D00295DD7?OpenDocument&Area=[Motorcyclists]

27 Interview with the head of the transport administration in Malaysia

> "That all bodies with an interest in motorcycling should seek to remedy the bias of some institutions – including local authorities, employers, regional government, educational bodies, environmental and safety pressure groups – which the Group believes is contrary to improving PTW safety". (Advisory Group on Motorcycling 2004)

Victoria began to address some of these issues in the 1990's, with the establishment of the Minister of Transport's Motorcycle Advisory Council in 1998, followed by VicRoads initiatives such as their Motorcycle Notes. However it is clear that it is a common problem shared with other countries when seeking to make further advances in safety as well as traffic, transport and planning factors related to motorcycles. The common emergent experience is that working together helps bridge these gaps. This appears to be most effective when Government resources devoted to develop a broader and better supported knowledge of all relevant aspects of motorcycling. Examples include the Advisory Group on Motorcycling in the UK, and the responsibility and active role of VMAC managing the funds raised by the 3-year TAC $50 Levy imposed on top of the third party/registration fee for motorcycles. The shortage of government staff with widely based expert knowledge of the mode remains a limiting factor.

The futures that can be planned for to support the role of motorcycles in the Victorian road system are therefore a combination of systematic small-scale measures, process improvements, and strategic initiatives. Data, transport choice investigations and ITS are essentially strategic. Regulatory reviews and adjustment, minor traffic management shifts, parking processes and provision are tactical. Both types are needed.

10. Drawing some scenario scenarios based on the work and visits undertaken

It is time now to draw on the various threads running through this report. We will do this by sketching out three different scenarios, which illustrate combinations of effects that might or might not arise. None of these scenarios are to be taken too literally, and recognition of different features chosen to draw the picture should not be taken as a judgement or advocacy or the reverse: they are to help to provide a perspective. The choices between these futures

will be the outcome of environmental and social changes, professional, political and governmental actions, or otherwise. No probabilities are attributed to any of these pictures of the future.

A valuable exercise to review this report would be to work through the creation of similar scenarios– and then work back to identify what are the key triggers that would make one future scenario more likely than another.

The most valuable step in such a process would be to appreciate what information flows (and what human capital) would be needed to determine what was happening and to formulate and adjust policy accordingly. Policies are developed and implemented a process, not as a single decision. Implementation stages are the results of decisions made along the way. This short section is a way of summarising the points of view exemplified by Rand Europe in forward scenario planning (and applied to assess and advise the air industry there)

There are three radically different futures that one can consider, the likelihood of any materialising probably depends more on the social, community and professional cultures of Victoria than on technical factors. It is likely that some elements from each of these scenarios will occur, but in very different contexts. A sudden and extended shortage of fuel would, for example, produce a very different picture.

10.1. No change, and no interest

This is a version of the present where motorcycle roles, potential and actual, are known about but no significant investment in knowledge, monitoring, choice analysis or users is made other than appropriate to address safety concerns. Minimal resources are applied to motorcycles outside a continued TAC Levy. Motorcycles are tolerated, but not recognised for their advantages and are defined by their disadvantages. No changes in current parking regulations are made. Small gains are made in specific locations in safety, regulation continues to be focussed especially on riders, and critical traffic and transport and regulatory factors continue to be occasionally addressed, but with little force leading to a steady decline

in the motorcycling environment. This will tend to thin out the utility riders other than those with no other workable choices and emphasise the core leisure riders.

Ageing will bring a steadily rising average age to motorcycling, as is already evident. Scooters will boom and then bust (as did mopeds once before) back to a lower stable sales profile (as they are showing evidence of already). Motorcycles mopeds and scooters will not be given access to protected or dedicated vulnerable road user road space. Small-scale action will occur but no commitment to information or provision will last more than a few years. ITS initiatives will be developed with little knowledge or interest in motorcycle issues, and be solved by restrictions on motorcycles or tightening of regulatory requirements or enforcement.

10.2. Mobility matches safety

This is a future where capacity (on road and for parking) is at a premium. Substantial motorcycle only parks are evident and well patronised. Fuel costs have risen and there is a sharp awareness of comparative advantage. Scooters and motorcycles have increased in use during the week, scooter usage mainly by older people and women, and there are issues with too many powered two wheelers parking on the footpath in some locations. Access to powered two wheelers and electric bicycles has been rationalised as progressive mobility options are now available from 14 to 18 years of age, with mopeds and small scooters at 16. Specialised training for small automatic and electric vehicles is readily available, and other regulations have been smoothly integrated to provide a coherent and differentiated access and mobility framework which constructively covers all forms of two wheelers.

Bicycles. mopeds, scooters and motorcycles are all identified and traceable leading to integrated management, theft recovery, insurance and regulation Targeted uniform enforcement of violations beyond just than helmet usage is proving to be effective, but with the registration and tracing of all types on road users travel behaviour of all vulnerable road user modes has become more predictable and compatible with other road, making shared usage of road space more successful. A smooth scaling up of unconditional mobility (currently restricted to bicycling) has been integrated into a progression that includes electric

and fuel cell power assisted cycles (see Appendix A8 for some further current examples), through mopeds and scooter and up to motorcycles, with a carefully graduated access age and regulatory rethink covering all ages from 8 to 80+. Consistent treatment of users of all vehicles across this continuum of modes is now routine as a result of these advances and overall community mobility has been raised and overall costs have been contained, or even lowered, based on a consistent evaluation framework..

Processes for effective shared use of dedicated lanes have been worked out, and bicycles and scooters/motorcycles are both able to benefit as a result. Tolling systems recognise the minimal capacity utilised and the community gains in safety for PTWs using high quality roads, and have continued to waive charges.

Inter-vehicle warning systems have improved the poor rates of driver identification and response to motorcycles with right of way, made all types of road vehicles safer to use in close proximity, and the legal structures have placed enforced liabilities on the larger vehicles to take due care. Crash rates in urban areas have fallen.

Intersection designs now permit motorcycles and bicycles to have different forms of priority and ITS detection systems have improved the handling of movements and improved motorcycle and bicycle safety in intersections. Filtering through traffic when it is stationary has been specifically endorsed in the National Road Rules, and an offence of inconsiderate driving has been put in place to handle any inappropriate use of such filtering. ITS systems on all types of vehicles have reduced door opening events and other forms of inter-vehicle collisions. Navigation and speed environment information aids enable riders to spend more of their attention of the riding task.

The usage levels of motorcycles and scooters is 15-25% of traffic in many busy urban locations, and all parties ride and drive in manner visibly more aware of these vehicles in the traffic stream.

10.3. Constraints

Here the no fault insurance system has been used to ensure reduced motorcycle use. There has been an increase in unriders[28] and tighter regulations have been introduced. Under pressure from other road users, motorcycles, scooter riders and mopeds have been specially banned from filtering, and increased conflicts have been observed with other traffic. The higher costs of access to the mode have not had enough of an effect, and so tight controls on usage have been introduced requiring GPS tracking and speed monitoring to be installed on all motorcycles over 500cc. Footpath parking has been banned, and theft rates in enclosed parking areas are on the rise, adding to the cost of registering and insuring motorcycles and scooters. Due to the rising rate of unriders, selective enforcement has been increased still further on motorcycle riders in all areas: a negative feedback loop.

Attitudes between riders and police and the community have deteriorated. Penalties for injuring or killing a motorcyclist have continued to be very low, as had already started to emerge in 2004. In an effort to contain the increased crash rates and the negative attitude from stronger enforcement, the riding age has been raised again. Active surveillance and active tracking has become commonplace, but only for motorcycles.

Motorcycles are not compatible with the new active ITS area speed management zones and no plans to change this being considered. No effort has been made to integrate motorcycles into other forms of on and off vehicle ITS and as a result motorcycles are no longer able to access key parts of the road system where they are in place.

10.4. Discussion

None of these scenarios are very likely to occur exactly as described, but elements of the potential negative feedback loops of Scenario 3 have been observed in other countries – but so too have elements of some of the positive feedbacks also inherent in other factors.

[28] **UnRiders** are riders without a valid applicable licence, riding an unregistered machine or both

The logical conclusions of Scenario 3 is that motorcycles would progressively lose their ability to have any practical role on the road system, and some measures based only on safety considerations would improve as usage and exposure levels fell. The combination of restrictive access, regulation and higher costs would be very likely to reduce usage levels substantially.

Scenario 1 makes little use of the potential benefits that motorcycles and scooters can offer, and unless positive measures to support motorcycle users continue to be developed, is perhaps the most likely scenario of the three to be actually mainly or partly realised unless the full range of overall factors involved are constructively and systematically assessed and managed to maximise mobility while containing and if possible reducing safety costs.

Scenario 2 has some aspects that reflect the experiences of Italy in terms of the take up rate, but if safety measures are handled in a coherent manner the safety losses may or may not be an issue as exposure levels rise, and a major fraction of urban crashes might be regarded as the fault of other vehicles not seeing motorcycles, or at least not taking any action if they do. Higher densities and levels of powered two wheeler use will not only make them less unusual events in the traffic stream, but increasing numbers of families will become familiar with at least one member having personal experience of the mode.

If monitoring and communication were improved it is likely that the trends sketched out in scenario two trends would emerge.

The striking aspect of this examination of roles is the importance of the cultures involved. These include the professional ‘safety’ culture, the ‘economic analysis’ culture in government and policy, and the community and enforcement cultures. If these continue to be neutral or negative, then larger changes are limited in likelihood. If there shifts occur, possibly induced by broader analysis, knowledge and policy integration, then the feedback loops would tend to move the outcomes towards a positive direction, as sketched in Scenario two.

Naturally many other aspects could be included in these scenario thumbnails, but each provides a framework or viewpoint highlighting what could or might be done,

Data flows and ITS both offer new ways of monitoring, managing and changing between different emergent futures.

At an infrastructure level, as long as motorcycles remain as a travel mode, then harm minimisation strategies will remain a critical common factor in all comprehensive VicRoads strategies and policies. However any such comprehensive strategy will need to include aspects embedded in the practices and programs of road design, traffic management, and road maintenance.

The complementary areas of training/education, regulation and enforcement are also in VicRoads areas of responsibility. Mediating these many areas for minority modes needs an internal centre for expertise and continuing knowledge capital to be built up (as has been done for bicycles), and also external resources where cumulative knowledge capital can be built up in a more independent framework.

Some combination of internal and external expert resources would be the most practical approach, and in accord with other developments in current government practice. This has largely been done for many of the safety aspects of motorcycles through MUARC, but it is now time to consider how to deal with the larger part of the resources utlised by travellers and transport.

11. How the road system and adjuncts to it may need to be improved or modified

The translation of these contexts and commentaries into how the road system needs to be improved or modified is considered in this section, but must be qualified by some of the recommendations discussed in earlier Sections. These qualifications will not be raised here.

The various measures fall into a range of categories, some of which have been identified in the consultation process and some of which were not.

The major development in road user services is the growth of the smart technologies on road and in vehicle, and connecting the two. The term ITS (Intelligent Transport Systems) is not as effective as it was. Once a new initiative or development proves to be successful, ITS becomes 'new features" and fades into good practice on the road management side and into marketing on the vehicle side. Freight systems of course have long had a higher level of information systems integration than passenger vehicles, and do not fall into this model.

The areas where adjustments or actions are possible on the road system span a wide range of areas and skills. For example, traffic engineering and road design options are not the only ones. Local subdevelopment criteria, parking, road surfacing, lines of sight, provision for slip lanes on tollways, different treatments of runoff road areas equally applicable. It was noticeable that there were few if any mentions of the use of road emergency lanes, or of joint use of transit and bus lanes.

Intelligent Transport Systems (ITS) can contribute progressively more and more of a series of positive options of benefit to motorcycles. These include, road treatments, signage, alignment guidelines, active speed warning systems, handling of the warnings of motorcycle proximity by ITS in other vehicles as well as motorcycle head up displays, collision avoidance on both motorcycles and other vehicles (cars, buses, trucks) - active alerts in other vehicles when the motorcycle at risk sees they are not responding. Fig. 33 summarises details of Honda's research investigation of this approach.

This is only a small fraction of the emerging ITS options becoming available. Many of them could assist motorcycles in both traffic and safety terms. Examples include adaptive warning signs that provide active information relevant to what is actually happening right now (instead of a generic warning such as 'road slippery when wet'), road surface warnings (frost/wet), active cats eyes with transponders for road surface information and warnings (and indeed speed detection), memory of vehicle coming the other way or vehicles on the wrong side of the road, Bridging smart cats eyes can give messages from around blind corners.

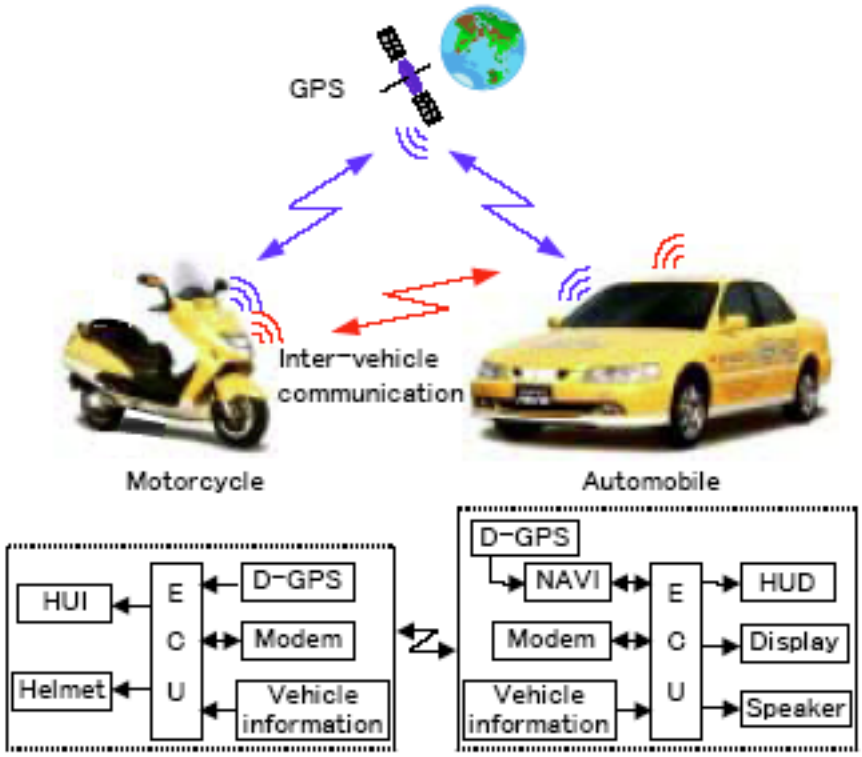

Figure 33. Intervehicle communication system for collision avoidance. (Takahashi and Asanuma 2001)

Active vehicle identification could be used for positive selective priority or guidance, and not solely (as is generally perceived by the motorcycle riders at present), simply as a means of harsher enforcement in pursuit of greater fine revenues, ID for guidance (and enforcement and tolling), Unfortunately there is little in the literature that addresses these issues or places them on the ITS agenda.

Infrastructure parameters are designed largely in terms of subgrade strength for trucks, and sight lines and design speeds for passenger vehicles. These principles are beneficial to cars and motorcycles, but the surfacing issues have a considerably greater relevance to motorcycles. Concrete roads with polishing or in need later grooving to regain some skid resistance are not favourable to motorcycles. A number of road surfacing treatments and options are not considered as often as they might be for the interests of vulnerable road users. High friction open course asphalts are successful in reducing noise, spray and increasing friction at critical points on the road system. These treatments are considerably more

favourable to motorcycles than grooving – especially longitudinal grooving, where vehicle stability is reduced – if we are to have a more appropriate road structure for motorcycle usage.

12. Summary

The present report has examined several scenarios implied by current conditions in different cities overseas, which demonstrate very different approaches to licensing, enforcement, regulation and traffic provision and the motorcycle and scooter outcomes of these different mixes and cultures. Data and consultations from a range of sources has been used to highlight a number of factors:

- Rapid growth in scooters, with a rising fraction of female riders on these motorcycle variants
- Increasing numbers of personal mobility devices and bicycle/motorcycle variants
- Continuing high levels of utility travel by motorcycles
- More active user groups banding together to cooperate with Government on safety issues
- Motorcycle users are very likely to have access to cars as well
- Real and positive potential from ITS developments with active motorcycle participation
- Higher standards of motorcycle -friendly traffic engineering sought

The pivotal influencing factors were found to be:

- Attitudes towards mobility (I terms of age of access to motorised mobility)
- Different regulatory approaches
- Government actions to alter the nature of motorcycle, scooter and moped fleets.
- General mobility culture towards motorcycles

It might be argued that many of these factors are largely set in Victoria, but benefits of examining such widely different views of mobility and the traffic and other aspect of high levels of motorcycle use have not only identified good work on how better to integrate motorcycles into traffic and transport planning, policy and operations, but also give an overall view of circumstances where high levels of usage of motorcycles are a part of the life of comparable cities.

Several specialised differential measures for treating motorcycles exist: dedicated motorcycle lanes (Malaysia); freedom from congestion charging and bridge tolls (UK); and footpath parking in Victoria). Unfortunately the data required to monitor and adjust policies and operations with a greater understanding of motorcycles are largely absent, and these data gaps need to filled, albeit selectively.

It was also apparent that the growth of ITS investments by manufacturers and infrastructure managers could well provide both an opportunity to correct these lacks in information and monitoring, but also needed to be approached in a manner which ensured that not only were motorcycles full participants in the ITS managed road system – but also gained specific benefits from it.

Any reappraisal of the roles that motorcycles can, should or could be encouraged to play on the road system are hampered by the lack of a continuing knowledge base and interpretive expertise that can link the diverse areas where motorcycles are small part - but are substantially affected if not treated from the start with understanding and timeliness. The potential for negative impacts has already been demonstrated by the Australian National Road Rules where the motorcycle issues affecting capacity and movement have not yet been fully considered.

The scenarios observed demonstrated that motorcycles can fulfil effective mobility roles considerably larger that they do now in Victoria, and that the scooter and moped variants have higher levels of utility to a broader cross section of the community that motorcycles have supplied in recent years - and but that to secure the full potential will require road rules and to be reappraised in a broader context.

The primary recommendation for all minority modes of transport is a plea that appropriate data be collected at regular – or at least appropriate – intervals. If it cannot be measured it cannot be managed, and the current default approach of using the only available data – that on crashes, injuries and fatalities – is simply not adequate to address motorcycling as a transport mode. Similar comments have been made about the other important minority modes: cycling and pedestrian movements and travel.

The planning and provision of supporting measures to assist motorcycles and motorcyclists on the road system requires information and monitoring processes that are able to identify problems, changes and benefits. As there are few methods of monitoring usage and ownership, and even the most recent Exposure Survey carried out by VicRoads (as yet unreleased) excluded motorcycles, at least in part due to the issues encountered in the previous exposure survey (Arup Transportation Planning 1995) and its application to crash risk (Diamantopoulou, M et al. 1996), there needs to be a basic framework of data acquisition and integration into the planning and policy process (see Appendix A4).

We therefore conclude that there are several direction that could be followed by managers of the road systems in Victoria

1. A systematic review of locations on and off the designated road system to identify clear zones and obstacle risks that are important for motorcycle safety, but not necessarily for cars and other vehicles. This would be aimed to bridge inter-governmental levels of responsibility, coverage and skills, and to have an educational component.

2. Improved information bases for assessment, monitoring and understanding of motorcycles and motorcycle users, for traffic management aspects and capacity aspects, and relevant areas of vehicle usage and dynamics in mixed traffic streams. This would include modal choice, demand, driving cycle and other transport factors, to overcome the current heavy reliance on crash information to provide appropriate levels of service for this road user type. The UK Government and Transport for London program of research is now available on a range of motorcycle issues, after

several years of investigations led by the Government Advisory Group on Motorcycles.

3. Positive analysis and policy action on ITS measures to ensure that motorcycles gain from these quickly emerging opportunities to improve safety - and at the same time improve capacity, information capture and availability. This is a large and potentially valuable area which has a real and realisable potential to assist motorcycles in both transport and safety terms – but will be realised only if it is specifically pursued to ensure that the potential is realised. However this has emerged as priority area in the present report in agreement with the RACV ITS report (Regan, Oxley et al. 2000) that:

   "The issue of ITS and motorcycle safety is large one on its own which warrants further research. Australia is in a strong position to take leadership in this area."

4, Positive strategies to secure the full benefits for the road system of appropriate road space management for motorcycles. The exemption of motorcycles from tolls on toll roads and on bridges and tunnels is proving to a positive measure for both movement and safety of motorcycles in other countries, and is a positive feature of the present CityLink[29] policies. Assessment of the safety, capacity and travel benefits aspects of these measures are required to ensure that appropriate public policy is formalised in this area. This includes both public and private tolls, and access to different types of road space, lanes, parking etc.

4. The influence of both professional and social cultures on the treatment of motorcycles on the road system is evident. Assessment of the extent that this has slowed or reduced the capacity of organisations to create an effective and resources focus of knowledge and expertise may be worthwhile, but it would be more productive to look

[29] CityLink has a declared pricing policy for motorcycles, but does not apply it. However, research on eTags that can be reliably and safely attached to motorcycles is currently under way in NSW. This is not an easy problem to solve, and SAAB Combitech (whose equipment formed the basis of CityLinks' image processing systems) uses rear number plate recognition for this purpose. This is in accord with the approach used in London, where a policy decision has been taken to exempt motorcycles from the central area tolling charge.

for ways of building up the current knowledge and capability investments. There are no equivalents of the broadly based pedestrian, bicycle and public transport specialist groups in Road Authorities for motorcycles: solely crash and safety focussed expertise.

5. Such a reassessment of the critical mass of knowledge to be able to deal with this mode appropriately would assist in the appraisal of the increasingly varied range of powered two wheeler mobility modes, often with different user cultures and social perceptions. The most recent emergent examples are scooters and electrically powered two wheelers. The assessment of the age of access, types of mobility and other tradeoffs need to be reassessed and considered over a broader front than just safety exposure reductions, as these variants will continue to appear and the distortions already apparent in electric powered two wheelers due to inconsistent regulatory stances will grow.

6. A less obvious, but still important, area of potential action would be to determine and assess the key dimensions of social, and professional, cultures and attitudes that form the framework within which motorcycles are viewed, regulated and used. While this is a difficult task, the issues are understood (Raux 2000) and appropriate techniques have been tried and tested successfully by the University of BodenKultur in Vienna (Hoessinger, Sammer et al. 2003), and offer a novel and valuable way of advancing understanding of how the various cultural forces shape – or reshape - transport, planning, traffic and safety decisions. The perceptions of all parties, including politicians and professionals, are used as part of this active process. These factors influence regulatory stances, the criteria used for evaluations and decisions, and it would be beneficial (albeit very difficult) to make these more transparent in view of the impacts on utilisation and user populations that they affect

While these six selected points address what road managers may pursue to determine and influence the future demands and usage patterns, and safety of this transport task, the brief required a view on what is likely to be the future scenarios for motorcycle ownership and use in Victoria. This has been addressed through analysis of available data, and comparisons with

other jurisdictions to highlight what trends and factors may influence the levels of onroad use of motorcycles.

Several important factors that emerged:

- There are shifts in the type of motorcycle (scooters and cross-boundary personal mobility devices) which are increasing the fraction of female rider.
- Resources for better traffic engineering tuned to rider needs are emerging
- Regulatory structures have a substantial impact on utilisation
- The 'intrinsic enjoyment' factor in choosing to ride a motorcycle (often when other vehicles are available) is also important in countries other than Australia

An issue not addressed in detail in the body of the text is the rising sales of offroad motorcycles, which now exceed onroad sales. There is a limited crossover to onroad (in the current definition of 'public road') usage for many such vehicles, and if motorcycles designed primarily for offroad use are considered, then not only is the level of ownership in the community more than doubled, but the growth rate increases.

This is a second boundary crossing issue that will need to be addressed, and depending on how this is done, the motorcycle roles on the road system may be significantly larger than they are presently perceived.

This issue has recently been identified and clarified by VMAC, which has determined that this area in one where VMAC needs to become more aware and involved.

The road system and adjuncts can be improved to support safer riding in a number of ways. Those discussed include capacity management changes, better and more sensitive traffic engineering, and better planning by including motorcycles in transport panning frameworks (mode choice demand etc analyses and models)

The two crossover areas present real challenges. The bicycle boundary in regualtory and as well as design terms, and offroad usage and special land and regulatoryprovision.

13. Conclusions

Motorcycles are currently continuing to grow in number, but with a shift on road towards scooters. This is bringing in more females and utility riders.

Supporting the safe use of motorcycles on the road system will involve both tactical (minor works auditing) and strategic measures (inclusion in transport and traffic strategies).

Two major opportunities are emerging, ITS and better data for monitoring and assessing measures supporting motorcycle mobility and safety. The two are closely linked.

Any licensing or regulatory measures introduced will affect the levels of motorcycle use.

Measures recognising that most motorcyclists have the choice of a car when choosing to use a motorcycle will be the most successful, and this group appears likely to continue to grow.

Toll road exemptions may well be justified not only by minimal usage of road capacity, but also in terms of reduced community risk costs.

A lesson from other cities is that much higher levels of motorcycle use can be accommodated on the roads are they are.

There are substantial benefits to be gained from taking an overall transport approach to motorcycling, and working with the riders on this with safety fully integrated into the wider context of their choice and use of this mode.

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Appendix A1: Transcript of the computer-supported facilitation session

The focus of this consultation session was "Future Role of Motorcycling in Victoria". It was organised by Professor Marcus Wigan in consultation with Bob Ayton of Edu Tech Concepts Victoria. And was held at the premises of Professor Bill Russell in Carlton on Saturday afternoon, June 5, 2004. The following questions were asked and responded to by a collection of people involved in motorcycling across Victoria and whose profile is included in this report.

The seven focus questions were as follows

"*What sorts of futures do you see for motorcycling in Victoria*"

1. "Who will be riding what?"
2. "What kinds of people in what kinds of households?"
3. "Riding where?, for what purpose?... and when?"
4. "What are the current problems for motorcyclists/scooter riders?"
5. "What might be done about the perceived problems? (Assume that the regulatory regime remains unchanged.)"
6. "What changes in regulations would be valuable to motorcyclists?"
7. "What is your reaction to smart technologies?"

"A brief profile of participants:"

"Bob Ayton: I am a motorcyclist (40+ year's experience) and I facilitate discussion sessions like this. I am a retired Principal of a large Secondary college."

1. "xxxxx not a current motorcyclist, have a safety focus, here to get a better understanding from motorcyclist perspective"
2. "xxxxx. Rider for 45 years. Industry position for 35 years."
3. "xxxxx Ulysses. Active motorcyclist, ex motorcycle courier, 32 years experience from 90cc to 1200cc road motorcycles."
4. "xxxx researcher - Fireblade 202 954/vfr800f1 1997 rider. Have ridden scooters for about 100,000 miles and motorcycles more - over 40+ years"
5. "xxxxx mature age Motorcyclist, Ulyssian"

6. "xxxxx secretary of xxxxn Owners Club in Victoria, have been riding for over 30 years"
7. "My name is xxxxxx, age 35 years. I have been riding scooters since age 16 and am past president of the Scooter Club of Victoria. I currently part-own Scooterxxxxxx in xxxxxx."
8. "xxxxx, RoadSafe xxxxxx Road Safety Council, MRA and, Ulysses member."
9. "xxxxx- former school Principal - motorcycle commuting daily, touring, car driver as well have ridden from 50cc scooter to 1100 and all in between"
10. "xxxxx. 54. Photographer, insurance agent, courier rider for 5 years. Motorcyclist since 1967."
11. "xxxxxx motorcycle trainer, riding and racing for over 30 years, trail riding is my hobby"
12. "xxxxx Mraa Road Safety & Research Officer ATSB rep, VMAC rep, 40 years. Ride every day. XT600 preferred mode of transport, 1000,000kms+"

Question 1: "What sorts of futures do you see for motorcycling in Victoria"

1 "More commuting journeys necessitated by problems with traffic flows (inner city scooterists perspective)"

2 "For motorcycles continuing increasing volume in the recreational and agricultural areas. For scooters (50cc to125cc) one of the key methods of personal transportation."

3 "M/cycling should expand. Popularity because of economy, ease of use, getting around, parking. Social aspects enticing for some."

4 "Low power machines able to be ridden on car license, Power restrictions for beginners not just CC of bike/scooter, Some sort of concession for getting more people commuting on bikes/scooters,"

5 "Static or increased use of large capacity motorcycles on country roads, as a recreational activity."

6 "high use of scooters in traffic growing use of motorcycles for weekend recreation. Possible mode separation of vehicles types. Safety of motorcyclists an increasing issue."

7 "Anticipate continuing issues from road and other authorities, trying to stem motorcycle use... i.e. Vicroads does not encourage new riders"

8 "incremental growth in motorcycle use in courier industry"

9 "more scooters if oil prices keep going up, more restrictions riding off road for environmental reasons,"

10 "Expanded education of all road users with follow up training after initial license"

11 "The future for two wheel transport can only be positive as Governments struggle to provide road infrastructure to carry four wheel vehicles."

12 "three directions - large motorcycles - leisure, 2 medium small commuting some growth, 3 scooters strong urban growth 4. Expected steady rises in fuel prices likely to make motorcycles and scooted increase in demand and in potential value to"

13 "More small scooters. More off-road riding. Proper integration into the transport system. Better vehicle design to improve safety e.g. ABS. Less roadside hazards. Better training. A better understanding of motorcycling issues."

14 "Petrol price rises may force more folk into 2 wheeled transport - perhaps a resurgence in side cars"

15 "dramatic increase in two wheelers as a short range urban transport for commuting. This is expected to be primarily small capacity scooters."

16 "use of smart technologies to improve rider travel, conspicuity, safety, convenience. Changing perceptions of motorcycles by car drivers, good? bad?"

17 "Growth in off road motorcycle use likely to be constrained by regulation."

18 "Cheap form of transport. Decreased license age."

19 "Increase in use for general transport, to reduce traffic congestion, An increase in the leisure use on week ends particularly by older i.e. 40 and over."

20 "improved parking opportunities in CBD to encourage them into city"

21 "More cats"

22 "Desirable futures- better informed traffic and transport engineers- the road system may become less unforgiving for motorcycles"

23 "A return of the popularity of road//rail motorcycles."

24 "fewer dogs"

25 "Limited off-street parking /embargo bring placed upon it. Scope for specific designated lave provision; speed restrictions; restricted age/engine capacity"

26 "I have a concern that the current direction of Government Regulation is intended to remove motorcycles from the road completely"

27 "Registration issues will have to be addressed"

28 "Motorbikes & scooter will become more popular and numbers will increase in Victoria. There will cont. to be distinct types of bike due to requirements of use & market. Commuter, recreational, competition, touring. Commuter role to increase"

29 "I agree strongly with point 22 - engineering and planning should better consider and respect all road users in traffic management/roads design and maintenance"

30 "better integration between authorities responsible for road maintenance as well as road building"

31 "Broad concerns over road surface issues- plates-bridge separators-poles, guard rail/ropes-maintenance of surface-intersection friction-paint use/friction"

32 "Issues of safety for motorcyclists need to be looked at by road designers and maintainers i.e. steel plates to cover up road works overnight, white lines no traction, traffic lights which do not register small bikes etc."

33 "VicRoads does have engineering guidelines for M/C including most of the issues raised in this forum. It is a matter of having a system in place that makes sure these issues are thoroughly adhered to. In the forefront of design."

34 "Road maintenance needs to consider motorcycles - gravel on bitumen, oil buildup, 'scoring' etc."

35 "Road engineering: Our planners need to be responsive to feedback from all road using communities - from motorcycles to large articulated trucks."

36 "roads cleared of hazards more regularly - oil, general road debris particularly after strong wind or rain"

37 "smart technologies noted-need to expand on how Motorcyclists see them and what they might be requested to do"

38 "improved technology required in road design and engineering methodology"

39 "Engineering: Vic Roads will address engineering issues over time and become more pro-active and inclusive. If it fails to do so it will be defending litigation as people are killed in preventable accidents. I believe better engineering is"

40 "Engineering of road appear to be for THE safety of road users but seem to create a culture of protecting car drivers so they don't look for anytime else."

41 "There is a culture in road engineering & maintenance that neglects minority road user groups. This is dangerous."

42 "There is a perception that all road planners plan from a motorcar perspective. The needs to be seen to be untrue."

43 "reinforced-the lack of training in m/c perspective in road design and road furniture. Is this a Standards issue?"

44 "motorcyclists should speak up more about the road issues that affect them ... ring the VicRoads line!!!!"

45 "also cost effective. It's cheaper to put in a clear zone than to put in a barrier. It's cheaper to put a barrier further off the road rather than closer because it needs less repairs"

46 "Delegation of authority is likely to become an issue at some time in the future."

Question 2: "Who will be riding what?"

1 "15 year old riding 50cc scooters- a positive step to introduce young people to the traffic system before they get into the booze and drugs."

2 "Older riders: large capacity road bikes. High percentage of 'cruisers'"

3 "younger riders able to get license. Perhaps a reduction in older riders taking up riding in their dotage. I.e. more people licensed from an early age and continuing"

4 "City based people on scooters acknowledging their zip and zapability around traffic gridlock"

5 "Metropolitan road users will increasingly look to scoters and small capacity motorcycles as they are easier to handle and less threatening to newer riders especially those who would not traditionally have considered 2 wheels."

6 "25-30s - more sports bikes"

7 "broad demographic of working people riding scooters. Touring cycles more popular for older weekend riders, continuing use of off-road bikes for country/farm areas"

8 "Some riding anything will be beyond their brain capacity to deal with sensibly"

9 "Increased time on our hands may increase use of motorcycles/scooters as a recreational activity"

10 "As Australia's population continues to age - more older riders on motorcycles and scooters."

11 "Old men riding huge cruisers...young women Urban riders trend to medium scooters or motorcycle/scooter hybrids. More customizable bikes that fit women (examples are already appearing). Sports bikes will top out (in every sense) convergence"

12 "the way VicRoads is going you won't get a licence until you are 25, I think that motorcycles will still available in many types as the market will demand it."

13 "Light, automatic, fuel efficient, cheap, simple, low maintenance. Inner city commuters, local commuting, second vehicle for short trips e.g. to the railway. Younger riders rather than older?"

14 "inner city residents: scooters and small capacity commuter bikes"

15 "lower priced machines to encourage greater use of this mode of transport"

16 "Older folk reliving younger days ... revisiting the older bikes ... more classics on road (todays bikes??)"

17 "greater cross section of society able to and actually riding"

18 "As scooters and small bikes become increasingly looked upon as an appliance to get you from A to B, cheap Chinese etc. machines will take increasing market share in this sector."

19 "Acceptance that off road riding skills are useful in introducing young people to the 'mechanical aspects' of two wheel riding - road skills and hazard perception to follow."

20 "Motorcycles as a fashion statement. Motorcycles as an extension of personality or to make a statement e.g. Harley"

21 "CONTINUE sports bikes will top out- convergence to a mid range, tourer and naked bike variants. Small machine like to grow in base size to 125-250cc(if allowed by regulation) size (500-650cc0 light and with sport"

22 "people getting onto bike/scooter in their old age will need training"

23 "possibly more scooter or small motorcycle because of space and fuel"

24 "Motorcycle outfits could become popular, scooters also increase in popularity- automatic motorcycles could also be an innovative form of transport"

25 "18 year olds; Small racer clones (CBR25o etc)"

26 "CONTINUE with sport tourer and naked bike variants."

27 "Women will speak up more about fitting better suited to build/ smaller hands, petite feet etc ... some controls are a stretch for us etc,"

28 "baby boomers will have come and gone therefore less old folk starting out"

29 "these changes will occur gradually"

30 "I would like to see a LAM scheme as in NSW, ACT etc."

31 "Commuters on small motorbikes and more scooters. Tourers/ists will ride more medium to large capacity machines fewer road reg. super sport M/Cs as enforcement increaces. More mid range multi purpose bikes in suburbs."

32 "The road recreation rider will be the same group and therefore get older the off road rider will be as now be younger group. The commuter rider will /may increase if full price"

33 "Steady growth of orbital engines (zero emissions) boosted by consumption pollutant emission and noise controls. Electric bicycles will w-->>25-400-500+(already happening with pressure to raise the 200watts.."

34 "50cc scoots on a car license are what is needed to make this boom"

35 "lower capacity with more output"

36 "30cc micro mobility?"

37 "Industry future volumes are dependent on two key areas - access to off road riding and licensing. If both areas `are positive growth of 10% per annum is possible."

38 "Growth in Scooter sales will very much depend on attitudes of law makers to urban transport. Adoption of streamlined avenues to road usage for scooters and small capacity bikes is the only way for large growth in this sector."

39 "Many bicycle and motorcycle issues merge?"

Question 3: "What kinds of people in what kinds of households?"

1 "Inner city living will increase and therefore the demand for personal mobility will increase = scooters."

2 "Many people in all types of households- more affordable transport mode"

3 "Young people starting out ... good for zipping around locally"

4 "increasingly middle class urbanites will turn to scooters and small bikes as traffic and parking continue to grow as problems. This will start inner city and fan outwards in a flow on effect."

5 "Scooters: urban dwellers - equal numbers of males and females."

6 "depending on laws and regulations I still think that there will be a mixed range as there is now"

7 "people in households in the outer with limited or no public transport ... single households"

8 "Anything but scooters: predominantly male riders"

9 "the lines between male vs female will blur as everyone considers 2 wheels due to traffic etc problems."

10 "Governments will spend more on "park and ride" centres - common sense and economics (fuel price up) will result in low powered / other two wheel transport being used to get to the park and ride centres."

11 "Larger capacity bikes being ridden by people commuting from the country - increase in ag bikes of small capacity in rural areas - for commuting and recreation"

12 "older people facing retirement, thinking of the future relaxed and social aspects of retirement"

13 "The demand for aged transport will press for more mobility hybrids (walking, so loved by lobbyists) just isn't an option for rising fraction of the older old.."

14 "Low income, high density housing with no parking spaces, inner urban & local suburban commuters. People commuting to the railway station? Mostly younger... but have a certain retro appeal to the older scooter savvy citizen."

15 "probably a culture of 'like father, like son, grandfather'"

16 "students: 250cc bikes of any style"

17 "MC is and will most be in the future for people without young families. Transporting children will remain for vehicles with the capability to protect children. So 20s and 40 plus age groups. Larger participation by female but mostly male."

18 "Pressure on land / space / support infrastructure will result in more people per dwelling and car use impossible = two wheel mobility."

19 "More light tricycles for older road users?"

20 "Yuppies - extreme sports bikes as weekend toys only"

21 "The larger touring bike etc will be the preserve of older male rides in general. The small commuter /scooter/moped would be for younger group of both gender."

22 "broader usage of M/Cs/scooters as machines and gear become more user friendly. More mature age riders of both sexes/. Autos up to 125cc on a car licence and lower licence age will inc. use by teens. Inc traffic = inc road mcs/scooters."

Question 4: "Riding where? for what purpose?... and when?"

1 "increase in commuting - particularly lower capacity machines"

2 "Road congestion will increase and therefore two wheel mobility will increase to and from work in metro areas."

3 "Everywhere, for fun & profit, all the time."

4 "Riding to commute; work, play, socialise. All days of the week"

5 "Off-road experience likely to be frustrated by regulation-but the demand will be there. Pressure for offroad facilities/access "

6 "continued fair weather riding"

7 "Commuting or rather travel to work in a portmanteau career mode will provide the necessary mobility out of transit hours"

8 "country roads, for recreation, on weekends."

9 "Ride locally. Ride on the weekend. Ride when sunny. Riding to work? Riding to the station? /riding for enjoyment."

10 "there may be more commuting in the future, but at the moment most people only ride for fun or pleasure"

11 "Motorcycle popularity will increase with older riders who will mostly ride in the country at weekends. Sports riders will also continue to ride mostly weekends."

12 "tourist road riding by large machines will grow-and be countered by enforcement"

13 "Metropolitan journeys will be increasing undertaken on smaller bikes, to and from work, running errands, visiting friends. Rec riding of larger capacity bikes including track days etc. and off road bikes."

14 "Riding to reduce costs."

15 "scooter design and ease of use will have more people shopping rather than taking the car"

16 "urban streets, commuting to work, weekdays"

17 "Probably limitations only with weather considerations ... see less riders in wet"

18 "Motorcycles as a second vehicle is already the case- this will expand to multiple m/c"

19 "Daily commuting/touring interstate Weekend club rides riding to local shopping centre"

20 "Touring will become more popular with longer distances being undertaken."

21 "Smart technology"

Question 5: "What are the current problems for motorcyclists/scooter riders?"

1 "perception of policing agencies"

2 "Training... we want better training but we can't agree on what should be in it."

3 "Lack of knowledge in traffic transport and operational management engineering--"

4 "Aggressive attitude by 'majority' road users (CARS)"

5 "lack of general road user appreciation of the vulnerability of 2 wheeled vehicle users"

6 "low friction road markings (white paint)"

7 "Needs to be specifically permitted to traffic filter (excellent safety record seems to be being ignored) and even police rely upon this---"

8 "MC should be very concerned about mobile phone use and in car offices. They distract attention away from anything that is not obvious i.e. vulnerable road users."

9 "Mobile phones & other in-car distractions Road side hazards. Lack of parking in carparks. Motorcycle theft and non-recovery is 1900% higher than for cars."

10 "Public perception of riders is bad and is not helped but industry focus away from commuting and exclusively toward sports and leisure sectors of the market. Lack of rider training for car drivers!"

11 "SUVs block out the light, view, forward view etc- a real problem (of course not just for m/c)"

12 "authorities responsible for road upkeep appear not to take notice of surfaces hazards for bikes"

13 "lack of uniformity in rider training in Australia. Insufficient scientific analysis of two wheel deaths and injury to determine corrective action"

14 "road users not acknowledging other road users ...being selfish, being cocooned, being impatient, being arrogant"

15 "Cars denying that they are part of the motorcycle safety solution. Failure of sensors to work."

16 "metal strips in the road (expansion joints)"

17 "hostile governments"

18 "people who have had a license for x years believing they can get back on a high capacity bike and ride safely"

19 "Lack of Liability insurance to allow deployment of better training for younger, female, scooter and other minority groups"

20 "hostile public perception"

21 "Lack of communication with other vehicles (you are about to hit me!) see smart technologies"

22 "authorities hell bent on getting frontal identification"

23 "Some riders behaviour is assumed to extrapolate to all other riders ... speeding, lack of protective clothing, breaking laws, etc ... one rider's behaviour can make the rest of us look bad too"

24 "Registration fees on multiple vehicles makes it impossible to register all vehicles... increasing perceived criminal behaviours. Risk takers from car community ride bikes without a license and add to our road stats."

25 "Entry barriers into riding are too high - costs are too high, obtaining a license for an entry level vehicle is too onerous. It should be easier to get on a sub 125cc auto low HP vehicle as in EU."

26 "vehicles, weather conditions, road conditions, bad motorcycle/scooter riders"

27 "lack of understanding and research on the characteristics of good riders--far too many New behind the Wheel theorists without data to back them up"

28 "Licensing is totally inappropriate for two wheel travel. Young people need to gain experience at a lower age."

29 "conveying their message to authorities and understanding what the authorities are actually doing."

30 "Poor interventions identified at both national & state level to improve m/c safety. No funding for motorcycle safety initiatives."

31 "too much reliance by authorities on window dressing solutions that don't work (E.G. lights on)"

32 "Shaky research results"

33 "250cc law for people just off L. - current 25 machines able to go much faster than previous bikes"

34 "Poor training of drivers. Road conditions, infrastructure. Car drivers consider that m/c are all rat bags and are always at fault.. Motorcyclists who ignore road rules and contribute to this perception."

35 "Car drivers as road hazards. Road design & maintenance. Regulation needs review e.g. licensing, passing on left. Tax/cost of riding punitive. Justice system biased against riders."

36 "Lack of awareness by motorists of motorcyclists motorists lack of concentration of what is currently happening around them safety issues re weather/road conditions"

37 "Hard to get licensed"

38 "Roadsides that kill"

Question 6: "What might be done about the perceived problems? (Assume that the regulatory regime remains unchanged.)"

1 "road surfaces would be improved with greater training of road designers and builders"

2 "Bringing in laws to allow easier access to riding will lead to more people riding and therefore to greater awareness by the general public of riders and riders needs."

3 "user representation (from all user communities: cars, bikes, trucks) on road design"

4 "removal of all wire rope barriers"

5 "With 50cc scooter use on a car license - total analysis of the Queensland, Western Australian experience to form opinion of any risks involved."

6 "Lobby to Victorian Government to change."

7 "if motorcycle problems get to hard to sort out how easy would it be to remove them from the road system."

8 "We need some credible Centre of knowledge and communication that takes a holistic, scientific, and professional approach to vulnerable road user issues so that there is a credible and respected source of sound information and well founded vie"

9 "Bus lane access, possible bicycle lane access to small 2 wheelers would decrease journey times and encourage 2 wheel use"

10 "Allow low capacity vehicles to be ridden on a car license and possibly having a practical component of driver training undertaken on bikes - i.e. in order to get car license one must have to ride competently"

11 "Involve motorcyclists in all research. Consult with motorcyclists. Fund motorcycle safety initiatives. Work towards a national m/c safety agenda. Provide more information on motorcycle issues particularly from TAC & hospital systems."

12 "everyone should keep in mind that this forum was arranged as part of a VicRoads project to get ideas on how to cater for MC yet there is constant messages that authorities are not listening- perception V reality!"

13 "Allow bikes to use additional lanes on freeways - BUT cleaning these lanes"

14 "The limited TAC advertising campaigns are rarely followed up or evaluated credible-and often run so rarely that their cumulative impact is low"

15 "license re-testing for all road users over 22"

16 "All players understanding that different perspectives should be acknowledged ... all have something to offer"

17 "Continue to push for easy mobility within inner city areas as cars find it more difficult to move in city areas."

18 "Improved signaling at intersections resurfacing of problem roadways more awareness of other road users towards motorcyclists"

19 "More info needed on unlicensed riders, theft, and off-road riders. Of road riders need to be bought into the system better. They fail to be represented by anyone but make up around 2/3 of motorcycles out in the community."

20 "Problems of bias/"antagonism against powered 2-wheelers will conti9nue to be systemic unless the recommendations of the 1992/'93 Vic MC Safety Inquiry are taken seriously. The culture of bias towards private cars is negative to trans - con"

21 "Ensure that all road users have a better understanding of the plus and minuses of motorcycles - we hear only about the negative, and attitudes are negative and ill-informed as a result"

22 "The clearances for motorcycles and also bicycles are NOT in compliance with the requirements of a 'leaning' machine- implementation is limited to vertical (car) design"

23 "Get motorcycling in to the media on a positive theme. Licence renewals every three years WITH a written test (multi choice)."

24 "lack of well developed and tested m/c oriented Road safety Audit procedures, checklists and subsequent validations..."

25 "Provide more/better m/c guidelines for people to follow. This is a funding and representation issue."

26 "Have clear strategies and use motorcyclists to create those strategies."

27 "road surface friction levels at critical areas are still not systematically measured and corrected- this matters more to m/c than to cars--"

28 "More acknowledgement that two wheel transport has many benefits - parking - less road maintenance - less fossil fuel use."

29 "Transport & safety needs of OZ cities."

Question 7: "What changes in regulations would be valuable to motorcyclists?"

1 "Ban car drivers"

2 "re-enable lane splitting"

3 "50cc scooters on a car license"

4 "250 cc law"

5 "introduce a LAM scheme as in NSW, ACT etc."

6 "Recognise filtering as a safety benefit which benefits traffic flow."

7 "Introduction of an EU style 125cc Auto law to encourage motorcycles. Lower the riding age or raise the driving age to encourage riding."

8 "Filtering in certain circumstances"

9 "Performance based Standards for licensing- and reconsideration of the ages once this has been done, based on the subsequent safety record"

10 "Permit use of m/c in bus lanes"

11 "Lower age license to young riders on 50cc scooters. Car license qualifies to ride a 50cc scooter."

12 "TAC $ - what is it used for and how do we use it to our advantage??"

13 "Make riding a motorcycle compulsory before you are allowed to drive a car!"

14 "Learner approved motorcycles"

15 "Scooters (50cc to 125cc) can use bike lanes."

16 "speed limit for motorcycles should be some kph higher than posted."

17 "Changes in road responsibility so that bad design in furniture and Standards for installations become sue-able issues if a motorcyclist gets hurt or killed"

18 "ability of riders and other drivers to dob in people who are driving and using mobile phones etc"

19 "Registration of multiple small vehicles with one payment."

20 "Unambiguous license plate readability/obscuring rules-backed by verifiable and contestable specifications and procedures"

21 "Limited access to lanes available to other traffic in bad conditions"

22 "Improved display of registration label."

23 "Changes in road design, road furniture to lessen danger for two wheelers."

24 "enforcement of bicycle lanes and making push bike riders use these rather than the whole of the ******* road"

25 "Clarity in filtering so that it becomes unambiguously a 'reasonable' behavior - test rather than simply banned or approved"

26 "Vehicles that run over motorcycles / scooters = loss of license for life!"

27 "more coppers in road surveillance"

28 "Removal of TAC levy which is discriminatory realistic registration/insurance charges intro of user -friendly roadways"

29 "Lower the licence age and change requirements. Scrap 250cc restriction, intro LAMS. Remove o/taking on left law & facilitate lane splitting. Enforce laws re drivers especially phones. Get rid of tinted private car windows."

30 "When fatalities occur if driver is at fault license should be lost, driver should be retrained and re-tested before being allowed back on the road."

31 "Higher speed limits on certain freeways."

32 "Extend foot path parking - common sense approach."

33 "Road use regulations that have a greater degree of credibility to the users- far more effort to bring the users along with regulations, serious efforts to demonstrate its not just prejudice or revenue"

34 "The licensing ages are now lined up with dr5inking age- we need to address this"

35 "Get ride of cars - bloody nuisance!"

36 "So teach them to lane split?"

37 "Acceptance of LAMS in Victoria. Motorcyclists be allowed to travel between vehicles on certain roads."

39 "TAC/Vicroads fees reduced to encourage environmentally friendly vehicles. Justice system bias against riders. Tougher penalties for private car drivers."

Additional Question arising from responses:

'Comment on the notion "Smart technology"'

1 "proximity control: will not work on m'cycles"

2 "Technology that prevents 'rear end' contact - allows 'space' between vehicles."

3 "Technology that warns of adverse road conditions - ice / fog / diesel."

4 "traffic light controls based on in-road detectors: currently do not detect motorcycles!"

5 "accurate speedo - transport control better coordinated"

6 "Cruise control, anti theft, GpS, engine management systems improve, black box, abs, smarter magnetic sensors at intersections. Anti-theft marking. Safety lockout?"

7 "Smart technology is a good idea for advancing safety but a major concern for individual freedoms etc. Are we prepared to give up our personalities and freedom for the sake of safety including our own?"

8 "Proximity alarms in cars/trucks to help motorcycles"

9 "bicycles carrying proximity warnings and directional warning to ensure one can miss them.."

10 "Let's not forget that manufacturers are working on smart technology for motorcycles - many forms tested but installed because the 'buyer' does not see value in the cost of this technology."

11 "headway control- make sure M/C are acted-for positively"

12 "security for vehicles - linked to GPS and phone network - allows tracking of stolen vehicles and recovery"

13 "Navigation systems. Proximity system. Hazard warning systems. Training... using virtual reality with various levels of fidelity."

14 "The danger in high-tech/intelligent systems is that it displaces priorities for user skill levels and operator responsibilities. Safety/transport/justice priorities are out of balance in OZ road authorities."

15 "more on #10 - government off set in fees to accommodate more technically advanced vehicles"

16 "road space management- use tolling, tracking etc technology for better time/space access to road space"

17 "ITS and technology is fundamentally good but needs to be designed with the human interaction in mind. It should not be market driven as it currently is with car vehicles. These are very important for MC because they might distract attention"

18 "Awareness of other vehicles in close proximity identifying another vehicle approaching from an opposite direction tour/ other users road-sense"

19 "Information to all people. Tracking and billing systems."

20 "Head up displays for motorcycles will help traffic awareness (currently speedos are not in field of view at all in many cases)"

21 "the riding experience i.e. wind in the face g force thrill of cornering should be maintained within a smart technology"

22 "Smart technologies can used for collision notification, i.e. to alert vehicle proximity and alert. Active and positive interactions by traffic control systems"

23 "More enforcement = more scooters!"

23 "Speed advisory systems would be very helpful for motorcycles--in fact if speed detectors with lcd displays were on every freeway bridge that would help too--speed feedback helps in local roads now"

Appendix A2: Post Consultation feedback follow up

This document was used as a prompt sheet for a Computer Aided Consultation Process[30] on 5 June 2004, but the prompting notes form a helpful framework for those who wish to contribute, but were not able to attend. As a result of feedback, one of the points made verbally are now included here: namely, if we consider the resource flows along a road, then they are made up of vehicle operating costs, time costs, police and administration costs, road construction and maintenance costs, and the consequences of safety failures- namely crashes.

(Wigan 1982)found that these crash costs were approximately 10% of the overall road resource utilisation, and the other 90% was the transport, traffic and management resource flow. Subsequent calculations have not given significantly different results.

The present consultation focuses on this 90%, not to the exclusion of the 10% or so of safety costs, but to get a better balance between the two broad areas. Consequently comments on traffic and transport issues are more valuable than those on safety, as there are far fewer opportunities to contribute for the former, but please don't hesitate to include your safety related issues as well.

Your further input is warmly welcomed

Marcus Wigan
http://go/to/mwigan

Introduction – this is a research project, not for any targeted purpose other than a better understanding of the present and possible future role/s of motorcycles and scooters in/on the Victorian Road system

[30] The results of the computer aided discussion using the Zing system, and facilitated by Bob Ayton of Edu Tech Concepts in Melbourne (bobayton@net2000.com.au), will form part of the published research project report when this has been received by VicRoads and subsequently been formally approved for publication.

The notes and ideas posed here have been written by the consultant simply to initiate discussion, and does not form part of any program or intent on the part of VicRoads)

• What sorts of futures do you see for motorcycling in Victoria? Who will be riding what? What kinds of people in what kinds of households? And riding where for what purpose/s/ and when? What are the current problems for motorcyclists? What might be done about it?

Prompts:

- assume (initially) that the regulatory regime remains as it is now
- if they were to change, what changes would be valuable from a motorcyclist perspective?

Prompts to tease out more views after general debate

What are examples of these?

- traffic engineering options, intelligent transport systems, more active consultation with riders, employment of expert motorcycle/scooterist within VicRoads (equivalent to bicycle manager), informed support for Councils, local subdevelopment criteria, parking regulations and provision, road line of sight, provision for slip lanes on tollways perhaps, better information for motorcyclists, better training of traffic engineers and planners, and different treatments of runoff road areas are immediate thoughts- others please?

Transport: the overall view of motorcycles as part of the transport system is not well informed professionally as the tools and data and training are either totally missing or extremely scarce, and is in most cases is generally neutral to negative: but what roles can you see them playing in future? Motorcycles include scooters and mopeds in this definition as well as on/off road and recreational registration machines

Safety and Technology (safety-ITS), road treatments, signage, alignment guidelines, active speed warning systems, handling of the warnings of motorcycle proximity by ITS in other vehicles as well as motorcycles, active information on speed environment, more external

feedback on speeds of travel to allow speedometer corrections and allow more time for the motorcyclist to watch out for traffic head up displays, active alerts in other vehicles when a motorcyclist sees they are not responding, crash dynamics recorders on the motorcycle, road surface warnings (frost/wet, on vehicle warning of poor conditions immediately ahead), active cats eyes with transponders for road surface info, memory of vehicle coming the other way? Live messages of warnings of blind corners or hazards ahead? Vehicle active ID for guidance (and enforcement and tolling), special training? for whom?

Infrastructure: have we the appropriate road structure and furniture standards and maintenance processes for motorcycles and scooters?

Now let us remove the current regulatory constraints:

First licensing age: what changes? why?

Consider differential access to different types of machines (examples include 'Lam'-Learner friendly motorcycles)

Specialised training for scooters/mopeds, young riders? (would probably need Personal and professional Liability and Indemnity support)

Changes in insurance from vehicle to PERSON (allowing wider use of one persons owned vehicles without the incentive to use all those registered…

Then different ways of accessing road space, advanced stoplines, lane access (bus, transit, cycle, emergency) under what conditions>

Now change the transport environment

- smart cards potentially allow parking/public transport usage and tolling in one card making things easier for mixed modes- what would this do for motorcyclists?

General discussion of things that would help m/c on the road systems
(NB include off road/recreational registration areas)

Session feedback form:
Please use the back of these sheets if you wish, all feedback is welcomed

Freely copy this form if you would like to pass copies to others for their input

(email to oxsys@optusnet.com.au, or mail to Oxford Systematics)

Comments on the computer aided discussion process

- how useful was it?
- How could it be improved?

Comment on the issues raised:

- Please comment on the items that were raised that you had NOT thought of before
-

Comments that you now want to add on any aspect of the project

Please add here contact details of those you would like us to email this feedback form to

----*snip*----

Thank you for your contribution, all contributions will be acknowledged in the final report, and we expect to be able to supply electronic copies to all respondents, subject to VicRoads agreement after the report has been submitted.

Appendix A3 Post Consultation Feedback Comments Received

Comment 1

I think most of what I have to say has been covered in the replies received already.[Appendix A1]

Some very valid points, and some not so!

In a nutshell:

Question 1: I see more small "cc" machines being sold for commuting. With rising petrol prices congestion, parking problems etc. I think people will start to see benefits from being on two wheels. Of course, greater increases will be made if license laws changed.

Question 2: Lots of scooters being ridden by commuters. And they may become a handy accessory for many households – nip to the shops on the scooter not in the 4x4. All the rest – much the same.

Question 3: Young people mainly, then an increase in olders too, based on scooters.

Question 4: Daily commute. Also probably increase in leisure riding on & off road.

Question 5: Parking – I'm not telling about pavements but organised on street parking. No secure parking – what about ground anchors to attach your bike to. Aggressive, irresponsible, dangerous car drivers.

Question 6: Organised parking made available with ground anchor's & protection from cars reversing over bikes (i.e. posts etc.) Not sure about aggressive etc car drivers? How do you tackle that? More traffic police? Cameras?

Question 7: Not sure what regulations are really regarding filtering, but I do it all the time – its' a must. So if it is legal – good! If not, then make it legal. Like the idea of access to bus lanes – works in London (I think). Change regulations regarding scooter so in line with QLD.

Comment 2

Quite a variety of view within the comments.[Appendix A1]

Future of M/C's needs to overcome a number of regulatory hurdles to be successful & achieve additional growth.

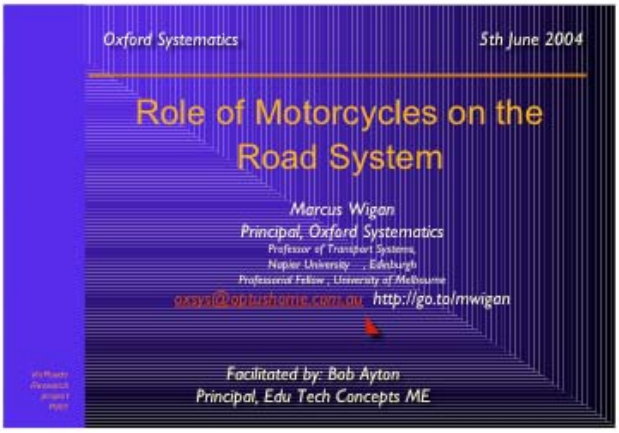
I.e. Licensing issues, rego fees (incl. $50/MC – discriminatory against M/C's) off road access, recreational riding areas

(The vocal minority can sometimes not help the overall cause!)

- Scooter & small cc M/C's are the growth sector. Urban living with restrictive access to parking will help this market. (i.e. scooter can fit in a lift, parking in your apartment!)
- Safety issues are very important. The vulnerable nature of injury to a motorcyclist discourages their use (ask any mother if their child can ride!)
- The provision of use of bike & bus lanes would assist in creating a "safer" zone.
- The more numbers of M/C's in traffic would also have a sublime impact on drivers; they will tend to make more notice of riders.
- Driver education should include areas of M/C awareness, (check blind spots etc; be aware they are smaller & can fit into a gap which a car cannot)
- Perhaps all drivers should ride for 3 months before getting car license? 50cc scooter on car license would be helpful.
- Lowering age to ride scooters would help people's awareness before they drive, they would have had valuable experience.

- Improving driver awareness would possibly address comment of aggressive drivers. Perhaps the rider was contributing by being in blind spot?
- Improved dedicated parking for M/C's in city areas would encourage use of M/C's too. Common sense must prevail however for footpath parking. Commercial businesses do not help current image & public perception in this area.

Appendix A4. Introduction to the consultation session



Appendix A5: Consultation with rider trainers

As it was known from previous work in this general field that general requests for comment and input were not easily handled or responded to, unless they referred to imminent concrete issues it would require personal and direct interaction to secure responses from the positive opportunity that the present report represents. While broad notifications to the motorcycle press and email lists, plus personal phone calls and emails were if course implemented, two other strategies were adopted to ensure broad inputs were secured.

The computer enabled consultation summarised in the earlier appendices was one of the focuses direct interaction strategies known to be effective in such cases.

The second thrust was to commission Motorcycle Safety Services P/L to undertake direct personal consultation with individuals involved in rider training, as a key area where issues arise and informed views developed. Motorcycle trainers also tend to be active members of clubs and other association of motorcyclists, and, while having a special interest in their professional area, come into contact with many views across a broad range from novice to returning experienced rider on a continuing basis.

The feedback and quotations secured are included here. An interesting, if discouraging, aspect of this consultation to ascertain what positive measures or steps could form part of a future role of motorcycles on the road system was an expressed wish not to have their names or contributions publicly associated with their contributions, or a desire to make all comments anonymously.

This cautious response is broadly consistent with the marked levels of reserve evident amongst most of the parties sought out for consultation input and responses, and may reflect the negative aspect with which government interventions (essentially in the safety subset of motorcycle issues) have been regarded in the past.

As in the end user consultations, it is clear that the roles of motorcycles on the road system is perceived very much form within the current context.

A5.1 Summary of interviews with rider trainers (by Motorcycle Safety Services P/L)

These summary points came from twelve responses from staff working at four training providers, namely HART, Stay Upright, Motorcycle Training Academy, DECA and Motorcycle Motion

Three of these have affiliations with a manufacturer, and six are members of the following clubs; Ulysses, Honda Riders club, BMW owners club, Hartwell, and Yamaha tribe

Q. What are the current problems that you can see for riders?

Returning riders and unriders, especially riders on sportsbikes with no licence.

ATVs are an increasing problem that needs to be addressed.

The main problem is stereotyping the riders.

The companies provide the equipment but not the place to use it. I.E. fast track based bikes -public roads, ATVs etc.

Need more dealer /company involvement in ride days, scooter courses(of a safer kind on track) and looking at the issue (of safety and training)from a fresh perspective.

Many riders have a lack of currency with riding experience, especially older riders and returning riders who regain a licence but only use it seasonally or irregularly.

There is a lack of encouragement on the part of the regulatory and road safety bodies for riders whose skills have declined to increase skill levels before returning to the road.

Many riders believe that are a "special case" and do not need to regain skills because they believe that they are either already sufficiently skilled or they are more careful than others and will not need to use emergency skills.

Lobby groups promote a "poor old us" mind set that is divorced from reality. Riders need to accept that they often contribute to crashes and examine their own performance.

There is an over emphasis on the un-rider problem. With more accurate statistics it may be that the problem is smaller than it is believed to be.

Other states have a bigger un-rider problem than Victoria.

Road conditions are still very poor. Despite considerable work it's only the tip of the iceberg.

There are too many roadside hazards that present a problem for riders.

Car drivers have no respect for riders and no understanding of the problems faced by riders.

It's too easy to get a car licence. New drivers should undertake training that includes information of motorcycling and trucks.

Police and government take the easy option and blame speed for crashes instead of looking for the real problems even if they don't suit the politicians and safetycrats.

Returning riders are often arrogant/over confident because they think that they have lots of experience as car drivers.

Returning riders don't understand their motorcycles and don't take the time to properly get to know the machine before pushing it.

Riders don't take responsibility for their actions.

Current lobby groups don't represent the mainstream of riders – they represent a few vocal radicals.
Some novice riders don't take training seriously and see it as a hassle that they have to put up with in order to get a licence or permit.

Q. What could be done about the perceived problems- assuming regulatory regime remains the same

Introduce worthwhile incentives to encourage riders to undertake training regularly.

Forcing riders to remain current with skills would be politically unpopular and the government lacks the political strength and will to address the problem.

There should be requirement that all drivers and riders should undertake retraining after a long period of absence: Six months or over.

There is a need for a new lobby group that is supported by the industry to from that represents real riders rather than the same old faces.

Riders need a professional lobby group that represents the way they feel about the way they're being treated.

There needs to be a review of the way statistics are collected so we can get an accurate picture of our problems.

There should be a national uniform licensing system.

TAC should fund a promotion at the start of the riding season that shows an older rider going for the first ride and crashing through a lack of skills. Maybe a catch phrase "are you really up to it?" then promote training refreshers.

Audit roadside hazards and identify those replaced or damaged through crashes. Find out how often they've been crash involved. Build a picture of where the danger spots are.

Sponsor through the $50 levy at least 6 free refresher courses at the start of the season throughout the state. Maybe rider training organizations could donate one day each or work together.
Cops should penalise bad driving habits not come down so heavy on being a few K's over the limit.

Penalise stupidity. Encourage people to improve their driving habits rather than blindly sticking to an arbitrary speed limit.

Three strikes and you are out for repeat mobile phone offenders.

Make the driving test more stringent and test drivers for attitude before issuing. Those who fail should have to undergo shock tactic education in hospitals.

Three strikes and your out for repeat mobile phone offenders. Cancel licence.

Phone companies should blacklist repeat driving offenders so they cannot have a phone.

Q. What could regulatory changes do to aid rider safety?

Make 90cc scooters available at 16, but Learners only at 18. Not allowed on freeways etc.

Make safety gear compulsory (full skin coverage at least)

There should be a separate scooter licence for 50cc scooters that are speed limited and time limited. No riding between the hours of 10pm and 6am.

Car licence holders should be allowed to ride 50cc scooters without training or testing.

Scooter licence should be issued to 15 year olds who undertake training and testing. 50cc and time limited.

Introduce three year .00 BAC for all new licences regardless of whether P periods have been completed.
Introduce .00 BAC for all road users.

Introduce a graduated licensing system like the one used in countries like the UK.

Introduce Learner Approved Motorcycles ('LAM's as in NSW).

Industry should be trusted with the responsibility for selecting LAMS. Power to weight system is badly flawed as it allows high powered enduro and off road type motorcycles to qualify as LAMs.

Drop motorcycle licence age to 16 with access to LAMs up until the age of 18.

Drop Learner Permit age to 16. Then licence at 18.

All drivers and riders should be re-assessed at the age of 65 and yearly thereafter.

Reintroduce an on-road test.

Permit riders to lane split legally

Permit riders to use bus lanes, cycle lanes and emergency lanes in heavy traffic during peak hours.

Make road repair contractors liable for crashes caused by poor repairs or bad clean ups.

Introduce give way when turning left at a red light rule as in California.

Q. What could smart technology do for motorcycle safety?

Smart technology will lead to complacency in drivers and riders and ultimately worse drivers.

An electronic Hazard Perception test should be developed for riders.

"Speed limiters would introduce the process where the driver/rider feels they are not responsible."

Speed limiters will prevent the opportunity to overtake safely.

Following distance warning devices are a good thing.

BAC interlocks are a good thing and should be fitted to both motorcycles and cars for drink drivers/riders.

Drivers with a history of dangerous driving (not speeding up to 25kmhs over) should be tracked with electronic logging devices.

Develop mobile phone lock out devices so that phones cannot operate inside cars.

Phones should be locked into hands free devices. Any driver with a phone loose inside a car should be fined and the phone confiscated.

No fines for mobile users just confiscation. (they can keep SIM card)

Make ABS more available and cheaper.

Proximity warning devices provide a distraction drivers don't need.

Drivers will rely on proximity devices and stop looking all together.

Install speed limiters on motorcycles with an over-ride function.

Stop relying on hi-tech solutions and teach people to drive properly. Raise the standard for getting a drivers licence. Hi tech devices lead to brain fade.

Q. What can we do as trainers (audit issues)?

Conduct a forum of all trainers. Before the forum the organisers collect all tests around the world and then put them on the table for a good look by working groups, the best of the best can be borrowed/stolen from other countries to create an amalgamated test.

Get rid of the current Learner test, but I'm unsure as to what should replace it..Refer to working group again.

The current licence test is good, although it should possibly have some other elements I.E. slow riding component but overall it mimics real life to a degree and that's what we're looking for

Training should be changed but with consultation with car groups so as to create a curriculum that involves the two seemingly different arms of Vic roads. This is not to say that motorcycles are to be treated like cars. It is to create a system where all involved in the training (as in students) are equally aware of each other due to the way they are trained.

Make on-road training more available.

Sponsor on-road training courses.

Introduce courses that combine skills and Hazard Perception training.

Seek rewards such as reductions in insurance premiums for those undertaking training. Especially Hazard Perception training.

Make training more real world. Allow real world speeds.

Current training is too short – get rid of the Learner Permit and introduce a four day course to go straight to licence.

Government should also provide access to better facilities for driver and rider training.

Training Audit and Surveillance

VicRoads should audit course delivery using experts and not just focus on the paperwork.

VicRoads should make sure that providers comply with the requirements for accreditation on a more regular basis.

Surveillance should be random and more focussed. VicRoads does not know enough about the actual training to know what they're looking at.

Assess whether the accredited training is achieving anything and identify providers who are achieving most and what components work best.

Assist VicRoads in developing improved accreditation standards.

Audit is not stringent enough,, there should be a combination of audit and surveillance using a specific person or an outside organization charged with the responsibility.

Get involved with local road safety councils more.

Additional points made

Introduce a graduated recreational licence that allows young off-road riders the chance to ride legally on recreational- registered bikes. Should be accompanied by sensible restrictions like adult supervision up to age of 13 and time restrictions

Make car drivers undertake Hazard Perception for motorcycles as well as for cars.

Enforce overtaking only on the right on freeways and dual lane roads as in the UK.

Stop accepting "I didn't see the motorcycle" as an excuse. It means "I didn't look, I didn't look properly,' or "I looked and went anyway."

5.2 Responses from riders who also ride offroad

Doesn't believe that there is a significant safety problem for the majority of off road riders. those that are serious buy all the right gear, register the bike and ride carefully and skilfully.

There is a problem with under licensing age riders - there needs to be education on the risks associated with unlicensed/unsupervised riding on unroadworthy/unsuitable motorcycles.

Government needs to realise that off road road riding involves a huge number of riders and there is inadequate consideration to the amount of areas available for them to ride legally and where necessary under supervision.

There is no reason why road legal ATVs cannot be recreation registered. establish a category for registration.

Provide off road rider training venues.

Statistics should be split so that off road crashes are not included in the numbers.

Unlicensed riders should be separate from other statistics

Crashes that involve unavoidable circumstances (like hitting a wombat)

should be left out.

Statistics currently are currently presenting a one sided and thus dishonest picture.

The major problem is that there are insufficient resources allocated to off road policing. There is a lack of qualified riders and a lack of suitable motorcycles.
Review the system that permits an illegal rider to get TAC cover if he is involved in a crash. Currently crash reporting is up because riders now realise the fine is much less than the money paid out by TAC if the crash happens on a road related area.

Never quite sure where I'm riding is legal - there should be a credit card type info card you can carry in your wallet with your licence that tells you the definitions.

After 12 years of causal off road riding never seen a bike copper off road. Seen a couple on trail bikes on the freeway though.

The biggest problem is kids riding around the streets on unregistered motocrossers with no helmets. They think they can get away with it just because they're going around the block. you call the police but they're gone by the time the police arrive - if they arrive at all.

The biggest problem is people who think just because they've got a 4WD they rip around the trails pretending to be rally drivers. They cut corners and drive way to fast. If you meet one coming the other way chances are they haven't seen you.

The other problem is blokes who ride a few times a year but think every ride is a race. They've got all the gear and the latest Yamaha or KTM but haven't got a clue. I've seen them run off the road a thousand times. There should

be a graded off road licence or something similar that restricts people without the skills to trail bikes and then they can move up to proper enduro bikes and competition bikes.

A big problem is drinking. A lot of blokes go and stay at pubs for long weekends or camp and drink heavily all night then go and ride the next day. They know they won't get caught. It's the same with 4WD drivers.
A lot of blokes are riding bikes that are too powerful for their ability. A lot don't have the right licence. They might have a learner permit but they're still riding a 450.

There should be better (offroad) policing

There's nowhere for kids to ride legally. What do they (VicRoads - police etc) think will happen? of course the kids are going to ride illegally. Give us somewhere to go.
We'd use somewhere locally but it's hard to know where to go.

There's nowhere for my son (11) to ride. We go up to the salt flats and ride up there because no-one bothers you. There's been two serious crashes where people have been badly hurt that we've seen because there's not parental supervision. Even so one crash involved a kid crashing into his father riding the other way on the track.

Protective gear is so expensive these days. We can't afford the good stuff that the other kids are wearing.

There needs to be better education too about ATVs. They're too dangerous for young kids but you see kids as young as 6 riding them. Parents buy them because they think they'll be safer on four wheels. Every ATV should come with a video that shows how to ride it and the reasons why it's dangerous for young kids.

Appendix A6: DVD materials

The field trip visits provided the opportunity to secure some video and pictorial materials to give a better perception of how road contexts operate and appear with high levels of motorcycle use.

Two DVDs have been created

1. A single short segment of the Computer aided consultation process, showing the introduction, layout and facilitation process. This DVD does not contain any of the consultation discussions per se.

2. A more complex DVD containing video clips of Rome and Kuala Lumpur, and three sets of slide shows of static pictures taken in London, Kuala Lumpur and Rome, arranged to give a feel for the environments. The original high resolution digital pictures are also included in a folder on the DVD

Kuala Lumpur

Video clips

- Intersection clearance flows
- Advanced stopline behaviours
- Heavy traffic filtering
- Motorcycle no-parking signage

Slide show of 21 slides

London

Slide show of 20 slides on central London motorcycle parking and usage near and in the congestion charging zone

Rome

Video clips

- Two long segments showing heavy motorcycle flows a complex intersection in inner Rome near the beginning of the afternoon peak, stopline behaviour, filtering, pedestrian interactions, and different mixed motorcycle/car-bus flow regimes. These give a good idea of the levels of integration of high components of motorcycles in congested traffic flow.

- Shorter segments taken from the back of a motorcycle in the traffic stream

    - Night conditions
    - Two way active filtering at a congested intersection
    - Main road flows at peak hour
    - Suburban road flows and behaviours

Slide show of 85 slides of motorcycle parking in central and inner Rome, including in the pedestrian and inside ring road controlled zones and suburban area outside ring road and motorcycle parking at railway stations in central and inner Rome

Appendix A7: Data types and sources for motorcycle policy management

The role of motorcycles in the road system has not been examined systematically on a statistical basis for quite some time. The data elements to do this on a continuing, or at least regular, basis are limited. A brief coverage of some options is given in this Appendix.

The general level of motorcycle use is measured in a number of different ways depending on which aspect of roads and road use are being considered. Commonly used illustrations of this are:

- Traffic flow on roads where road improvements are being considered: Victoria 0.5%
- Traffic flow off major roads Victoria 2%
- Crash and injury and fatality involvements: extensive data available on a continuing basis
- Population Census Journey to work usage Victoria <2%
- CityLink Financial reports for some years showed motorcycles as **>>2** % of the traffic flow

To which one may add (amongst other candidates):

- Fraction of households with a motorcycle owned (registered or not registered, on or off road)
- Fraction of the population licensed to ride a motorcycle
- Fraction of the population who have ridden a motorcycle in the last six months
- Numbers of motorcycles parking on road, off road and in parking stations in Melbourne
- Length, frequency, purpose and duration of trips made by motorcycle in city, country and off road circumstances. This is partly addressed by the ABS Motor Vehicle Usage surveys, using a very small sample.
- Situations where a motorcycle is available and chosen or not chosen for a specific trip or type of trip.

Only a small fraction of this fundamental data is collected or available in Australia at a scale where it can be used for many transport policy purposes.

Some of the VATS (Victorian Activity and Travel Survey) household interview data have been used in previous work (Wigan 2002), and some very limited fresh data in the present report. The numbers of motorcycles in such surveys is low, and special measures are required to secure a usable sample for most practical purposes.

Registration data is now very difficult to establish. Although new registrations were not collected by the ABS after 2000, the Federal Automotive Chamber of Commerce (FCAI) has subsequently picked up this task.

Injury and fatal crash data are far more readily available than exposure data, so establishing the actual safety of the mode is not possible to determine in any great detail.

The data available on motorcycles is increasingly limited in Victoria, and indeed in Australia. The public sources of data are limited:

Due to the large number of data gaps, scenario planning has had to play a major role in the projection process. However, even at the simple level used here, this approach has the benefit of providing consistent perspective on the various factors involved in the future situation, and made it easier to disentangle the interactions between the many demand, suppression, supply and usage factors that are inevitably bound up in demand projection processes. The use of a small grid of cities at different points on the intervention, demand and usage dimensions has had the effect of broadening the rage of feasible future to assess (as they are all there in the present in some form), and some of the connections that may give rise to them.

One of the factors that emerged as a major issue is that of attitudes and culture towards minority modes. This affects both the types and levels of investment effectively informing public policy and operational investments, and the allocation of effort to understand and mange them appropriately. In the case of both bicycles and motorcycles the issues of safety have at various items completely dominated the consideration of these modes, and a more

balanced level of information, training and expertise will require more broadly based information flows.

A key data item needed to monitor this sort of balance is the attitudes of the communities involved (professional, riders and the community) towards riders and motorcycles and the matches between these views and the measured reality. Image is a powerful factor that has wider impacts than are usually appreciated.

There are two very different objectives to be served:

1. Acquisition of sufficient data to understand motorcycle ownership, mode choice, attitudes, and the safety emission and other attributes of movements for overall policy purposes
2. Monitoring data to assess if remedial actions are needed in specific locations or for specific groups
3. Assessments of the impacts of polices for safety, training, movement etc

Victoria does not yet have overall information strategies that take this systematic view of what data is for, how reliable it needs to be, and how frequently and where it needs to be collected for policy, planning and operational management purposes. Under such a framework the evaluation of the utility of information could be more readily assessed and may well justify the securing of appropriate data for motorcycles – and indeed other minority mode – purposes.

Such a framework is needed for motorcycles, not only to justify the costs currently incurred in data collection (almost all in the crash area at present), but to expand the statistical collections undertaken that may not presently include motorcycles so as to meet these three different categories of data application.

This is just one area where a wider use of social science in transport offers perspectives and tools that could profitably be utilised more effectively.

Appendix A8 Fuel cells in bicycles, mopeds, scooters and motorcycles

Breakthrough technologies institute (2004) in Washington DC undertook a world wide (entitled "Fuel Cell Vehicle World Survey 2003") review of fuel cell developments across the world for the US Department of Energy. The following section is extracted from their report as it clearly demonstrates the tandem developments in bicycles and scooters in clean fuel cell powered vehicles. As can be seen the overlaps between bicycles and scooters are marked and the performance envelopes also overlap, raising again the question of consistent treatments and definitions for these modes.

EXTRACT of pp 117-120 from Breakthrough (2004)[31] follows

"Since fuel cells are modular, scalable, and fuel-flexible, they remain excellent candidates for a wide range of specialty vehicle applications. Fuel cells are currently being demonstrated on land, in the sea, and in the air.

Bicycles and Scooters

Fuel cell bicycles and scooters are being developed for markets in Europe and Asia. Densely populated cities, particularly in India, rely heavily on bicycles and scooters for personal mobility. There are an estimated 100 million motorized two-wheel vehicles in use worldwide. These vehicles are inefficient and polluting. In Bangkok, scooters produce more hydrocarbon and particulate emissions than buses, trucks, and cars combined.

Electric bicycles are becoming more and more popular, in part as a result of government incentives and restrictions on two-stroke engines. Major Asian cities, such as Shanghai, have recently adopted policies to phase out gas mopeds and bicycles. Most companies working on fuel-cell-powered scooters project market introduction in 2004, although that target appears very ambitious.

[31] www.fuelcells.org/info/charts/vehiclestudy.pdf

Asia Pacific Fuel Cell Technologies

Asia Pacific Fuel Cell Technologies (APFCT) showcased a proof-of-concept Zero Emission Scooter (ZES) scooter in April 2000, working with Kwang Yang Motor Co., Taiwan, Taiwan Institute of Economic Research, and the W. Alton Jones Foundation. The scooter's development began at the Desert Research Institute (DRI).

The second-generation scooter, the ZES II, appeared in November 2000. The ZES III was redesigned from the ground up and debuted in July 2002. It uses an APFCT 1-kW PEM fuel cell stack. ZES III has a top speed of 58 km/hour and a range of 120 km at 30 km/hour. A pre-commercial prototype, the ZEV IV, was completed in September 2003. It weighs 109 kg.

Fig. 34 ZES fuel cell Scooter

APFCT, DuPont Fuel Cells and DuPont Taiwan, Ltd., have agreements in place to commercialize PEM fuel cells for the Taiwan electric scooter market by 2005. The Taiwan Institute of Economic Research is exploring infrastructure options, such as collecting and refilling pressurized hydrogen canisters at 7-11 or Super K stores.

Palcan Fuel Cells Ltd.

Palcan Fuel Cells is developing small fuel cells (100 W and 5 kW power range) for bikes, scooters, and forklifts. Palcan and Shanghai Forever unveiled a fuel cell bicycle at the Asia Pacific Economic Cooperation (APEC) TechnoMart Exhibition in China.

Fig. 35 Palcan fuel cell scooter

In 2000, Palcan established Shangai Palcan Fuel Cell Ltd. with three Chinese partners to develop a Chinese market for fuel cells. Palcan's marketing strategy is to enter joint venture agreements with OEM's worldwide, providing access to system integration, manufacturing, sales, and distribution and service capability. In 2001, Palcan signed a memorandum of understanding (MOU) with both the Chuang Yuan Group Company, Ltd., and Shanghai Forever Company, Ltd., for the manufacturing and integration of Palcan's PalPac portable fuel cell system into electric bicycles and motor scooters.

Palcan Fuel Cells has successfully integrated its 2 kW fuel cell system into a scooter, using its own metal hydride hydrogen storage technology.

PEM Technologies, Inc.

PEM Technologies, Inc., is focusing on small- to medium-size fuel cell power systems (<10 kW) for portable power, light/personal electric vehicles, and non-road industrial electric vehicles. In July 2002, PEM Technologies introduced the PemPower-02, a PEM fuel cell scooter, and in 2003 unveiled the PemPower-03, a two-wheel motorcycle and the PemPower-04, a three-wheel motorcycle. The range for both the 03 and 04 was increased by more than half.

Manhattan Scientifics

In 2003, Manhattan Scientifics, Inc., issued a non-exclusive patent license of its NovArs mid-range fuel cell technology to Ballard Power Systems, providing unlimited use rights to Ballard for its proprietary technology and systems.

In 1999, Manhattan Scientifics acquired global intellectual property rights to the advanced fuel cells, materials, and concepts technology of NovArs and is working with Italian bicycle manufacturer Aprilia to incorporate units made by NovArs into scooters and bicycles.

Fig. 36 Aprilia Mojito fuel cell scooter

Its most recent prototype was shown in 2002. The Mojito FC uses a Manhattan Scientifics/NovArs 3-kW PEM fuel cell stack fueled by compressed hydrogen. Top speed is 35 miles per hour, and the range is 120 miles.

The fuel cell bicycle made by Manhattan Scientifics, designed by Aprilia S.p.A. with a NovArs fuel cell, was named one of Time Magazine's "Inventions of the Year" in 2001. The bicycle stores compressed hydrogen in a 2-liter canister in the frame and has a range of about 50 miles and top speed of 20 miles per hour.

Fig. 37 Manhattan Scientific fuel cell bicycle

Prior to working with Aprilia, Manhattan Scientifics released the Hydrocycle, a fuel-cell-powered concept bicycle. The hydrogen fuel is stored in a 2-liter carbon fiber pressure vessel located behind the seat. The bicycle has a range and top speed comparable with those of the initial Aprilia unit.

Yamaha Motor Company has developed a fuel cell for motorcycles, powered by methanol. Yamaha is also working with battery maker Yuasa Corporation to develop fuel cells for 50 cubic centimeter (cc) -class motor scooters. A prototype reached 40 kilometers per hour (25 mph), with an output of 500 watts, which is generally equal to the performance of standard 50-cc scooters. With support from the South-North Institute for Sustainable Development (SNISD)

Beijing Fuyuan Century Fuel Cell Power Ltd. has joined forces with Suzhou Small Antelope Bicycle Company and jointly manufactured a fuel-cell-powered scooter in China." *Breakthrough technologies institute (2004*)

One may conclude that, as argued in the body of the text of the present report, that the pollutant aspects of motorcycles are likely to be less of concern quite soon, and that consistent treatments of bicycles/electric/fuel cell-Bicycles/scooters be treated coherently as the spectrum that they are. This may encounter some problems with the established regulatory frameworks (or lack of them) for bicycles, and require some rethinking of those for light motorcycles. These are not solely safety issues, but also involve emissions, greenhouse impacts and accessibility factors in at least equal measure.