

# **Vehicle modifications for drivers with disabilities: developing the evidence base to support prescription guidelines, improve user safety and enhance participation**

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## **Executive Summary**

### **Key messages**

Understanding how drivers with disabilities use vehicle modifications (VMs) to support independent driving is a key pre-requisite to improving VM prescriptions. The drivers surveyed identified the importance of their VMs as enablers of independence and participation in personal, social and health related activities, underpinning safe and independent involvement in community based activities. Driver comments highlighted the significance of appropriate VM prescription.

A review of the international literature and resources regarding VMs, together with the results of an overseas study tour of driver rehabilitation clinical and research facilities and Occupational Therapy Driving Assessors' (OTDA) training opportunities, have highlighted the many factors which should inform a draft model and set of guidelines to support VM prescription.

OTDA VM prescription guideline development is most effective when consultation and collaboration underpins the formulation process. The active participation of more than 80% of all formally trained OTDAs in Victoria currently listed with VicRoads forms the basis of guideline ownership by the profession, and motivation to undertake further usability trialling with OTDAs and their clients.

A draft VM model and prescription guidelines ready for further development have the potential to influence OTDA training, service delivery, quality assurance and funding guidelines in this aspect of driver rehabilitation practice. Ultimately, guidelines will support safer, consistent VM prescription processes to optimise opportunities for people with disabilities to be safer independent drivers.

### **Purpose**

The broad objective of this project was to provide a stronger basis for the future improvement of independent driving and community participation outcomes for drivers with disabilities.

Specific project objectives were to:

1. Collect data about drivers with disabilities who routinely use vehicle modifications (VMs), including their personal characteristics, their experience of the prescription/implementation process, and their current use of modified vehicles.
2. Identify VMs assessment, prescription and implementation practice gaps and opportunities, considering human factors, safety, new technologies/innovations, registration and regulatory imperatives within a human-centred systems framework
3. Develop a shared VMs practice model and set of guidelines for future trialling and implementation.

# 1. Rationale

## 1.1 Background and rationale

Many individuals experience changes to function from significant work or transportation injuries. Permanent physical limitations may impact personal independence and mobility including the ability to drive safely. In the 'Decade of action for road safety' the World Health Organisation identified the impact of mobility/transportation restrictions on social, medical, family and recreational participation (World Health Organisation, 2009). A recent Australian national health survey highlighted the intertwining of disability, health and community mobility with mobility impacting on disability and health, and vice versa (Australian Institute of Health and Welfare, 2010). Thus, attainment of independent community mobility contributes to productivity and quality of life, and is an important aspect of rehabilitation and both community and work participation (Pellerito, 2006).

With appropriate VMs, people with limited use of hands, arms or legs may still be able to drive safely. VMs include aids/adaptations to manage vehicle operations (e.g. steering, acceleration and brake functions) and to provide vehicle access for wheelchair users (Pellerito, 2006; RACV, 2011). Evaluation of the non-compensation based Victorian Vehicle Modifications Subsidy Scheme (VMSS) found that "vehicle modifications are a tangible and practical way to facilitate better social and health outcomes for people with a disability, family members and carers" (Nucleus Group, 2009, p3).

Data regarding licensing of drivers with disabilities and associated vehicle modifications is not available in the public domain. VicRoads manages about 6,000 requests per year for various types of modifications that impact upon vehicle safety and/or compliance, a significant proportion of which would relate to drivers with a disability. However, not all VMs are captured in these figures. As VicRoads registration approval is not required for "add on" devices such as simple steering aids, left foot accelerators or pedal extensions, such devices are not included in this figure.

Occupational Therapy Driver Assessors (OTDAs) help drivers with disabilities to gain or retain the ability to drive independently (Australian Association of Occupational Therapists Victoria Inc, 1998). OTDAs in Victoria annually assess thousands of drivers but specific VMs-related prescription outcomes are not currently collected by VicRoads and are therefore unavailable.

The right to VMs has been legislated for many years, in the Accident Compensation Act (1985), Section 99 AC, and more recently in the Workplace Injury Rehabilitation and Compensation Act 2013, Section 231 (Modification of cars and homes) and the Transport Accident Act (1986) Section 60 (Medical and like benefits) and the Transport Accident Amendment Act (2004) Section 18 (Modifications to vehicles). Costs for modifying vehicles for injured drivers or passengers can be substantial. In 2009, the TAC paid \$123.9 million for aids and equipment, including those related to transportation, to claimants with spinal cord and traumatic brain injuries (Access Economics, 2009). Therefore, VM prescriptions should be systematic, equitable and evidence-based to ensure best use of resources and optimise road safety and driver independence outcomes.

Victorian OTDA practices are based on the content of post-graduate university coursework, documented general professional competency standards and OTDA guidelines regarding VicRoads processes. However, none of these resources currently provide specific, detailed information about the complex process of prescribing VMs to match individual capacities (Australian Association of Occupational Therapists Victoria Inc, 1998; Di Stefano, Stuckey & Lovell, 2012). Consultants undertaking the VMSS review (2009) analysed the characteristics of users of the scheme (drivers, passengers and their family/carers) and how funds were used over the first year of the scheme's implementation. They also interviewed a range of stakeholders including OTDAs. Study authors established that OTDAs want detailed VM prescription guidelines and education to improve driver rehabilitation practice (Nucleus Group, 2009). Consistent OTDA prescription practice for VMs is critically important, particularly as technological developments continue to increase the number, sophistication and cost of vehicle modification options (VicRoads, 2008).

## **1.2. Evidence gaps and research aims**

a) At present there are no detailed Australian OTDA practice and prescription guidelines for VMs, and little information regarding either the efficiency with which VMs are provided, or the effectiveness of their implementation. Potential issues of safety, efficacy, cost and appropriateness are poorly understood by the multiple stakeholders including service providers and end-users.

b) A 2010 review of published research evidence and 'grey literature' concerning Australian VMs highlighted some important information gaps and identified a need for further investigation of international evidence, resources, guidelines and technical literature with potential applications in the Australian OTDA VM context (Di Stefano, 2010).

c) Apart from the VMSS review referred to above (Nucleus Group, 2009), which has not been subject to peer review or published in a scholarly journal, no detailed Australian research has been located which has examined characteristics or experiences of drivers using VMs, related driver assessment and prescription processes, or the impact of VMs on rehabilitation outcomes. Such gaps have previously been identified by international researchers (Dickerson, 2007) and within Australia, specifically for individuals with TBI (Prang, 2012)

d) The focus of this project was also informed by earlier work completed by the investigators involving Victorian road safety partners (the TAC, RACV and VicRoads) in collaboration with the Disabled Motorists Association (DMA). The DMA is Australia's peak national body for drivers with disabilities. Previous projects centred on identifying user, funding and research gaps in the VM domain and developing a consumer guide for drivers with disabilities planning to use VMs. This project provided an opportunity to address some of the gaps identified in these previous projects – particularly in relation to understanding the use of VMs from the perspective of the user, and developing professional guidance materials to enhance prescription processes.

Based on the above, the project aims were to:

- (i) gain an understanding of the characteristics and experiences of drivers with physical disabilities related to their use of VMs; and,

- (II) Work collaboratively with OTDAs to develop a draft model of practice and guidelines for VMs prescription.

The research data collection had the following four components:

- i) A Project Advisory Group (PAG)
- ii) Literature and resource review
- iii) An international study tour by the chief investigator (funded through the Churchill Trust not ISCRR)
- iv) A survey of drivers with disabilities who use VMs, and
- v) An OTDA survey and associated focus groups to evaluate proposed items for a draft model of practice and guidelines for VMs prescription.

The aims, methods and sampling are described below, separately for each of these five components, followed by results, discussion and conclusions.

## **2. Methods and Sampling**

### **2.1 Project Advisory Group (PAG)**

A PAG was established which included representatives of TAC and VWA, OTDAs, Disabled Motorists Australia, VicRoads staff and a vehicle engineer/modifier. See Appendix A for full list of members.

The initial PAG meeting was held at an early stage of the project. Discussion confirmed the project scope, consultation process, research methods and time-lines. A survey and agenda were circulated to all PAG members prior to the meeting, to facilitate the process of them contributing their ideas and experiences regarding VMs assessment, prescription and implementation practice gaps and opportunities. A “SWOT” data collection and analysis process (SWOT = Strengths, Weaknesses, Opportunity and Threats) was used (Houben, Lenie & Vanhoof, 1999). The survey also included prompt items which elicited PAG members’ thoughts regarding various VMs-related issues, including: human factors; driver and other road user safety issues; technologies / innovations; funding criteria; and vehicle registration/regulatory imperatives.

A second (final) meeting was held when the project was close to completion and the guidelines and a model of practice had been drafted. Key results from other project components (including literature review, driver and OTDA surveys) were shared with PAG members at this meeting, followed immediately by a forum to discuss the draft model of practice and guidelines. For the draft VM prescription guidelines, discussion focused on (a) ratification of items for inclusion, and, (b) establishing the percentage agreement cut-off scores to be applied as criteria for inclusion/exclusion of specific items.

### **2.2 Literature and resources review**

A review of international research literature, resources, technical reports, conference presentations, web-sites and guidelines was completed to identify key aspects of the VMs prescription process.

Embase, Medline, Proquest, and Cinahl electronic data bases were searched for relevant material. A range of key/derivative words identified through preliminary literature searching and consultation with university librarians were used as search terms, for example: *Vehicle modifications, disability / disabled driver, clinical guidelines, Occupational Therapist / Driver Assessor, automobile conversions, practice model, motorist, adapted car, spinal cord injury*. A number of relevant websites including those of the USA National Highway Traffic Safety Authority, the USA Department of Transportation and Austroads (Association of Australasian road transport and traffic agencies) were also accessed. Manual searching through the reference lists of published research studies and relevant book chapters was also undertaken. The key findings from this search process are outlined in an annotated bibliography. (See appendix B).

### **2.3 International study tour**

A two-month study tour was conducted by Dr Di Stefano in 2014. The tour was funded by the Jack Brockhoff Foundation Churchill Fellowship and its' goals were aligned to the research goals of the studies reported here.

The aims of the study tour were to:

1. Investigate driver assessment and associated rehabilitation services for people with disabilities in the USA, UK and Sweden,
2. Gather information about advances in VMs that support driving independence for people with physical disabilities,
3. Attend the annual American Driver Educators of the Disabled conference held in Buffalo, USA, and,
4. Participate in a 2-day American Driver Educators of the Disabled workshop for professionals specialising in VMs for drivers with disabilities.

### **2.4 Survey of Australian drivers with disabilities who have used VMs**

Aim:

To gather information about, and from, drivers with disabilities using VMs to inform current health professional driver rehabilitation practice.

Methods:

An anonymous self-completion survey method was used; this was distributed over a 9 month period across 2013 – 2014 using snowball and convenience sampling procedures (Hissong, Lape & Bailey, 2014). The survey instrument design and items were informed by earlier work completed by the investigators as described above. The survey tool consisted of a mixture of 19 closed and open-ended items eliciting both quantitative and qualitative data responses. Questions focussed on driver characteristics, VM prescription experiences, driving and safety-related experiences, perceived benefits of driving with VMs, recommendations about VM prescription to others, and any other issues associated with VM use that respondents chose to raise. (See Appendix C: Drivers' questionnaire). Data were extracted and analysed using the SPSS 21 software program to produce descriptive statistics.



#### Sampling:

We partnered with DMA and the Australian Quadriplegic Association (AQA), which are advocacy and support groups likely to include members who would be using VMs. DMA and AQA were keen to support research which supported safe, independent driving. Both organisations reviewed and approved the distribution of hard copy or electronic versions of the survey questionnaire to their members. All questionnaires were de-identified. The survey was conducted in compliance with the process approved by LaTrobe University human research ethics committee.

### **2.5 OTDA survey and focus groups**

#### Aim:

To obtain the views of practicing OTDAs concerning key priorities and principles to be considered in a draft version of the proposed OTDA VM prescription guidelines.

#### Methods:

A survey instrument was used in conjunction with focus groups to gather relevant opinions and data from OTDAs. Eligible participants were invited to participate in the study via direct email and via the Driving Special Interest Group of the Victorian branch of Occupational Therapy Australia. OTDAs were emailed the survey and advised about the focus groups to be conducted at VicRoads, Kew. Focus groups could be attended in person, or via video-conference. Participation was completely voluntary for both the survey and the focus groups.

#### (i) Survey instrument

The first two sections of the survey (A and B) gathered background information about respondents and the client populations they service. The remainder of the survey related to the proposed OTDA guideline principles. (See Appendix D: OTDA Survey). These were specified as action statements for possible inclusion in draft OTDA VM prescription guidelines. Statements were constructed and grouped based on an activity analysis of the VM prescription process. This was informed by a review of resources including the Victorian Competency Standards for OTDAs (Schneider, 1998), European car adaptations for disabled drivers best practice guidelines (European Committee for Standardisation (CEN), 2013) and the Vehicle Features Matrix tool developed for OTs by the Independent Living Centre, Victoria (Independent Living Centres Australia, 2014).

Action statements were grouped under the following headings:

- (C) General assessment and prescription principles;
- (D) Person-centered factors (individual driver variables e.g. impairments, activity limitations and participation restrictions);
- (E) System factors impacting on VM provision (e.g. financial constraints, environment of use);
- (F) Driving as an occupation, and VM training issues; and
- (G,H,I) three sections related to how OTDAs evaluated VMs including in-vehicle evaluation.

For each of the items in sections C through to I, respondents rated the importance or relevance of each draft guideline for their own clinical practice when prescribing VMs. Rating scales captured the frequency of application (yes all the time, sometimes, never, don't know, not applicable). At the

end of each section, participants were prompted to provide further comments and to identify any significant omissions, thus providing qualitative feedback.

Recipients were asked to review and complete the survey prior to attending the focus groups. Surveys were completed anonymously and collected at the end of the focus groups.

#### (ii) Focus groups

Focus groups were coordinated by three experienced facilitators, following a set format which was explained to participants prior to group commencement. Focus group activities were structured so that survey items were systematically reviewed and discussed. After discussion, consensus was reached for some items and recommendations for changes made for others (e.g. clearer wording). A note-taker supported the facilitator by recording comments, discussion points, suggested wording changes and total numbers of individuals who dis/agreed with item inclusions. Individuals not able to attend the focus groups could still submit completed surveys.

Quantitative survey data was extracted from surveys and entered into the SPSS 21 statistical package for descriptive analysis. Qualitative data from both the survey and focus groups was transferred to a master file of comments and content analysis was used to identify and summarise common issues.

#### Sampling:

All formally trained OTDAs in Victoria listed with VicRoads (n = 65) were invited to participate in the study. OTDAs remain on this list whilst they are active in delivering OTDA-related services, education or research.

## **2.6 Ethics**

LaTrobe University Human Ethics Committee approved all research protocols. Approved participant information was provided to all prospective participants. Participation in focus groups and/or return of surveys was accepted as informed consent. All forms of participation were anonymous, no participant names or details have been recorded. Study information was distributed via mail or email via VicRoads, AQA or DMA, the custodians of their own confidential email and postal address lists. (nb: researchers did not have access to these mailing lists or other identification..)

## **3. Research findings and implications**

### **3.1 Literature and resource review**

#### 3.1.1 Overview

The review of international literature identified many research articles and book chapters discussing general OTDA assessment processes and client related issues.

Modifying vehicles as part of Australian OTDA driver assessment and rehabilitation education and practice was first noted in our national journal in 1988 (Caust, 1988). Since then, other international

and Australian authors have confirmed the valuable contribution made by OTDAs in the driver assessment field and explained certain aspects of the evaluation process (see for example, Di Stefano & Stuckey, 2015; Di Stefano & Macdonald, 2010, Stav, 2004).

The first (and currently the only) international text book specifically addressing driver assessment and community mobility was published in the USA in 2006. It includes a chapter highlighting characteristics of vehicle adaptations and modifications to assist drivers to overcome limitations associated with traditional vehicle design (Pellerito, 2006). Whilst many other aspects of driver evaluation are covered in depth in the text (e.g. assessment of driver vision and cognitive function, on-road assessment) no specific details associated with the VM prescription process are provided (Pellerito, 2006).

There are relatively few research or scholarly publications related to VMs or the VM prescription process for people with disabilities. Numbers of publications or web-based resources that we found, referring to VMs either generally or in detail, were as follows: 11 research articles, 6 magazine/newsletter articles discussing personal experiences with VMs, 3 practice guideline resources, and several web-based resources providing consumer advice. Information from these resources of relevance to the present project is summarised below. (See Appendix B for Annotated Bibliography).

### 3.1.2 VMs enabling community participation

There is some evidence that VMs increase user participation both in the paid workforce and in leisure activities. A recent longitudinal study of wheelchair users with spinal cord injuries in the USA found that driving a modified vehicle was positively correlated with both paid employment and social participation (Tsai, Graves, & Lai, 2014). An earlier large USA survey of the same population found that driving was correlated with improved social and workplace productivity, as well as community reintegration. This included improved access to education, social and recreational activities and community health care, as well as greater life satisfaction (Norweg, Jette, Houlihan, Ni, & Boninger, 2011). Further, a Malaysian study found that amongst members of a support group for individuals with spinal cord injury, 79.5% of those driving were in paid employment, compared to 32.5% of those who were unable to drive (Ramakrishnan, Chung, Hasnan, & Abdullah, 2011).

### 3.1.3 Safety of VMs

Very little published research addresses safety issues related to VM prescription. A Swedish survey of 793 randomly selected users of cars with VMs found that 91% of drivers reported feeling either “very safe” or “rather safe” when driving with their VMs (Henriksson & Peters, 2004). The survey also asked respondents about any driving accidents they had experienced; they reported involvement in a total of 97 crashes in total, 31 of which were reported to police. Of those reported to police, 13 were associated with personal injury. Nine of the accidents were reported to have been influenced by VMs, as follows: ‘driver unfamiliar with equipment’ (3 cases), ‘adaptation did not sufficiently satisfy the individual needs’ (2 cases), and ‘equipment broke down’ (4 cases). This study highlighted the need for regular VM maintenance and a more flexible subsidy system which regularly reviews driver needs in relation to VMs, particularly for drivers with progressive conditions (Henriksson & Peters, 2004). The authors concluded that drivers with disabilities (as represented

by this random sample) did not constitute a traffic safety risk different from that of drivers in the general Swedish population. However this conclusion must be tempered by limitations of the study, including no age or exposure matching of the sample with drivers without disabilities, and no external validation of their self-accident histories.

In 1996, Turner-Stokes and colleagues reviewed the impact of a range of VMs on secondary safety – the ability of vehicle-features to prevent or reduce injury during a crash. Authors raised concerns about the safety of various VMs in crashes involving impacts with objects or other vehicles. VMs mentioned as problematic included steering wheel balls (steering devices such as spinner knobs) during a frontal impact, push-pull hand controls which could cause injuries to lower limbs, the structural integrity of raised roofs in roll-over accidents, the stability of swivel seats and sliding doors, and the ability of drivers to secure objects in the rear of the car which, if not secured, may become injury-causing missiles in the event of a crash. The authors concluded that a risk-benefit balance must be achieved; although some VMs may increase injury risk, they also enable independent mobility. They proposed a variety of strategies for improving the secondary safety of these modifications.

Only one study was found that examined the usability of VM controls. Peters and Ostlund (2005) used a driving simulator to evaluate the design of two different types of joy-sticks. Twenty drivers with high-level spinal cord injuries drove the simulator using the joy-sticks with passive versus active-force feedback systems, while various vehicle and driver performance parameters were recorded, including time lag (response times) in relation to speed and steering control, . Differences in driver performance and stated preferences between groups of drivers with more or less hand and arm function highlighted the need to provide trial opportunities and to take driver preferences into account. Researchers concluded that both types of joy-stick controls could produce short time lags and were easy to learn to use.

#### 3.1.4 Need for evaluation of VMs and training

Several authors advocate for the importance of drivers receiving sufficient training in the safe use of VMs, and mandatory post-installation evaluation of the VM to ensure it is appropriate and that the driver can demonstrate proficiency (Pellerito, 2006; Stav, 2004). This principle was reinforced by the conclusions of Benoit and colleagues (2009). They studied on-road driving during a 30 km fixed route and measured task-related workload experienced by drivers (using the NASA Task Load Index) of 2 groups: healthy younger (n=27) and healthy older (n=27) drivers. Drivers drove in two conditions, either with normal vehicle controls or with hand controls. Modifying the vehicle's controls significantly increased workload, especially with those older drivers who had greater attentional declines at baseline. The authors concluded that healthy drivers experience increased task demands when required to use modified controls and therefore it is likely that drivers with physical impairments required to make similar adaptations also experience these demands. Provision of adequate training is therefore important to help drivers integrate and automate the new skills required to use VMs safely.

#### 3.1.5 Summary

In summary, the literature and resource review highlighted the following:

- (a) no detailed OTDA VM prescription guidelines are currently available in the public domain, and
- (b) OTDA practice model and prescription guidelines should include reference to:
  - driver functional assessments, both initial and, for drivers with deteriorating conditions or capacities, ongoing
  - driver needs for training and on-road evaluation
  - safety requirements
  - factors that may affect VM choice - the characteristics of available vehicles environment of use, financial constraints
  - VM design, including applicable mandatory design standards
  - VM trialling, installation and maintenance requirements
  - Easily accessible information about VMs to support informed consumer choices and VM management

### **3.2 Jack Brockhoff Foundation Churchill Fellowship – overview and conclusions**

The study tour was an important means of consulting with international colleagues, including those working in specialist clinics, and other experts in driver rehabilitation. Its purpose was to obtain detailed information about recent advances in rehabilitation practices, new technologies and VM prescription practices that is not otherwise available in Australia.

OTDA practice and research in three countries was investigated, and the tour included attendance at the annual conference and training program of the only international professional association representing specialist driver educators.

Major lessons and conclusions:

The rehabilitation services offered currently by Australian OTDAs to drivers with disabilities are relatively consistent and evidence-based compared to services offered internationally. However, few Australian OTDAs understand 'high tech' vehicle adaptations or the detailed prescription process required to make sound clinical judgments about their application. Continuing education is needed to improve the knowledge and skill levels of Australian OTDAs on these topics.

In the UK, the mobility allowance, (a subsidy scheme to support independent mobility applicable to drivers with disabilities) the availability of modified vehicles through a hire-lease scheme, and the 'one-stop-shop' model of UK "mobility centres" enable drivers with disabilities to easily access services and resources to meet their personal mobility needs. Such innovations could be considered for application in the Australian context.

A range of brochures and magazine articles have been written in various countries to assist consumers in the process of obtaining and using VMs (see for example, Adelson, 2005; Anonymous, 2007; and Rogers, 2001). The National Highway Traffic Safety Administration (NHTSA) in the USA have developed a brochure which includes advice on funding available, information regarding the role of a driving assessor and VM dealer, and suggested questions to

ask during the assessment and purchasing process. The authors also advocate for training in use of the VMs and regular VM maintenance.

There is a need for more OTDA professional education, along with further research to document and explore VM-related safety issues, prescription issues, user experiences, and the long term benefits of using assessment technologies (e.g. simulators) to support driver rehabilitation and driving with VMs.

Study tour findings, particularly attending the VM 2-day training course and speaking to OTDAs who routinely prescribed VMs, informed the draft OTDA vehicle modification prescription guidelines,

### **3.3 Survey of drivers currently using vehicle modifications**

Responses were received from 97 drivers. A response rate could not be calculated because it was impossible to establish the total numbers in the population of drivers in Victoria who use VMs.

#### **3.3.1 Key findings:**

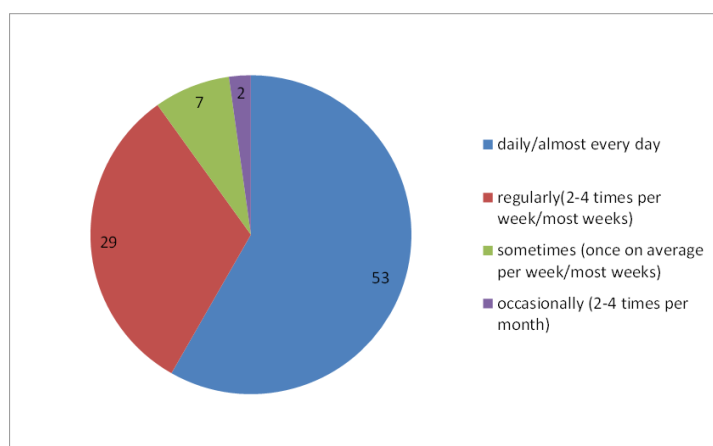
##### **(i) General characteristics of the sample**

- 66% male and 63.9% aged 61 years and over
- 67.7% live with another person
- 72.2% live in the Greater Melbourne region whilst 20.7% reside in a rural setting/city and a further 6.2% interstate
- 62.9% reported ability to independently access suitable public/community transport. Of these, 86.4% were able to access taxis, 45.7% had access to trains and 33.9% to buses
- 67% reported their general physical health as good/very good
- 86.6% reported their psychosocial health to be good/very good
- Most common health condition leading to requirement for VMs: 'paralysis' or 'spinal injury' (n=50), 'Polio' (n=12)
- Length of time since diagnosis (in 10-year intervals) - Range: <1 - 69 years ago, largest group 31-40 years ago for 20.6%
- Most common "other diagnosed health conditions" (not necessarily affecting need for VMs): arthritis (20.6%), vision loss (12.4%), hearing loss (10.3%)
- 94.8% routinely use personal mobility aids including self-propelled wheelchairs (54.7%), motorised wheelchairs (21.6%) and walking frame/stick (20.6%)

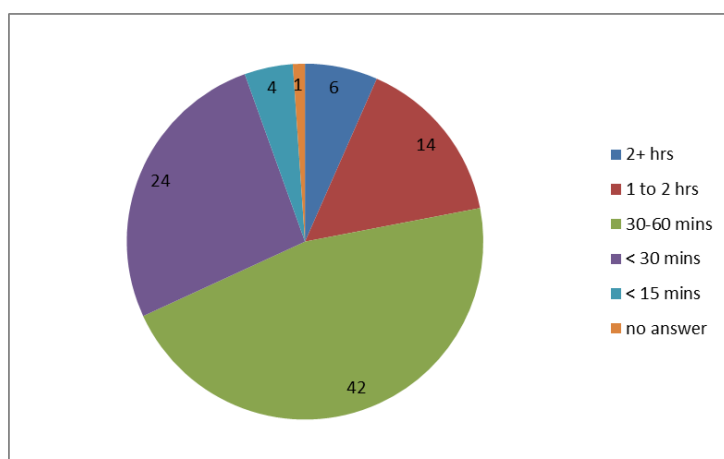
##### **(ii) Driving-related behaviours**

- Driving is the preferred method of transport for majority of drivers surveyed (90%)
- Almost all drive at least weekly to access shops, appointments, recreational/social club outings, and to visit friends/family (See Figure 1)
- 70.8% (n=97) generally drive for less than 1 hour in one stretch. The pattern of durations shown in Figure 2 validates the current duration of driving assessments (around 60 minutes) as relevant to ongoing patterns of use.

**Figure 1** Regularity of car use (n=91)



**Figure 2** Length of time spent driving in one stretch when driving to most common destinations (n=91)



- 8 participants reported ceasing driving in the last six-twelve months with half citing health changes as the reason for ceasing driving
- The majority of drivers reported that they did not often modify their driving patterns or destinations to accommodate their disability, with the exception of the frequently reported strategy of driving to places where they knew disabled driver parking bays were available (See Table 1).

Strategy used to assist accomodation.	Never (n)	Sometimes (n)	Often (n)	Always (n)
Drive to places with disabled parking	7	25	35	23
Avoid nights	54	20	8	5
Avoid peak hour or busy traffic	34	36	10	6
Avoid bad weather	47	24	10	4
Avoid long distances	46	18	7	16
Avoid unfamiliar destinations	60	17	4	5
Avoid unfamiliar petrol stations	45	24	7	8

**Table 1** Driver strategies modifying driving to accommodate disability

(iii) Driving with VMs

- The most frequently reported types of VM were hand controls and steering aids; and most reported using these for more than 20 years (see Table 2).

Type of VM used (nb. more than one type may be used by each driver)	Participants with this modification (n)	Mean years of use	Range of years of use (SD)
Hand controls	64	25.5	1-60 (16.0)
Steering aids	48	22.0	1-58 (14.9)
Lowered floor/raised roof	2	2.0	2-2 (0.0)
Ramps/hoist/WC access	26	14.3	2-58 (12.2)
Extended/ additional mirrors	2	8.0	2-14 (8.5)
Modified foot brake/accelerator	23	26.1	2-60 (18.1)
Modified indicators/light switches	18	14.6	1-42 (13.3)
Other (1)	7	19.0	6-39 (14.5)
Other (2)	2	7.0	2-6 (1.4)

**Table 2** Types of VMs used



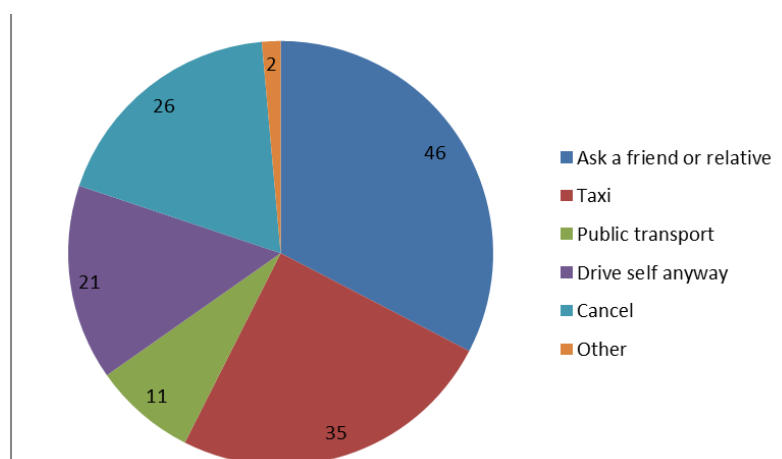
- Participants reported that VMs enable increased independence and ability to participate in many desired community based and health related and other activities. (See Table 3)

VM enabling ability to reach destination	Strongly Agree	Agree	Disagree	Strongly Disagree
Travel to places without reliance on others	87	6	4	0
Access to local shops	81	10	3	1
Access to medical or therapy appointments	87	8	1	1
Participation in sport/ recreation/ leisure	75	9	1	3
Ability to get to work	55	10	1	3
Ability to get to volunteer work	46	14	4	5
Attendance at church/ social club outings	62	13	3	3
Travel to unfamiliar areas/ destinations	71	15	1	2
Visits to friends and family	85	8	1	3
Travel to rural destinations	68	11	3	3
Interstate travel	58	8	3	6

**Table 3** Destinations able to be reached as a result of VMs.

- When they did not want to/could not drive, the majority would travel with a friend or use a taxi, but a quarter of drivers would cancel the outing for want of other options. (See Fig. 3).

**Figure 3** Available transport options for instances when participants do not want to drive



- Access was described as difficult or impossible without the use of VMs to frequently used destinations including local shops (70% drivers) or medically related appointments (62%). (See Table 4)

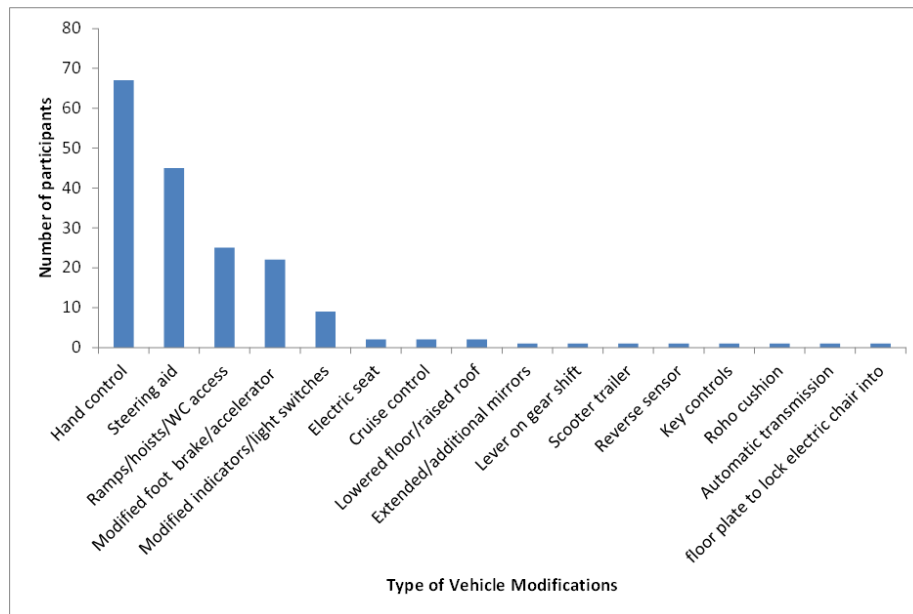
Desired Destination (n=97)	Easy	Manageable	Difficult	Very Difficult	Impossible	N/A
Access to local shops	2	6	8	25	43	13
Access to medical or therapy appointments	2	8	8	23	37	19
Church	6	10	6	13	18	44
Participation in sport/ recreation/ leisure	3	12	13	25	31	13
Ability to get to work	2	8	7	15	26	39
Ability to get to volunteer work	1	11	10	15	26	34
Attendance at church/ social club outings	3	13	16	19	24	22
Travel to unfamiliar areas/ destinations	2	8	8	24	45	10
Visits to friends and family	3	20	16	30	26	2
Travel to rural destinations	2	6	8	25	43	13
Interstate travel	2	8	8	23	37	19

**Table 4** Ability to access various destinations without VMs

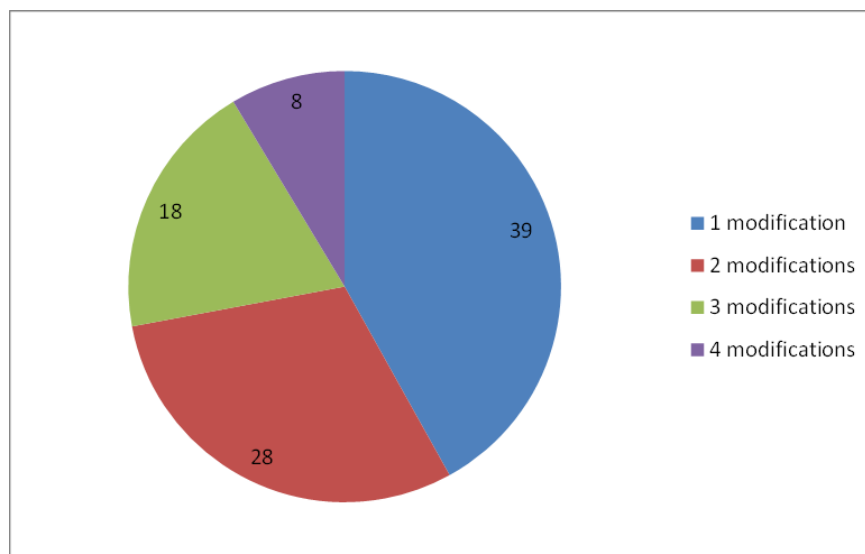
- Hand controls and steering aides are the most commonly used VMs. (See Figure 4)
- Ramps/hoist/WC access and modified foot brake/accelerator are also widely used. Forty-two percent of drivers reported using one type of modification, while the majority used two or more types. (See Figure 5)
- In general, the majority of drivers were mostly satisfied or very satisfied with their VMs. VMs reported associated with low satisfaction ratings were ramps/hoists/WC access (n=11 were only partly or not satisfied ) and steering aids (n=4 were only partly or not satisfied).
- There were 12 reports of partial satisfaction/dissatisfaction with particular VMs. (See Table 5). Comments from individual respondents included concerns about:
  - The risk of engaging the brake and accelerator simultaneously due to proximity of pedals
  - The small number of specialised engineers, all far from home

- Velcro on steering glove detaching during sharp turns
- Lack of leg support so the seat belt does not provide sufficient hold when cornering, necessitating slow speed driving
- Brake failure due to lack of modification maintenance
- Unable to reach wiper controls while driving/braking
- Lack of access to moderns technology

**Figure 4** Types of VMs used



**Figure 5** Number of VMs used (n=93)

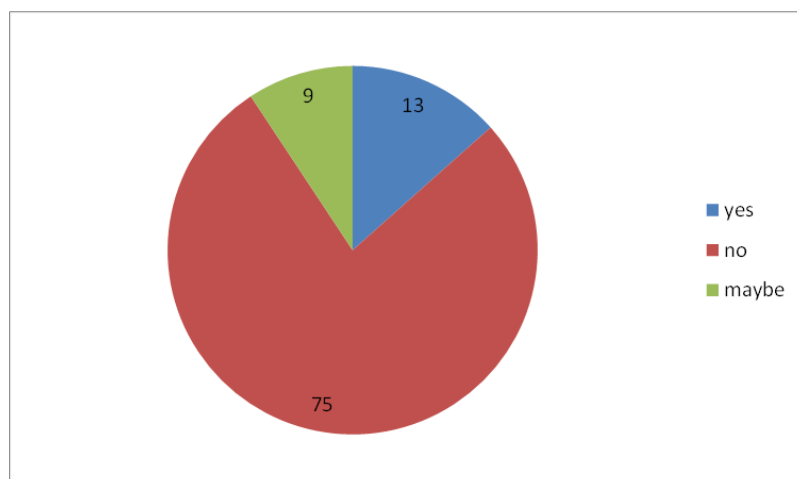


Type of VM	Not Satisfied	Partly satisfied	Mostly satisfied	Very satisfied
Hand controls	0	1	19	46
Steering aids	1	3	14	33
Lowered floor/raised roof	0	0	0	2
Ramps/hoist/WC access	4	7	19	65
Extended/ additional mirrors	0	1	0	1
Modified foot brake/accelerator	0	0	9	16
Modified indicators/ light switches	0	0	8	12

**Table 3** Level of satisfaction with VMs used

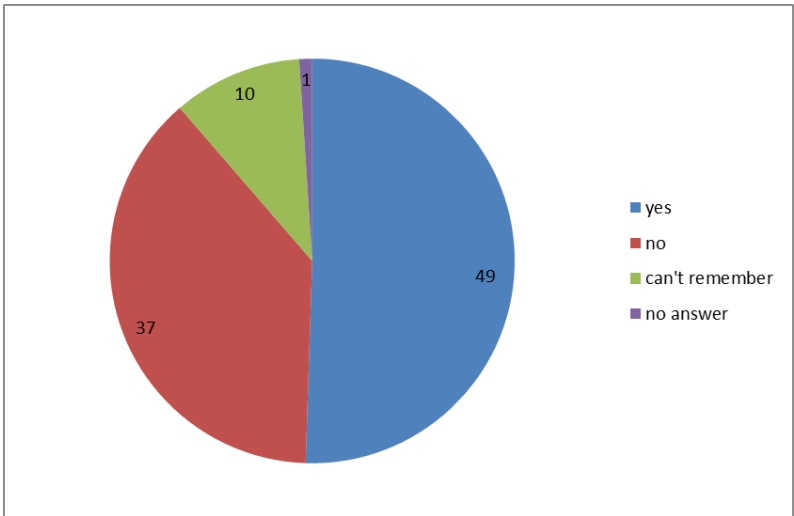
- 75 participants reported they would be unable to drive independently without VMs, while a further 9 were unsure. (See Figure 6) Participants' comments included "able to drive short distance in automatic in case of emergency" (n=3) "can drive a normal car but law won't allow me" (n=2) use automatic now instead of VMs (n=2).

**Figure 6** Participants' ability to drive without VMs (n=97)



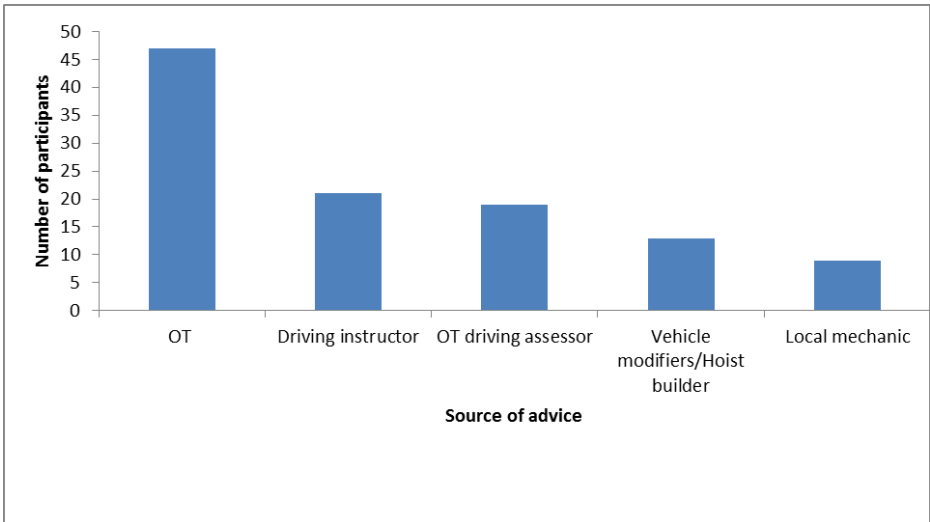
- Approximately half of all participants had undertaken an OT Driving Assessment and OTs were the most often used source of advice for VM choice (n=49) (See Figure 7).

**Figure 5** Number of participants who had an occupational therapy assessment specifically related to driving (n=97)



- The most common services accessed at time of planning for VMs were lessons with an instructor (n=58) and talking to people about VMs (n=32) (See Figure 8)

**Figure 8** Most common sources of advice/assistance for VM choice



### **3.4 Development of guidelines**

#### **3.4.1 Background sources**

Development of draft OTDA guidelines and practice model for vehicle modification prescription for drivers with physical impairments was informed by information from a range of sources:

- The AGREE II tool (Brouwers, 2010) was developed as a tool for assessing the processes used in the development and reporting of evidence-based guidelines. This tool was used as a guide in the early stages of the development of guidelines for VM prescription, particularly to inform stakeholder involvement and the rigour of content development.
- The format is modelled on the Competencies Standards for OTDAs developed by the Australian Association of Occupational Therapists Victoria Inc (Schneider, 1998). OTDAs will be familiar with this layout therefore aiding the usability of the guidelines.
- Content of the guidelines incorporates relevant sections of the Competencies Standards for OTDAs (Schneider, 1998), European best practice guidelines (European Committee for Standardisation (CEN), 2013), and Vehicle Features Matrix (ILC Australia, 2014).
- Content was also informed by:
  - Findings from the review of literature and other resources .
  - Materials from the ADED conference and workshops attended by Dr. Di Stefano during 2014 as part of her Churchill Fellowship tour.

#### 3.4.2 OTDA survey and focus group consultation regarding the draft guidelines

A total of 45 OTDAs completed the survey, which included draft action statements for possible inclusion in the guidelines. From the 65 OTDAs currently listed on the VicRoads register, a total of 53 participated in the three focus groups held at VicRoads: 45 in person with an additional 8 via video conferencing. This represents an 81.5% participation rate.

The content analysis of OTDA comments and recommendations made during the focus groups identified suggestions for changes to wording within the guidelines and designation of items/actions statements as either “essential” or “desirable”.

#### 3.4.3 OTDA role clarification, boundaries and differentiation

OTDAs provided clarification of their perceived role as assessors as distinct from the roles of the vehicle engineer/installer and the driving instructor. For example:

- The majority of OTDAs do not have or need mechanical or technical VM-related expertise if they can rely on other professionals to provide this: OTDAs focus on driver functional requirements.
- The OTDA role is to prescribe/ make evidence-based recommendations rather than to negotiate with insurers, installers or suppliers regarding costs or compliance requirements.
- OTDAs cannot always use standardised assessments if they are not readily available (e.g. due to cost); however, they do routinely use systematic observation to thoroughly assess functional abilities in the real world context of driving. ..
- Psychosocial factors such as anxiety need to be taken into consideration for VM prescription and training, for example, expecting a highly anxious newly disabled older person to learn to use a multi-faceted spinner device with integrated horn, lights and

indicators may not be appropriate due to the novel and unfamiliar usage patterns and significant new learning required.

- A client driver's roles within their own family and community, and the impacts of these roles on driving requirements, need consideration
- Family/carers should be consulted during the assessment and VM prescription process, where judged to be appropriate
- OTDAs are not frequently involved in evaluation or follow up post-installation; funders won't pay for this service, relying instead on the vehicle installer/client to check if installation is in accord with prescription and ordering requirements

#### 3.4.4 OTDAs highlighted concerns related to current practice of relevance to the model of practice:

- Access to view and trial VM equipment needs to be improved to enable drivers to visually assess and physically test different VM equipment options and to compare alternative designs
- Funding limitations affect the OTDA's ability to provide VM post installation follow-up/evaluation and also to manage drivers with non-English speaking backgrounds
- OTDAs find it difficult to assess whether new products comply with applicable standards
- It is difficult for OTDAs to provide training with the exact equipment prescribed as driving instructors (DI) may not have these adaptations installed.
- It is difficult to find appropriately skilled DIs who are both accessible and affordable

### **3.5 PAG consultation**

The PAG were presented with the findings from the survey of VM users, and OTDA responses to suggested action statements/items for possible inclusion in the draft VM guidelines.

Through this consultation process, it was decided that items to be included in the draft guidelines to progress to the next stage of development will be labelled as follows: items with 90% agreement will be worded as 'essential', and those with 80% as 'desirable'.

### **3.6 Conclusions**

Taken together, findings from these varied resources and stakeholders provide a very substantial knowledge base which reinforces both the importance of VMs to drivers with disabilities and the need for safe and consistent guidelines for their prescription.

Clearly Australian OTDAs can learn much from the international experience, particularly in the area of implementation of 'high tech' modifications. Despite some innovative and exciting international initiatives, which have potential to assist to improve training and funding of VM users, no work has previously been undertaken to develop prescription guidelines,

Conclusions are further strengthened by the active involvement in this research of a wide range of stakeholders including VM users, OTDAs, a number of regulatory and funding groups, and others

with expertise in the management of driver rehabilitation programs. This participative approach has ensured the practical relevance of the research, and provides a very sound basis for the draft prescription model and guideline development.

## **4. Outcomes**

### **4.1 Draft Guidelines**

A set of VM guidelines has been drafted in preparation for usability trialling with OTDAs and their clients. See appendix E.

### **4.2 Draft VM Prescription Model**

The draft VM prescription model (see Appendix F) represents the factors influencing safe and effective VM prescription. This is based on the Person-Environment-Occupation model (PEO) (Law, 1996) which posits that occupational performance is determined by the complex interrelationships between factors centred around the person, the occupation (activity) in which they are participating and the environment in which they are situated. During the VM assessment and prescription process it is essential that the OTDA takes all of these factors into consideration in order to provide VMs which are appropriate for the needs of the driver, promoting both independence and safety. The person is seen as a unique individual who takes on a range of roles and has a variety of experiences and influences. The context in which this person operates can be categorised into physical, institutional, cultural and social. The occupation is the task or activity engaged in by the person in order to satisfy a need or desire and/or fulfil a role. Occupational categories include self-care, productivity and leisure. An analysis of the occupation includes consideration of task characteristics, duration and complexity. Optimal occupational performance is promoted by a good fit between all three components (Christiansen, 2005). The section of the model where the circles overlap represents the OTDA intervention point, and the process of consideration of all factors in the three circles to assess driving skills and limitations and the VM requirements best suited to each individual driver's needs and other relevant characteristics.

### **4.3 Study findings regarding the literature review and drivers with disabilities using VMs**

The driver survey results and literature review findings have highlighted that driving independence facilitated by the use of VMs for people with disabilities enhances their ability to undertake life roles (worker, parent etc.) and enhances self-maintenance (access to shopping and medical facilities) thus extending community participation. However, effective VM prescription must consider a range of different factors including driver characteristics and needs, the design of the VM devices, safety issues, driver training and OTDA assessment processes. These factors informed the structure and content of the draft model of practice and VM prescription guidelines.

### **4.4 Study Limitations**

The study components have produced data and information hitherto not available to clinicians and researchers about Australian drivers who use VMs and about Australian OTDA opinions regarding



items to be included in a draft VM model and prescription guidelines. However a number of limitations should be considered when interpreting the results and planning future research activities.

Firstly, recruitment of VM users for the survey was largely limited to two advocacy groups. This may have produced a biased sample of older and more experienced drivers with mostly spinal cord injuries and polio. Extending recruitment methods to include other advocacy groups and techniques (e.g. recruiting via rehabilitation centres, OTDAs or driving instructors) may have yielded both a larger and more diverse sample of drivers with disabilities. Also, inclusion of a question in the driver survey regarding whether participants shared their car with other drivers would have provided useful data as to how often drivers without disabilities need to be considered as potential users of vehicles which must both accommodate VMs and be used by drivers without disabilities.

Secondly, whilst participation of OTDAs in the draft VM guideline process was very high (81.54%), time limitations precluded the involvement of OTDAs in reviewing and providing feedback regarding the draft model of practice. It is recommended that this be considered as a component of the next stage of this research.

## **5. Applications of the research**

### **5.1 Use of outputs**

Immediate and longer-term outputs of this project could be used in the following ways to the benefit of OTDAs, TAC, TAC clients and other rehabilitation clients undergoing driver rehabilitation:

- A) Increase the number of OTDAs who are competent and feel confident to approach the VM prescription process, by providing detailed guidelines and a model of practice to guide their clinical reasoning. In the longer term, this will improve client access and broaden the OTDA base which is currently narrow and subject to the perspectives of a limited number of individuals
- B) Improve the knowledge of WorkSafe agency and TAC staff involved in reviewing and approving requests for VMs, which should lead to time efficiencies and more appropriate decisions
- C) Information may also contribute to development of a VM provision and funding policy that incorporates standard requirements, to assist with setting expectations regarding the rehabilitation service delivery market, reviewing reasonableness of requests and reducing timeframes for approval of requests.
- D) The draft model and guidelines for VM prescription will form the basis for OTDA initial training and professional development in this aspect of driver assessment and rehabilitation. They will also help guide further research in this field, during which process they be amended as required for full validation.

E) The draft VM guidelines can be used by the profession to guide quality assurance and professional practice standards in relation to this aspect of OTDA practice.

## **5.2 End Users**

The end users of the project are: practicing OTDAs, community Occupational Therapists, including BASSA OTs, HDSG Clinical Panellists, TAC claims officers and WorkSafe agency staff responsible for reviewing VM requests and HDSG policy staff.

## **5.3 Audiences**

TAC and WorkSafe clients are also potential end users, as are the ultimate recipients of the VMs, OTDAs and generalist OTs, and their professional associations, VM suppliers, and other compensation schemes and funders of services (e.g. NDIS)

# **6. Potential impacts of the research**

The development of evidence-based guidelines for VM prescription has the potential to improve the rigour of current practice amongst OTDAs, as it provides a much stronger basis for VM prescription, in a format familiar to OTs. The outcomes may be utilised as part of OTDA training, service delivery and quality assurance processes.

Use of the guidelines is expected to improve the appropriateness of VM prescriptions by OTDAs and thereby improve the independence and safety of drivers with disabilities who are using VMs.

The survey results from drivers with disabilities who are using VMs will contribute to a small but growing body of research evidence about this driver group. Improved understanding of the positive effects on community participation that driving with VMs affords individuals with disabilities highlights both the economic and social capital value associated with independent driving.

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## **8. LIST OF APPENDICES**

A: Project Advisory Group members

B: Annotated bibliography

C: Driver survey

D: OTDA survey

E: Draft guidelines

F: Draft Vehicle Modification Prescription Model

## Appendix A: Project Advisory Group Members

Participants	
Fiona Chomley	Manager Health & Disability Policy and Research, Health & Disability Strategy Group, Transport Accident Commission
Fiona Cromarty	Senior Manager, Partnerships, Strategy & Performance, Transport Accident Commission
Joanne van Berkel	Team Manager, Spinal Team, Claims Transport Accident Commission
Victoria Leckey	Clinical Panel Consultant, Health & Disability Strategy Group, Workcover Victoria.
Simon Carter	Policy Coordinator, Health & Disability Strategy Group, Workcover Victoria.
Frank Parisi	Frank's Engineering
Gulsun Ali	Program Manager, ISCRR
Jeni Burton	Vehicle Modification Subsidy Scheme Clinical Advisors, State Wide Equipment Program
Michael Chan	Senior Vehicle Standards Engineer, Vehicle & Motorcycling Policy, Vic Roads
Tricia Williams	Senior Policy Officer, Road User Access and Mobility, VicRoads
Nazim Erdem	Information / Peer Support Coordinator, AQA Victoria Ltd.
Rosalind Pickhaven	Member, Disabled Motorists Australia
Vee Lyn Tan	Driver Assessor/ VAOT Driving Special Interest Group
Tom Eley	O.T. Solutions (Driving assessment and vehicle modifications)
Pamela Ross	Driver Assessor/ VAOT Driving Special Interest Group
Emilio Savle	President, Disabled Motorists Australia.

Invitees	
Robin Lovell	Course Coordinator, Driver Education and Rehabilitation, Occupational Therapy, La Trobe University
Sanjeev Gaya	Forensic Physician , Clinical Forensic Medicine, Victorian Institute of Forensic Medicine
Peter Trethewy	CEO, AQA Victoria Ltd.

## Appendix B: Annotated Bibliography – most relevant references/resources

Title	Author	Type of study	Relevance
Driving Assessment – a case of need.	(Barnes & Hoyle, 1995)	<ul style="list-style-type: none"> <li>• Cross sectional, retrospective Questionnaire n = 11,000 (to identify physically disabled)</li> <li>• Targeted Driving Questionnaire n= 420 (to identify disabled drivers)</li> </ul> Intervention (driving & medical assessment) n= 39	20% of 420 respondents said they would benefit from advice from driving centre  39 drivers were assessed <ul style="list-style-type: none"> <li>• 17 current drivers benefitted from further advice</li> <li>• 11 non/ex drivers should be able to drive following advice</li> <li>• 2 current drivers found to have medical conditions that affected driving ability but hadn't informed DVLA(Driver &amp; vehicle Licensing Agency)</li> <li>• Needs to be more driving assessment centres in the UK.</li> </ul>
Drivers' perceived workload when driving using adaptive equipment: A Pilot study	(Benoit, 2009)	N = 27 assessment of drivers using 3 clinical measurement tools	<ul style="list-style-type: none"> <li>• Finding: Introducing vehicle adaptations increases task demands for drivers</li> <li>• Article includes description of perceptual/cognitive/vehicle control monitoring tests used in driving assessment</li> </ul>
Decision Tool for clients with medical issues: A framework for identifying driving risk and potential to return to driving	(Dickerson & Bedard, 2014)		<ul style="list-style-type: none"> <li>• Outline of a framework for Occupational Therapists by which to consider clinical evaluation data and an older adult's driving risk and potential to return to driving</li> </ul>
Evaluating Technologies Relevant to the Enhancement of Driver Safety	(Foundation for Traffic Safety, 2014)	Evaluation of 7 technologies which aim to improve driver safety. (not specific to disabilities)	<ul style="list-style-type: none"> <li>• Authors highlight limited evidence available regarding the performance of safety devices.</li> </ul>
Driving for Happiness: Modified Vehicles and Health-Related Quality of Life After Spinal Cord Injury	(Giordano & Dijkers, 2011)	Cross sectional survey n=8,552	<ul style="list-style-type: none"> <li>• Examines the ownership/driving of modified vehicle and relationship with aspects of Health Related Quality of Life</li> <li>• Outcome measures &amp; results:               <ul style="list-style-type: none"> <li>○ ownership of modified vehicle 51%</li> <li>○ driving of modified vehicle 34%</li> <li>○ HRQL indicators</li> </ul> </li> </ul>



			<p>(satisfaction with life, self-perceived health status, health status compared with 1 year ago, severity of depressive symptoms, social integration, occupation)- more positive results for drivers than non-drivers.</p> <ul style="list-style-type: none"> <li>• If more people are able to use modified vehicles, significant positive lifestyle changes can be made, therefore physicians should push for driving as a longterm goal for patients.</li> </ul>
Safety & mobility of people with disabilities driving adapted cars	(Henriksson & Peters, 2004)	Questionnaire n = 793 (random sample of adapted vehicles registered with National Vehicle Register)	<ul style="list-style-type: none"> <li>• Outcome measures: <ul style="list-style-type: none"> <li>○ Describe safety situation of adapted car driver (accidents over the last 3.5years, driving confidence)</li> <li>○ Driver demographics</li> <li>○ Car details</li> <li>○ Driving habits</li> </ul> </li> <li>• Findings included: <ul style="list-style-type: none"> <li>○ Three main causes of accidents that resulted in injuries: <ul style="list-style-type: none"> <li>➤ Driver unfamiliar with equipment (3 cases)</li> <li>➤ Adaptation did not sufficiently satisfy the individual need – braking force insufficient (2cases)</li> <li>➤ Equipment broke down (4 cases)</li> </ul> </li> <li>○ Need for sufficient training to support disabled drivers</li> <li>○ Recommend mandatory adaptation evaluation to ensure adaptation is appropriate and driver has sufficient training</li> <li>○ Need for more flexible subsidies system to facilitate continuous adaptations if disease progressive</li> </ul> </li> </ul> <p>Drivers with disabilities in adapted cars did not constitute a traffic safety risk different from drivers in general.</p>

Adapting Motor Vehicles For People With Disabilities <a href="http://www.nhtsa.gov/cars/rules/adaptive/brochure/brochure.html">http://www.nhtsa.gov/cars/rules/adaptive/brochure/brochure.html</a>  <a href="http://www.infinitec.org/live/driving/car/mods.htm">http://www.infinitec.org/live/driving/car/mods.htm</a>	(National Highway Traffic Safety Administration, 1999)	Brochure for people considering car modifications	<ul style="list-style-type: none"> <li>• Chapters include:</li> <li>• Investigate cost saving opportunities and licencing requirements</li> <li>• Evaluate your needs</li> <li>• Select the right vehicle</li> <li>• Choose a qualified Dealer to modify your vehicle</li> <li>• Obtain training on use of new equipment</li> <li>• Maintain your vehicle</li> <li>• Resources</li> <li>•</li> </ul>
Patterns, Predictors, and Associated Benefits of Driving a Modified Vehicle After Spinal Cord Injury: Findings From the National Spinal Cord Injury Model Systems	(Norweg, Jette, Houlihan, Ni, & Boninger, 2011)	Cross sectional retrospective survey n = 3726 (National SCI database)	<ul style="list-style-type: none"> <li>• 36.5% of sample drove modified vehicle post SCI, predictors: <ul style="list-style-type: none"> <li>• Younger at injury</li> <li>• Degree or higher</li> <li>• Paraplegia</li> <li>• White, male</li> <li>• Using wheelchair for &gt;40 hours a week</li> <li>• Higher activity of daily living independence at hospital discharge</li> </ul> </li> <li>• Driving post injury: <ul style="list-style-type: none"> <li>• increased the odds of being employed by two times</li> <li>• Higher community reintegration score</li> <li>• Less depression &amp; pain</li> <li>• Better life satisfaction &amp; general health status</li> </ul> </li> </ul>
In-vehicle communication systems: the safety aspect	(Pauzie, 2006)	Review of current technology	<ul style="list-style-type: none"> <li>• Outlines ergonomic principles in relation to driving and technology and safety</li> </ul>
Return to work after spinal cord injury in Malaysia	(Ramakrishnan, Chung, Hasnan, & Abdullah, 2011)	Cross sectional survey n = 84	<p>Aim: To determine employment outcomes in people with SCI, and associated variables.</p> <ul style="list-style-type: none"> <li>• Findings: Ability to drive was one of the strongest variables for positive employment outcome.</li> </ul>
The association of assistive mobility devices and social participation in people with spinal cord injuries	(Tsai, Graves, & Lai, 2014)	Population study (using National Spinal Cord Injury Database) n = 2986, examining relationship between mobility device and social participation.	<ul style="list-style-type: none"> <li>• The use of a modified vehicle was found to be positively associated with social participation in a Spinal Cord Injury (using a wheelchair) population.</li> </ul>

"Can I drive, doctor?" LEAN thinking may help us answer the question.	(Thomas & Hughes, 2009)	Review of UK Driving and Vehicle Licensing Authority (DVLA) guidelines in context of clinical consultation.	<ul style="list-style-type: none"> <li>• Development of a structured discussion LEAN (Licence status, Eligibility, Ability, Notification – whether patient needs to notify DVLA)</li> <li>• Recommendations include: <ul style="list-style-type: none"> <li>○ Establishing driving status early on in history taking</li> <li>○ Referring patients to a Driving Assessment Unit for eligibility/ability testing rather than trying to determine status in clinic consultation</li> <li>○ Inform DVLA if a patient refuses to accept diagnosis and continues to drive.</li> </ul> </li> </ul>
Secondary Safety of car adaptations for disabled motorists	(Turner-Stokes, 1996)	Qualitative survey n = 33	<ul style="list-style-type: none"> <li>• Conversions decrease safety (primary safety e.g., mod introduces safety risk, and secondary safety e.g., interferes with safety features of car)</li> </ul>

#### Grey Literature: Lifestyle Magazine Articles/Opinion pieces/non-research articles

Big Ticket Items: buying an adapted car.	(Adelson, 2005)	Lifestyle mag description of acquiring car modifications	
Take the Wheel Again...The Right Way	(Anonymous, 2007)	Guidelines to obtaining modified vehicle (Lifestyle Mag)	<ul style="list-style-type: none"> <li>• Recommend using a National Mobility Equipment Dealers Association dealer to purchase vehicle/get information</li> <li>• Funding available from:</li> <li>• Vocational Rehabilitation Program (to assist people to get back into workplace)</li> <li>• Veterans Administration</li> <li>• Charitable organizations</li> <li>• Mobility rebate programs through vehicle manufacturers when purchase</li> </ul>

			new vehicle
National Mobility Equipment Dealers Association: Consumer guide to purchasing wheelchair accessible vehicles and equipment	NMEDA	General information regarding vehicle modifications and process for obtaining assessment, funding and training	<ul style="list-style-type: none"> <li>• Outlines steps on process for obtaining modifications/modif ied including OT assessment and driving lessons vehicle</li> </ul> <p>Describes range of possible modifications</p>
Making a wheel (chair) difference	(Parker, 2008)	Summary of development of conversion business in NZ	<ul style="list-style-type: none"> <li>• Business now produces one fully modified (driver in wheelchair) car per week (new floor, seat bases, wheelchair locks etc.).</li> </ul>
Modified car controls for motorists with a disability	(Rogers, 2001)	Overview of driving aids by disabled Engineer	<p>Outline of provision system in the UK:</p> <ul style="list-style-type: none"> <li>• Mobility Centres (operated by Dept Transport, Environment &amp; Regions) offer advice/demonstrati on of adaptations</li> <li>• Motability (charity) offers low cost hire scheme for applicant receiving high rate of disability living allowance for &gt;3yrs.</li> <li>• Blue Badge scheme operated by Dept Social Security provides access to disabled parking &amp; reduced ferry/toll bridge fees</li> <li>• Mobility Choice (part of DETR Mobility Unit) runs charity events/expos</li> </ul> <p>Outline of aids:</p> <ul style="list-style-type: none"> <li>• Adapted controls eg, hand brake/throttle</li> <li>• Converted vehicles e.g., lowered floor</li> </ul>

			<ul style="list-style-type: none"> <li>Specialist controls e.g., joystick, press button electronic controls</li> </ul>
Modified Vehicles	(Waite, 2011)	Interview, personal account	<ul style="list-style-type: none"> <li>Outlines general rehabilitation and vehicle modification process in USA</li> </ul>

## Appendix C: Drivers' survey



DEPARTMENTS OF OCCUPATIONAL THERAPY & HUMAN BIOSCIENCES

FACULTY OF HEALTH SCIENCES

Bundoora Campus, Kingsbury Drive, Bundoora. 3086

January, 2014

Dear AQA member,

**Re: DISABILITY AND DRIVING: IMPACT OF VEHICLE MODIFICATIONS FOR  
ENABLING COMMUNITY PARTICIPATION**

Thank-you for considering contributing to this important research.

AQA have endorsed this ground breaking study and promoted it to members via an item in an AQA newsletter. Findings from this research will contribute to the first ever Australian survey of drivers with disabilities. The project investigates how driving has helped support personal independence and community participation for people with a disability.

**Your involvement is very important.** As a token of appreciation, the first 50 completed questionnaires returned will receive a Hoyts or Village cinema movie voucher which you can keep or give away.

All you have to do is...

- 1) Read the attached information statement and decide if you want to complete the questionnaire
- 2) If you would like to participate you can either:
  - a. email your contact details to: [nkinsman@latrobe.edu.au](mailto:nkinsman@latrobe.edu.au) and she will send you a hard copy questionnaire and movie voucher form with reply paid envelopes
  - OR
  - b. complete the questionnaire electronically, save a copy to your hard drive, then attach to email and send to: [info@aqavic.org.au](mailto:info@aqavic.org.au)
  - OR
  - c. print out the questionnaire, complete and post to: *Dr Rwth Stuckey, Human Biosciences, La Trobe University, Bundoora VTC 3083* (please make sure there are no identifying details on the questionnaire envelope)
- 3) If you want to go into the draw for one of 50 movie vouchers, complete the movie voucher slip and return this in a separate envelope (to maintain your anonymity) or email to [info@aqavic.org.au](mailto:info@aqavic.org.au)

All completed surveys and forms for movie vouchers should be returned by 21<sup>st</sup> March, 2014 but the sooner the better to collect a movie voucher!

Thank-you.

Dr Rwth Stuckey (on behalf of Dr. Marilyn DiStefano & A/P Wendy Macdonald)

## **DISABILITY AND DRIVING: IMPACT OF VEHICLE MODIFICATIONS FOR ENABLING COMMUNITY PARTICIPATION**

### ***Participant Information Statement***

**Contact Investigator:** Dr. RUTH Stuckey, Senior Lecturer, La Trobe University

Phone: (03) 9479 5751, Email: [r.stuckey@latrobe.edu.au](mailto:r.stuckey@latrobe.edu.au)

**Other Investigators:** Dr Marilyn DiStefano & A/P Wendy Macdonald)

#### **What are the aims of this research project?**

This research project aims to explore the limitations/benefits and considerations associated with the use of vehicle modifications by people who have disabilities. We are also interested to understand how the use of a modified vehicle has impacted on your ability to be independently mobile and participate in social and community activities. Specifically the research aims to describe the:

- population characteristics of people who use vehicle modifications
- different types of vehicle modifications that people use
- benefits / limitations /considerations associated with driving a car with vehicle modifications
- driver opinions regarding aspects of vehicle modifications
- impacts on personal independence and community participation afforded by the use of vehicle modifications

#### **Who can participate in the study?**

In order to participate in this study you must:

- Be a person with a disability who uses vehicle modifications and/or a member of AQA
- Be aged 18 years or over
- Have used a vehicle modification before
- Be an active or retired driver (retired within the last 12 months)
- Be able to read and write in English

#### **What will I be required to do as a participant in this study?**

If you wish to participate in this study, you will be required to complete a written questionnaire which should take about 15 to 20 minutes. The questionnaire will ask you to report on your experience of driving a vehicle with modifications and what you believe to be the benefits/issues of using a vehicle modification. **You can complete the questionnaire anonymously.**

#### **What will become of the information I provide in this study?**

It is anticipated that a summary of the results of this study will be included in a forthcoming edition of the AQA newsletter. The results may also be published in academic journals or presented at conferences. As this is a pilot study, the data collected may be kept for use in a larger study in the future.

*Note: No information that could potentially be used to identify any participant will appear in any published material.*

**What will be done to ensure the information I provide remains confidential?**

As the questionnaire is anonymous, the researchers will not be able to identify responses as belonging to certain participants. To assist with maintaining anonymity, participants are asked **not** to write any identifying information on the questionnaire such as full name, address etc. Request forms for movie vouchers will be kept separately from the completed questionnaires in a locked filing cabinet, and all information stored as computer files will be password protected. No one apart from the researchers will have access to names/addresses of people requesting a movie voucher.

**What are the likely benefits of participation in this study?**

No immediate direct benefit to you as a participant is expected as a result of participating in this study. However, some participants may benefit from being able to share experiences of using vehicle modifications and offering suggestions to the researchers. It is hoped that this study will inform current health professional driver rehabilitation practice especially, occupational therapists in helping other people with disabilities to continue driving with the use of vehicle modifications.

VicRoads are interested in the results of this questionnaire survey and of ways they can enhance the vehicle modification prescription/application process. Please note that VicRoads will **not** be involved in collecting or analysing the data and will **not** be provided with the names or addresses of any participant who returns the request form for a movie voucher. To protect your anonymity, please ensure that you return the request form separately to the questionnaire. Two reply-paid envelopes are provided for this purpose.

**Are there any risks, discomforts or harms which may result from participation in this study?**

Some participants may feel some emotional discomfort when recalling past experiences of how and why they began using vehicle modifications. Such individuals may find it a comfort to know that their questionnaire responses will help to inform health professionals and VicRoads of ways to make it easier for other people with disabilities to use vehicle modifications.

Participation in this study is completely voluntary. There are no disadvantages, penalties or adverse consequences of not participating in this study. No-one will know if you do or do not reply to the researchers. Please note that as the questionnaire is to be kept entirely anonymous, it will not be possible to return any questionnaires or to withdraw them from the study once they have been returned. Your return of the questionnaire implies you consent to participate in the study.

**Questions or queries?**

Any questions regarding this study may be directed to the Senior Investigator, Dr. Rwth Stuckey, of the School of Human Biosciences at La Trobe University on (03) 9479 5751 or via email at [r.stuckey@latrobe.edu.au](mailto:r.stuckey@latrobe.edu.au)

If you have any complaints or queries that Rwth Stuckey has not been able to answer to your satisfaction, you may contact the Secretary, Human Ethics Committee, Research Services, La Trobe University Bundoora, Victoria 3083, by telephoning (03) 9479 1443 or via email at [humanethics@latrobe.edu.au](mailto:humanethics@latrobe.edu.au)



## Disability and driving: impact of vehicle modifications for enabling community participation

### Section A: General information about you.

*Please answer the following questions about **yourself**, by ticking/circling the box/es that best apply to you, or writing your answers in the space provided.*

<b>1. Your Gender</b> <input type="checkbox"/> Male <input type="checkbox"/> Female	<b>2. Your Age (in years)</b> _____
--	-------------------------------------

**3. What are your current living arrangements? (*One only*)**

☐ Live alone  
☐ With spouse, other family and/or friend  
☐ Hostel  
☐ Other (please specify) \_\_\_\_\_

**4. Where do you currently live in Victoria? (If interstate – state this under “other”).**

☐ Melbourne - Inner or suburban  
☐ Outer Melbourne or close to large regional centre (mostly suburban)  
☐ Rural setting/outside of Melbourne (fair way from transport/services)  
☐ Other (please specify) \_\_\_\_\_

**5 a. When you don't have access to your modified vehicle, (e.g. car maintenance / repairs), are you able to independently access suitable public or community transport?**

☐ Yes    **Please continue to Question 5b.**  
☐ No     **Please continue to Question 6a.**

**5 b. What type of transport are you able to access? (*Tick all those that apply*)**

☐ Train  
☐ Tram  
☐ Bus  
☐ Community bus  
☐ Taxi  
☐ Other (eg. Transport roster) \_\_\_\_\_

**6 a. How would you describe your current general physical health? (*One only*)**

☐ Very Good – only occasional issues  
☐ Good – mostly consistent  
☐ Fair – patchy/variable  
☐ Poor – regular issues

**6 b. How would you describe your current general psycho-social health? (eg. the stability of your mood, how well you interact socially with people, motivation) (*One only*)**

☐ Very Good – only occasional issues  
☐ Good – mostly consistent  
☐ Fair – patchy/variable  
☐ Poor – regular issues

**7 a.** Have you ever been **medically diagnosed** with a permanent health condition or disability?

- ☐ Yes  
☐ No  
☐ Unsure    If no, or unsure, **Please skip to Question 7c.**

**7 b.** If yes to Question 7a, what were the condition(s)? \_\_\_\_\_

**7 c.** Consider the main health/disability issues that led you to require a vehicle modification(s).

(i) What are the main health condition(s)? (Please specify) \_\_\_\_\_

(ii) How long ago did the conditions develop or were diagnosed?  number of years  
 Comments \_\_\_\_\_

**7 d.** Do you have any other diagnosed health condition(s)? (Apart from any already mentioned in Question 7b.) *(Tick all those that apply):*

- |   |   |
|---|---|
| <input type="checkbox"/> Vision loss/cataracts                      | <input type="checkbox"/> Amputation                   |
| <input type="checkbox"/> Arthritis                                  | <input type="checkbox"/> Polio                        |
| <input type="checkbox"/> Hearing Loss                               | <input type="checkbox"/> Spinal cord injury           |
| <input type="checkbox"/> Diabetes                                   | <input type="checkbox"/> Epilepsy                     |
| <input type="checkbox"/> Stroke                                     | <input type="checkbox"/> Sleep apnoea                 |
| <input type="checkbox"/> Mental illness; eg. Depression             | <input type="checkbox"/> Alcohol/ drug abuse          |
| <input type="checkbox"/> Neurological disease; e.g. Parkinson's, MS | <input type="checkbox"/> Other (please specify) _____ |

**7 e.** Do you currently have any functional limitations as a result of your diagnoses?

*(Tick all those that apply):*

- |   |   |
|---|---|
| <input type="checkbox"/> Functional restrictions in one arm | <input type="checkbox"/> Functional restrictions in two arms        |
| <input type="checkbox"/> Paralysis of one arm               | <input type="checkbox"/> Paralysis of two arms                      |
| <input type="checkbox"/> Functional restrictions in one leg | <input type="checkbox"/> Functional restrictions in two legs        |
| <input type="checkbox"/> Paralysis of one leg               | <input type="checkbox"/> Paralysis of two legs                      |
| <input type="checkbox"/> Neck problems (ie. stiffness)      | <input type="checkbox"/> Low endurance                              |
| <input type="checkbox"/> Back/trunk problems                | <input type="checkbox"/> Vision problems (other than short sighted) |
| <input type="checkbox"/> Other (please specify) _____       |   |

**7 f.** Do you routinely use any personal mobility aides (e.g. wheelchair, walking frame)?

- ☐ No **Please continue to Question 8a.**  
☐ Yes **Please specify which ones and how often you use them below.**

Type of personal mobility aide	Rarely	Occasionally	Most of the time	All the time
a. Self propelled wheelchair				
b. Motorised mobility device (e.g. wheelchair or scooter)				
c. Walking frame or stick				
d. Other – please specify _____				

## Section B: Current Driving Status

**8 a. Which way do you prefer to get around? (*One only*)**

- ☐ Drive yourself
- ☐ Have someone drive you
- ☐ Use public transport
- ☐ Use a taxi
- ☐ Other (please specify) \_\_\_\_\_

**8 b. Are you currently driving?**

- ☐ Yes Please continue to Question 8c.
- ☐ No Please skip to Question 9a.

**Complete this section if you are STILL driving...**

**8 c. How long have you been driving for?**

Please specify: \_\_\_\_\_ years

**8 d. How often are you driving? (*One only*)**

- ☐ Daily / Almost everyday
- ☐ Regularly (2 - 4 times per week/most weeks)
- ☐ Sometimes (once on average per week/most weeks)
- ☐ Occasionally (2 - 4 times per month)
- ☐ Other (please specify) \_\_\_\_\_

**8 e. Where do you normally drive? (*Tick all those that apply*)**

- ☐ Local shops (grocery shopping, chemist, banking, post office)
- ☐ Medical or therapy appointments
- ☐ Church
- ☐ Work
- ☐ Volunteer work
- ☐ Social clubs/outings
- ☐ Recreation or leisure activities
- ☐ Unfamiliar areas
- ☐ To visit friends/family
- ☐ Regularly travel to rural destinations (eg. 1-2 hours drive)
- ☐ Regularly travel interstate (eg. 4 or more hours drive)
- ☐ Other regular destinations (please specify) \_\_\_\_\_

**8 f. When you drive to your most common destinations, how long do you usually drive for in one stretch of time? (*One only*)**

- ☐ 2 hours or more
- ☐ 1 to 2 hours
- ☐ Between 30-60 minutes
- ☐ Less than 30 minutes
- ☐ Less than 15 minutes

**8 g. Why do you continue to drive? To visit/attend/maximise: (*Tick all those that apply*)**

- ☐ Transport independence/flexibility
- ☐ Local shops (grocery shopping, chemist, banking, post office)
- ☐ Medical or therapy appointments
- ☐ Church
- ☐ Work.....(*more options on next page*)

- ☐ Volunteer work
- ☐ Social clubs/outings
- ☐ Recreation or leisure activities
- ☐ Access to unfamiliar areas for recreation
- ☐ To visit friends/family
- ☐ To travel to rural destinations (eg. 1-2 hours drive)
- ☐ To travel interstate (eg. 4 or more hours drive)
- ☐ Necessity – can use public transport but none accessible
- ☐ Other regular destinations (please specify) \_\_\_\_\_

8 h. If you had to go somewhere and you didn't want to drive yourself, what would you do?

- ☐ Ask a friend or relative to drive you
- ☐ Call a taxi
- ☐ Catch public transport
- ☐ Drive yourself regardless of how you feel
- ☐ Cancel or postpone your plans and stay home
- ☐ Other (please specify) \_\_\_\_\_

8 i. When you normally drive, do you ever modify how, when or where you drive to **accommodate your disability**? In the boxes below, indicate (with an "X") any considerations you apply and how frequently you usually do these things.

Ways I modify my driving	Never	Sometimes	Often	Always
a. I drive to places I know have "disabled" car parking				
b. I avoid driving at night				
c. I avoid driving at peak hour or to places where I know there will be a lot of traffic				
d. I avoid driving during rain/bad weather				
e. I avoid driving long distances (e.g. > 200km in the one day)				
f. I avoid driving to unfamiliar destinations that require navigation				
g. I avoid driving to distant locations if I am unsure about petrol stations / accessing mechanical support				
h. Due to the vehicle modifications I have, I avoid..... (please specify) _____				
i. Other/comments: _____ _____				

\*\*\* Please skip to Question 10.

**Complete this section if you have STOPPED driving....**

9 a. How long ago did you stop driving? (*One only*)

- ☐ 0 - 6 months
- ☐ 6 - 12 months
- ☐ More than 1 year ago

9 b. What has influenced the decision or requirement to stop driving? *(Tick all those that apply)*

- ☐ Health issues
- ☐ Age associated changes
- ☐ Recommendation from health professionals
- ☐ Advice/pressure from family/friends
- ☐ Accident involvement when driving (major vehicle damage/someone getting hurt)
- ☐ Loss of confidence
- ☐ Cost of modifying/maintaining/upgrading your vehicle
- ☐ Other (please specify) \_\_\_\_\_

9 c. Are you satisfied that stopping driving was the best decision under these circumstances?

- ☐ Yes
- ☐ No
- ☐ Unsure

Any comments? \_\_\_\_\_

\*\*\*\*Please continue to Question 10.

### Section C: Vehicle Modifications

10 a. Please think about the vehicle modifications you have used or are currently using. Indicate below how long you have used the modifications (in years) and your overall satisfaction with using them. (Use an "x" in the column that corresponds to the rating).

Vehicle modifications I've used	Years of use	Overall satisfaction rating			
		Not satisfied	Partly satisfied	Mostly satisfied	Very satisfied
a. Hand controls					
b. Steering aids					
c. Lowered floor/ Raised roof					
d. Ramps/hoist/wheelchair access					
e. Extended/additional mirrors					
f. Modified foot operated brake/accelerator changes (e.g. pedal extension, left accelerator)					
g. Modified indicators/light switches, etc.					
h. Other (Please specify) _____					

10 b. Do you have any comments about the design / safety / installation of the modifications you use?

If so, comment here. Don't forget to specify which type(s) of modification you are commenting on.

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12. Please specify the type of vehicle modification(s) you currently use.

Vehicle modification 1: \_\_\_\_\_

Vehicle modification 2: \_\_\_\_\_

Vehicle Modification 3: \_\_\_\_\_

Vehicle Modification 4: \_\_\_\_\_

For each vehicle modification, please rate your level of concern about the following issues.

Vehicle modification issue	No concerns	Few concerns	Regular concerns	Constant concerns
<b>a. Breakdown of modification(s)</b>				
Vehicle Modification 1				
Vehicle Modification 2				
Vehicle Modification 3				
Vehicle Modification 4				
<b>b. Expensive to maintain</b>				
Vehicle Modification 1				
Vehicle Modification 2				
Vehicle Modification 3				
Vehicle Modification 4				
<b>c. Any additional costs (ie. registration)</b>				
Vehicle Modification 1				
Vehicle Modification 2				
Vehicle Modification 3				
Vehicle Modification 4				
<b>d. Safety of the device</b>				
Vehicle Modification 1				
Vehicle Modification 2				
Vehicle Modification 3				
Vehicle Modification 4				
<b>e. Mental effort needed to operate devices</b>				
Vehicle Modification 1				
Vehicle Modification 2				
Vehicle Modification 3				
Vehicle Modification 4				

f. Comments/explain concerns here:

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#### Section D: Impact of using Vehicle Modifications

**11 a. Have you had an occupational therapy assessment specifically related to driving? (Tick one only)**

- ☐ Yes                      **Please continue to Question 11b.**  
☐ No                        **Please skip to Question 11c.**  
☐ Can't remember      **Please continue to Question 11b.**

**11 b. Did the occupational therapist assist with vehicle choice (ie. advise you about the best type and model of car to suit your circumstances)? (Tick one only)**

- ☐ Yes  
☐ No, or not applicable (couldn't afford to change vehicle)  
☐ Not applicable (changing vehicle was not an option)  
☐ Can't remember

**11 c. Who provided you with assistance/advice about which vehicle modifications to use? (Tick all those that apply)**

- ☐ Occupational therapist  
☐ Occupational therapy driver assessor  
☐ Independent Living Centre (ILC)  
☐ Vehicle modifiers  
☐ Local mechanic  
☐ Driving instructor  
☐ Can't remember  
☐ Other (please specify) \_\_\_\_\_

**11 d. At the time of planning for your vehicle modification/s, did you access/use any of the following? (Tick all those that apply)**

- ☐ Lessons with an instructor to practice using vehicle modifications  
☐ Opportunity to trial different vehicle modifications  
☐ Opportunity to talk to people about vehicle modifications / see them in other peoples' cars  
☐ Can't remember  
☐ Other (eg. Hire a car with the modifications to trial, no funds for lessons, no suitable vehicle available) Please specify:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Think about the destinations you have been able to reach and/or activities you've been able to participate in, as a result of your driving independence achieved via the use of vehicle modification(s). Rate your level of agreement with the following statements below. (Add an "x" in the column.)

Vehicle Modification(s) have allowed me to....	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Travel places without reliance on others				
b. Get to local shops (for food shopping, chemist, banking, post office)				
c. Get to medical or therapy appointments				
d. Participate in sport/recreation/leisure activities				
e. Get to work				
f. Get to volunteer work				
g. Attend church, social club/outings				
h. Travel to unfamiliar areas/destinations				
i. Visit friends/family				
j. Travel to rural destinations				
k. Travel interstate				

l. Are there any other activities/destinations that you have been able reach because of your vehicle modification(s)? Please specify: \_\_\_\_\_

\_\_\_\_\_

m. Could you drive by yourself without your vehicle modifications?

☐ Yes

☐ No

☐ Maybe

Any comments? \_\_\_\_\_

\_\_\_\_\_



14. If you did not have a vehicle with suitable modifications, how easy/difficult would it be for you to access these destinations and/or participate in the following activities? Please rate the following. (Add an "x" in the column.)

Activities/destinations:	Without a suitably modified vehicle, accessing transportation to the following activities/destinations would be....				
	Easy	Manageable	Difficult	Very Difficult	Impossible
a. Local shops (for food shopping, chemist, banking, post office)					
b. Medical or therapy appointments					
c. Church					
d. Participate in sport / recreation / leisure activities					
e. Get to work					
f. Get to volunteer work					
g. Attend church, social club / outings					
h. Travel to unfamiliar areas/destinations					
i. Visit friends/family					
j. Travel to rural destinations					
k. Travel interstate					
l. If you did not have a vehicle modification(s), what activities/destinations would be difficult for you to reach? Please specify: _____ _____ _____ _____ _____ _____					

## Section E: Further Comments

*Please answer the following questions by writing your answers in the space provided. If you need more space, feel free to attach an additional sheet of paper – remember to add the question number.*

**15 a.** What do you think are the most important aspects of making sure that vehicle modification(s) are best matched to suit a driver's needs? \_\_\_\_\_

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**15 b.** What do you think could have helped you in choosing the best vehicle modification(s) for your circumstances (eg. access to displays of life size cars with installed vehicle modifications, hard copy resources, photos on the internet)? \_\_\_\_\_

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**16.** What advice would you recommend to other drivers with disabilities who might be faced with needing to find out about or have modification(s) installed to their car? \_\_\_\_\_

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**17.** How could occupational therapists or other people help drivers with disabilities to choose the best vehicle modification(s) for their circumstances? \_\_\_\_\_

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**18.** How could other organisations (eg. Motoring clubs like RACV, licensing authorities like VicRoads, RTA, funding bodies) help in supporting drivers with disabilities to be more independent with driving? \_\_\_\_\_

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**19.** Is there anything else you would like to mention in relation to vehicle modifications? \_\_\_\_\_

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**Thank-you for completing this survey** and returning it in the self-addressed postage-paid envelope. Don't forget to return your request form in a separate self-addressed postage-paid envelope in order to go into the draw for a movie voucher. **Please return by 21<sup>st</sup> March 2014 or ASAP** to claim a movie voucher.

## Appendix D: OTDAs Survey

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### VicRoads OTDA Seminar 18 October 2014 – Workshop Survey regarding OTDA Vehicle Modification (VM) prescription.

**\*\*Please review this workshop handout and complete the items. Bring the completed form along with you to the Seminar to be held at VicRoads – completed anonymous surveys will be collected. Your responses will contribute to the development of the draft VM OTDA guidelines. If you are unable to attend in person, you can submit your anonymous responses via email or mail to Tricia Williams ([tricia.williams@roads.vic.gov.au](mailto:tricia.williams@roads.vic.gov.au)) (See later also).**

#### Scope:

*This workshop survey relates to items for consideration in draft OTDA guidelines for use when prescribing Vehicle Modification (VMs). VMs are defined as vehicle adaptations or modifications including low/high tech driver mods or adaptations (add-on or requiring significant vehicle adaptations) to support independent driving tasks and vehicle access/egress. The survey focuses on the role of OTDAs in the driver assessment and aid/modification prescription process. It will not address the role and activities of vehicle engineers/installers or product developers. The focus is primarily on **vehicle drivers** rather than passengers and on **drivers with physical impairments** rather than behavioural/cognitive limitations. The OTDA Competency Standards (1998), results from an overseas study tour and other references have been used to identify key items/issues. Your responses and the workshop discussion to be held on 18.10.2014 will highlight issues and priorities for consideration in the draft OTDA VM guidelines.*

#### Instructions:

*Thanks for completing this anonymous workshop survey. Your opinion matters and will contribute to the development of practicable guidelines. We will discuss the items in the workshop to be held on 18.10.2014. Firstly we'll collect some general information about you as a driving assessor. Then we'll ask you to indicate your response to statements relating to how you think the OTDA profession should approach driver assessment and the vehicle modification prescription process. There are places where you can contribute comments as well.*

#### **A. Background Information about you and your clients**

1. **How long** (in years) have you been conducting Occupational Therapy Driving

Assessments? .....

2. On average, how many full assessments (includes both off & on-road tests) do you conduct

**each month?** .....

3. Which **age category** best represents the **majority of clients** you see for driving assessments: **(tick one only)**

- a. aged 65 plus ☐
- b. working age (18 – 65) ☐
- c. young drivers (16 – 25 years) ☐
- d. mixed - all driver age groups ☐

4. Which **diagnostic category** best represents the **majority of clients** you see for driving assessments: **(tick one only)**.

The majority of my clients present with:

- a. mostly physical issues ☐
- b. mostly cognitive/perceptual issues ☐
- c. mixture of both physical and cognitive/perceptual issues ☐

### B. Client characteristics

Please indicate your responses to the following statements in relation to the **drivers who require VMs** presenting to you for OT assessments.

**(Tick one response only per item.)**

Issue related to vehicle modifications (VMs)		Proportion of my clients						
		Almost all	Most	About half	About 1/3rd	Small number	none	N/A
1	Proportion of my clients with <b>insurance funding</b> for VMs (e.g. TAC, workers comp.)							
2	Proportion of my clients with access to Victorian <b>VMSS funding</b>							
3	Proportion of my clients with <b>no funding</b> for vehicle modifications							
4	Proportion of my clients who <b>share the vehicle</b> they will be modifying with others							
5	Proportion of my clients that <b>have to</b> modify an <b>existing car</b> they have access to/own							
6	Proportion of my clients who have to <b>purchase a new car</b> to modify							

7	Proportion of my clients requiring “ <b>minor</b> ” or low tech vehicle modifications (e.g. “add ons” like steering aides/hand controls, left foot accelerators)							
8	Proportion of my clients requiring “ <b>major</b> ” or high tech vehicle mods/aids (e.g. alternative steering/braking systems, platforms/ramps/lowered floors, complex steering aides with integrated secondary controls, systems requiring integration with car electronics)							
9	Proportion of my clients who <b>compromise</b> on VM because they <b>cannot afford</b> what they really need							
10	Proportion of my clients that need to have <b>lessons</b> in order to learn how to use vehicle modifications relating to driver controls							
11	Would you like to comment on any other driver needs/characteristics regarding VMs? Is there anything missing?							

### C. General Assessment and Prescription Principles

**Note:** the “cues” are used in a similar way to the 1998 OTDA Competency standards. They represent possible ways of addressing the issue/item as relevant to the client. Cues listed here are only examples and are not an exhaustive list. **(Tick one response only per item.)**

Issues		Frequency of application related to VM prescription				
		Yes: all the time	Sometimes	Never	Don't know	N/A
1	Recommendations for adaptive driving equipment or VMs are based on <b>assessment results</b> , the client's strengths and limitations, and sound <b>clinical reasoning</b>  Cues:  Off road assessment results, vehicle design, ergonomic factors					
2	Therapist ensures that clinical decisions made throughout the prescription process are <b>ethical</b>					

	<p>Cues:</p> <p>recommendations based on “best fit”, if possible provision of min. 3 options for aide supply</p>					
3	<p>Therapist must consider additional disadvantages/resources/issues which may be relevant to clients/ of Indigenous (Aboriginal or Torres Strait Islander) heritage or from a <b>culturally and linguistically diverse</b> or non-English speaking background</p> <p>Cues:</p> <p>utilise interpreter, provide written/translated information re VMs, involve family</p>					
4	<p>Therapist must consider VM prescription goals in <b>partnership</b> with relevant others</p> <p>Cues:</p> <p>clients’ family use of vehicle / other drivers, clients’ insurer, vehicle modifier, driving instructor</p>					
5	<p>Therapist should use appropriate standardised (if available) <b>measurement/outcome measures</b> at baseline or at other stages during VM prescription to measure change /progress</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- hand strength, ROM measurements, sitting height in wheelchair from floor</li> <li>- head clearance from internal roof</li> </ul>					
6	<p>Client’s existing <b>available vehicle</b> or currently available <b>standard</b> (non-modified) vehicles and fixture/fitting adjustments are initially evaluated prior to complex/high tech VMs</p> <p>Cues: In client’s existing car evaluate potential to</p> <ul style="list-style-type: none"> <li>- adjust steering wheel position, adjust seat /mirror position, modify door opening</li> </ul>					
7	<p>Evaluate <b>available “minor/low tech” VMs</b> and access/egress aides prior to</p>					

	<p>"high tech/major"</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- consider mechanical ("add on") steering aides before integrated electronic steering systems</li> <li>- evaluate options for lower limb accelerate/brake before considering hand controls</li> </ul>					
8	<p>Consider driver <b>needs for training and familiarisation</b> with potential/recommended VMs.</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- contact with other drivers who have similar VMs, trialling , lessons, costs for lessons</li> </ul>					
9	<p>Prescription process involving <b>lessons</b> with/&amp; <b>trailing</b> of modifications should consider client, activity and environmental demands/requirements</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- the client's expectations of the adapted vehicle, adequate length of trial</li> <li>- commonly undertaken driving tasks (e.g. parking, mobility aide use/storage, getting petrol)</li> <li>- environments that are usual/relevant to the client (e.g. garage/driveway/country driving)</li> </ul>					
10	<p>Therapist must inform client about the <b>characteristics/design features</b> of VMs/adaptations</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- range of available solutions, including their limitations</li> <li>- the appearance, installation/de-installation/storage issues</li> <li>- the limitations, drawbacks and/or advantages of different types of solutions</li> </ul>					
11	Any further comments?					

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**D. Person Centred Factors: Impairment + Activity limitations and participation restrictions**

Issues – OTDA.....		Frequency of application related to VM prescription				
(Tick one response only per item.)		Yes: all the time	Someti mes	Never	Don't know	N/A
1	<p>Considers <b>driver licensing/health/disability factors</b> impacting on VM viability/requirements</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- type of licence held, nature of condition (e.g. fluctuating, deteriorating, cognitive issues)</li> <li>- time since injury, use of medication, insight into functional abilities</li> </ul>					
2	<p>Considers driver factors impacting on <b>capacity to learn</b> how to use modifications</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- nature of condition (e.g. memory, learning capacity), intellectual disability</li> <li>- cognitive-perceptual impairments, driving experience</li> <li>- ability to learn road law and obtain learner permit</li> </ul>					
3	<p>Establishes that the client has <b>adequate cognitive, physical and psychological abilities</b> to operate the VMs safely, consistently and effectively</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- doctor referral information, off and on-road assessment, neuropsychological assessment</li> </ul>					
4	<p>Assesses client's <b>posture, trunk control, upper &amp; lower limb position</b> etc., to maintain body in correct position</p>					



	<p>to use VMs effectively</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- trunk stability, sitting position, restraint adjustment and application</li> </ul>					
5	<p>Assesses client's limb/body function to control VMs for steering/ acceleration/ braking devices (<b>primary controls</b>)</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Upper/lower limb impairments, reliable limb positioning, endurance, ability to hold/move steering device</li> </ul>					
6	<p>Assesses client's limb/body function to control modified indicators, windscreen wipers, horn and/or lights (<b>secondary controls</b>)</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Upper/lower limb impairments, reliable limb positioning, endurance, hold/moving devices</li> </ul>					
7	<p>Assesses client's vision/body function to use <b>internal/rear view/side mirror/parking</b> VMs</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- referral information, off road vision screen results, assisted vision (glasses/contacts)</li> <li>- neck/trunk movement, eye disease, neck restrictions</li> </ul>					
8	<p>Assesses client's body function to manage <b>ingress/egress</b> with standard existing vehicle adjustability features before suggesting aide or VMs</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- adjust seat, transfer board, adapt door handle, portable grab stick, extend seat tracks</li> </ul>					
9	<p>Assesses client's potential use of aides/customised seating options to support <b>mobility/access/egress/seating requirements</b></p>					

	<p>Cues:</p> <p>-Bony deformities/body shape, safe driving position, safe transfers, storing/transporting aides</p>					
10	Any further comments? Are there any key issues missing?					

### E. System, financial and environmental factors

	<b>Issues – OTDA.....</b>  <b>NB: “Family” includes all significant others.</b>  <b>(Tick one response only per item.)</b>	Frequency of application related to VM prescription				
		Yes: all the time	Someti mes	Never	Don’t know	N/A
1	<p>Discusses <b>costs and funding</b> options with client/family</p> <p>Cues:</p> <p>- TAC/VMSS/other insurance cover, criteria for government funding</p>					
2	<p>Informs client/family of <b>costs and availability</b> of the adaptive equipment/modifications</p> <p>Cues:</p> <p>- A range of options is provided (if possible), ILC database, discussion with vehicle modifier</p>					
3	<p>Provides client/family with <b>information</b> about adaptive equipment/vehicle modification installation options and requirements</p> <p>Cues:</p> <p>- Where possible, 2 or more equipment options are provided, cost estimates, 2<sup>nd</sup> hand options</p>					
4	<p>Only recommends VMs/aides meeting <b>relevant national, design and</b></p>					

	<b>engineering standards</b>  Cues:  - liaison with vehicle installers, VicRoads vehicle engineers  - Australian Standards, ILC information services					
5	Evaluates whether the required VMs will <b>suit the vehicle the driver wants to use/adapt</b>  Cues:  - Liaison with client/family/vehicle modifier/insurance company  - Impact of modifications on safety systems like airbags  - Adaptations placed/installed so as not to impede access to/functionality of other controls/displays					
6	Any further comments? Are there any key issues missing?					

#### F. Occupation of driving, activity issues and training

	<b>Issues –</b>  <b>The OTDA.....</b>  <b>(Tick one response only per item.)</b>	Frequency of application related to VM prescription				
		Yes: all the time	Someti mes	Never	Don't know	N/A
1	Obtains information on the <b>intended patterns of driving</b> , activities, roles involving driving and destinations that may impact on minor or major VMs  Cues:  - Duration, distances, city/rural driving, work/parenting roles/requirements, transporting items  - general/routine maintenance (e.g. getting petrol, mechanical repairs)					

2	<p>When required, refers client to suitably qualified <b>driving instructor (DI)</b> for lessons to learn use of adaptations (usually for modified steering/acceleration/braking/indication controls).</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- DI with suitable equipment and experience with drivers with disabilities</li> <li>- DI is accessible and affordable</li> <li>- Lessons may occur in in DI;s vehicle or client's vehicle if training brake is installed</li> </ul>					
3	<p>Observes the client's ability to use the adaptive driving equipment or vehicle modifications safely and competently with <b>adequate sampling of driving behaviours</b></p> <p>Cues</p> <ul style="list-style-type: none"> <li>- representative driving tasks, feedback from DI regarding lessons</li> <li>- parking lot and standard or local area on-road assessment</li> </ul>					
4	<p><b>Seeks expert advice</b> regarding customised/complex adaptive driving equipment or VMs not commercially available "off the shelf" or simply installed</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>-Consults with other OTDAs, Mechanics with specialised knowledge, Technical Aid to the Disabled, Vehicle modifiers, Drivers with similar modifications</li> </ul>					
5	<p>Provides the client with <b>information about provision and installation</b> of aides/ adaptive equipment or VMs</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Professional/experienced vehicle engineers/modifiers, other OTDAs</li> <li>- Where possible, 2 or more options for installation</li> </ul>					
6	Any further comments? Are there any key issues missing?					

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### G. Evaluation of Modifications – General

	<b>Issues:</b>  <b>Post installation, the OTDA evaluates/ensures that.....</b>  <b>(Tick one response only per item.)</b>	Frequency of application related to VM prescription				
		Yes: all the time	Someti mes	Never	Don't know	N/A
1	Driver/family knows how to <b>use the adaptations safely</b> (**see also specific items below)  Cues: - documentation, explanation, training, on-road evaluation, feedback from DI - closed circuit/car park in-vehicle assessment, on-road assessment					
2	<b>Fitted aides/VMs</b> match the <b>prescription</b> provided and suit the driver's capabilities  Cues: - type/location of modified controls appropriate, within UL reach envelope, driver capacity/strength to generate forces required to safely, reliably operate the controls - Detailed requisition order/Quote for services, diagrams/photos showing installation location					
3	Driver/family is aware of any <b>operational limitations</b> of the VMs  Cues: - what adaptation will/won't do, installation/de-installation issues - instructions for other drivers/mechanics when driving/servicing vehicle					
4	Driver/family knows where to access <b>general information about VMs</b>					

	<p>Cues:</p> <ul style="list-style-type: none"> <li>- installation/maintenance manuals, safety manuals, mechanics, VASS engineers</li> <li>- internet websites, vehicle modifier, product manufacturer and suppliers</li> </ul>					
5	<p>Driver/family knows where to access <b>VMs specific maintenance information/requirements</b></p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- driver understands nature and frequency of maintenance checks</li> <li>- vehicle modifier provides instructions, product use guidelines, service manuals</li> </ul>					
6	<p>Client/family advised re; considerations related <b>to use of modified vehicle by other drivers</b></p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- restrictions or responsibilities when vehicle driven by a non-disabled driver</li> <li>- insurance implications, activation/de-activation, installation/de-installation</li> </ul>					
7	Any further comments? Are there any key issues missing?					

#### H. Evaluation of VMs – specific issues evaluated during “stationary” in-vehicle component

	<p><b>Issues</b></p> <p>OTDA evaluates/ensures that during <b>stationary in-vehicle assessment....</b></p> <p><b>(Tick one response only per item.)</b></p>	Frequency of application related to VM prescription				
		Yes: all the time	Someti mes	Never	Don't know	N/A
1	Driver understands how to switch on, calibrate (if relevant) and operate <b>adaptations/VMs</b>					

	<p>Cues:</p> <ul style="list-style-type: none"> <li>- Driver verbalises checking and switch-on/off procedures during assessment</li> <li>- driver aware of possible breakdown issues/trouble shooting/problem solving options</li> </ul>					
2	<p>When driver is seated correctly and uses the VMs they have appropriate <b>field of view</b> inside and outside the vehicle</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- safe &amp; adequate range for forward view, rear and side views (left and right) outside vehicle</li> <li>- visual access to seat, seat belt, dashboard, accelerator/brake/steering controls and displays</li> <li>- driver can correct any field of view related features in case these are out of position</li> </ul>					
3	<p>Driver can independently access, activate, apply &amp; remove <b>driver safety restraints</b> correctly</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- demonstrate use of seat belt/safety restraints/wheelchair lock down system</li> </ul>					
4	<p>If relevant, driver can access, activate, and correctly use <b>modified accelerator</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- operate the accelerator control over its full range of application movement without any difficulty, obstruction or interference with other controls or parts</li> <li>- operate the accelerator in a graduated manner</li> <li>- release the accelerator smoothly, completely and repetitively</li> <li>- operation with no fatigue, as required for relevant trip length duration</li> </ul>					
5	<p>If relevant, driver can access, activate, and correctly use <b>modified brake system</b></p>					

	<p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- exert enough force to actuate the brake</li> <li>- operate brake control quickly with a smooth and well-directed movement</li> <li>- avoid simultaneous actuation of brake and accelerator</li> <li>- operate brake over its full range of application (including range for an emergency brake)</li> <li>- operate brake without obstruction or interference with other controls or parts</li> </ul>					
6	<p>If relevant, driver can access, activate, and correctly use <b>modified parking brake</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- exert enough force to actuate hand brake, quickly with smooth &amp; well-directed movement</li> <li>- avoid simultaneous actuation of hand brake and accelerator</li> <li>- operate hand brake control over its full range of application without difficulty</li> <li>- operate the brake without obstruction or interference with other controls or parts</li> </ul>					
7	<p>If relevant, driver can access, activate, and correctly use <b>modified clutch and gears</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- exert enough force to actuate clutch/gears</li> <li>- operate clutch/gears quickly with a smooth and well-directed movement</li> <li>- operate the clutch/gears without obstruction or interference with other controls or parts</li> </ul>					
8	If relevant, driver can operate					



	<b>modified ignition, switches/secondary controls</b> without undue effort  Cues:  - driver comfortably operates all important switches (e.g. lights, indicators, windscreen wipers, horn, indicators, windscreen defroster), whilst maintaining posture/stability					
9	Any further comments? Are there any key issues missing?					

### **I. Evaluation of VMs – on-road component (driving in traffic)**

	<b>Issues</b>  OTDA evaluates/ensures that during <b>open-road in-vehicle assessment....</b>  <b>(Tick one response only per item.)</b>	Frequency of application related to VM prescription				
		Yes: all the time	Sometimes	Never	Don't know	N/A
1	If relevant, driver demonstrates safe, consistent use of <b>adapted access/egress system</b>  Cues: Driver can  - use keyless entry system, activate door opening/ ramp lowering systems  - keep a steady lane position at various speeds  - smoothly steer the vehicle while braking, changing gear or operating switches					
2	If relevant, driver demonstrates safe, consistent use of <b>adapted steering</b>  Cues: Driver can  - steer the vehicle in a straight line, round bends, carry out left and right turns, change lanes in moving traffic  - keep a steady lane position at various					

	<p>speeds</p> <ul style="list-style-type: none"> <li>- smoothly steer the vehicle while braking, changing gear or operating switches</li> </ul>					
3	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted vehicle accelerator</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- accelerate/decelerate the vehicle appropriately to meet speed limits/environmental demands</li> <li>- keep the speed constant for a prolonged period of time</li> <li>- release the accelerator completely and in a timely manner when braking</li> </ul>					
4	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted braking</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- brake fluently, accurately and forcefully</li> <li>- avoid applying accelerator at the same time as braking</li> <li>- brake appropriately under different conditions (e.g. emergency brake, different speeds)</li> </ul>					
5	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted clutch/gears</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- operate the clutch and gears so that the vehicle drives without jolting or jerking</li> <li>- change gears without adversely influencing the steadiness of steering</li> <li>- change gears appropriately for the external driving conditions, speed etc.</li> </ul>					
6	<p>If relevant, driver can operate <b>modified ignition, switches/secondary controls</b> without undue effort, in a timely manner and safely whilst driving</p> <p>Cues: Driver can operate ignition/switches</p> <ul style="list-style-type: none"> <li>- comfortably without undue effort, without adversely impacting steadiness of</li> </ul>					

	steering  - retaining suitable body posture/stability  - during on-road assessment, feedback from DI/family/other trainers					
7	Any further comments? Are there any key issues missing?					

*Thank-you for taking the time to respond to this survey.*

If you are not able to attend the workshop in person, please

- a) Complete this survey and return via email to Tricia Williams:  
[Tricia.Williams@roads.vic.gov.au](mailto:Tricia.Williams@roads.vic.gov.au)
- b) Complete and return by mail to:  
Tricia Williams  
Senior Policy Officer  
Road User Access and Mobility  
South Building  
60 Denmark Street, Kew, 3101.

## Appendix E: Draft VM guidelines for usability trialling with OTDAs and their clients

Additional comments (*in italics within the document*) represent suggestions made during the focus groups which underpinned changes to wording and/or concept..

	Elements		Performance criteria
1	General assessment and prescription principles		
	Essential		
		1.1	Recommendations for adaptive driving equipment or VMs are based on <b>assessment results</b> , the client's strengths and limitations, and sound <b>clinical reasoning</b> Cues: Off road assessment results, vehicle design, ergonomic factors
		1.2	Therapist ensures that clinical decisions made throughout the prescription process are <b>ethical</b> Cues: recommendations based on "best fit", if possible provision of min. 3 options for aide supply
		1.3	Client's existing <b>available vehicle</b> or currently available <b>standard</b> (non-modified) vehicles and fixture/fitting adjustments are initially evaluated prior to complex/high tech VMs Cues: In client's existing car evaluate potential to - adjust steering wheel position, adjust seat /mirror position, modify door opening
		1.4	Evaluate <b>available "minor/low tech" VMs</b> and access/egress aides prior to "high tech/major" Cues: - consider mechanical ("add on") steering aides before integrated electronic steering systems - evaluate options for lower limb accelerate/brake before considering hand controls
		1.5	Consider driver <b>needs for training and familiarisation</b> with potential/recommended VMs. Cues: - contact with other drivers who have similar VMs, trialling , lessons, costs for lessons
		1.6	Prescription process involving <b>lessons</b> with/& <b>trailing</b> of modifications should consider client, activity and environmental demands/requirements Cues: - the client's expectations of the adapted vehicle, adequate length of trial - commonly undertaken driving tasks (e.g. parking, mobility aide use/storage, getting petrol) - environments that are usual/relevant to the client (e.g. garage/driveway/country driving)
	Desirable		
		1.7	Therapist must consider additional disadvantages/resources/issues which may be relevant to

			clients/ of Indigenous (Aboriginal or Torres Strait Islander) heritage or from a <b>culturally and linguistically diverse</b> or non-English speaking background Cues: utilise interpreter, provide written/translated information re VMs, involve family
			Therapist must consider VM prescription goals in <b>partnership</b> with relevant others Cues: clients' family use of vehicle / other drivers, clients' insurer, vehicle modifier, driving instructor
		1.8	Therapist must inform client about the <b>characteristics/design features</b> of VMs/adaptations Cues: - range of available solutions, including their limitations - the appearance, installation/de-installation/storage issues - the limitations, drawbacks and/or advantages of different types of solutions

	Elements		Performance criteria
2	Person Centred factors: Impairment + activity limitations and participation restrictions		The OTDA...
	Essential		
		2.1	Considers <b>driver licensing/health/disability factors</b> impacting on VM viability/requirements Cues: - type of licence held, nature of condition (e.g. fluctuating, deteriorating, cognitive issues) - time since injury, use of medication, insight into functional abilities
		2.2	Considers driver factors impacting on <b>capacity to learn</b> how to use modifications Cues: - nature of condition (e.g. memory, learning capacity), intellectual disability - cognitive-perceptual impairments, driving experience - ability to learn road law and obtain learner permit
		2.3	Establishes that the client has <b>adequate cognitive, physical and psychological abilities</b> to operate the VMs safely, consistently and effectively Cues: - doctor referral information, off and on-road assessment, neuropsychological assessment
		2.4	Assesses client's <b>posture, trunk control, upper &amp; lower limb position</b> etc., to maintain body in correct position to use VMs effectively Cues: - trunk stability, sitting position, restraint adjustment and application

		2.5	Assesses client's limb/body function to control VMs for steering/ acceleration/ braking devices ( <b>primary controls</b> ) Cues: - Upper/lower limb impairments, reliable limb positioning, endurance, ability to hold/move steering device
		2.6	Assesses client's limb/body function to control modified indicators, windscreen wipers, horn and/or lights ( <b>secondary controls</b> ) Cues: - Upper/lower limb impairments, reliable limb positioning, endurance, hold/moving devices
		2.7	Assesses client's vision/body function to use <b>internal/rear view/side mirror/parking</b> VMs Cues: - referral information, off road vision screen results, assisted vision (glasses/contacts) - neck/trunk movement, eye disease, neck restrictions
		2.8	Assesses client's body function to manage <b>ingress/egress</b> with standard existing vehicle adjustability features before suggesting aide or VMs Cues: - adjust seat, transfer board, adapt door handle, portable grab stick, extend seat tracks
		2.9	Assesses client's potential use of aides/customised seating options to support <b>mobility/access/egress/ seating requirements</b> Cues: -Bony deformities/body shape, safe driving position, safe transfers, storing/transporting aides

	Elements		Performance criteria
3	System, financial and environmental factors		The OTDA...
	Essential		
		3.1	Discusses <b>costs and funding</b> options with client/ <b>and or</b> family Cues: - TAC/VMSS/other insurance cover, criteria for government funding
	Desirable		
		3.2	Only recommends VMs/aides meeting <b>relevant national, design and engineering standards (if seeking appropriate advise whether all licencing requirements)</b> Cues: -liaison with vehicle installers, VicRoads vehicle engineers - Australian Standards, ILC information services  <i>If you can</i>  <i>rely on modifier/distributor (poor knowledge re:this)</i>

			<p><i>If cannot VASS engineering , other installers.</i></p> <p><i>If new vehicle how do I know adaptation is meeting jurisdiction criteria?</i></p> <p><i>If controversial, VicRoads will defer to VASS engineers. VASS engineers are reliable contact</i></p> <p><i>New products – can we speak with VASS engineers to certify? Impossible?</i></p> <p><i>How do we know if a new product complies with standards etc?</i></p> <p><i>Hand controls do not require a VASS certificate (Vic only) NSW hand controls require certificate.</i></p> <p><i>Standards are never accessed VR engineers more of an issue with incre</i></p>
		3.3	<p>Evaluates whether the required VMs will <b>suit the vehicle the driver wants to use/adapt</b></p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Liaison with client/family/vehicle modifier/insurance company</li> <li>- Impact of modifications on safety systems like airbags</li> <li>- Adaptations placed/installed so as not to impede access to/functionality of other controls/displays</li> </ul> <p><i>The OT seeks advice as to whether the required VMs will suit the vehicle the driver wants to use/adapt and funding requirements</i></p> <p><i>If it's possible</i></p> <p><i>Need to add – “if appropriate” – wording</i></p> <p><i>seeks advice</i></p> <p><i>criteria for funding</i></p>
	Needs wording to be changed		
		3.4	<p>Informs client/family of <b>costs and availability</b> of the adaptive equipment/modifications</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- A range of options is provided (if possible), ILC database, discussion with vehicle modifier</li> </ul> <p><i>OT may refer to case managers etc for follow up</i></p> <p><i>Applying for/costing modifications is separate to OTDA</i></p> <p><i>Paid to do driving ax – some do it all in one</i></p>
		3.5	<p><i>Provides client/family with information about adaptive equipment/vehicle modification installation options and requirements (either provide directly or refer on)</i></p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Where possible, 2 or more equipment options are provided, cost estimates, 2<sup>nd</sup> hand options</li> </ul> <p><i>Depends on availability of suppliers</i></p>

			<p><i>Depends if client wants family involved</i>  <i>Some new cars fit as part of deal but can't move to other car</i>  <i>Get the client to speak with installer or other individual</i>  <i>often only stick to one supplier in local area</i>  <i>or refer onto vehicle modifier</i>  <i>Ots have limited time - looking for 2nd hand options should be clients responsibility</i>  <i>rarely/never discuss 2nd hand options, should be client responsibility</i>  <i>seeks advice or refers on; VAS engineers; call insuppliers/ installers</i></p>
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	Elements		
4	Occupation of driving, activity issues and training		The OTDA...
	Essential		
		4.1	<p>Obtains information on the <b>intended patterns of driving</b>, activities, roles involving driving and destinations that may impact on minor or major VMs</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Duration, distances, city/rural driving, work/parenting roles/requirements, transporting items</li> <li>- general/routine maintenance (e.g. getting petrol, mechanical repairs)</li> </ul>
		4.2	<p>When required, refers client to suitably qualified <b>driving instructor (DI)</b> for lessons to learn use of adaptations (usually for modified steering/acceleration/braking/indication controls).</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- DI with suitable equipment and experience with drivers with disabilities</li> <li>- DI is accessible and affordable</li> <li>- Lessons may occur in in DI's vehicle or client's vehicle if training brake is installed</li> </ul>
		4.3	<p>Observes the client's ability to use the adaptive driving equipment or vehicle modifications safely and competently with adequate sampling of driving behaviours</p> <p>Cues</p> <ul style="list-style-type: none"> <li>- representative driving tasks, feedback from DI regarding lessons</li> <li>- parking lot and standard or local area on-road assessment</li> </ul> <p><i>Often the DI don't have all the adaptations to train someone to use</i>  <i>It may be difficult to train someone to use the exact equipment</i>  <i>Complexity of devices and readily available for ax</i>  <i>Cannot assume one modification is as usable as another</i>  <i>All OTDA should assess clients competency using the equipment</i></p> <p><i>not on the freeway.</i>  <i>where training is available</i>  <i>mostly but sometimes rely on DI</i></p>



	Desirable		
		4.4	<p>Seeks expert advice regarding customised/complex adaptive driving equipment or VMs not commercially available “off the shelf” or simply installed</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>-Consults with other OTDAs, Mechanics with specialised knowledge, Technical Aid to the Disabled, Vehicle modifiers, Drivers with similar modifications</li> </ul> <p><i>Google or colleagues</i>  <i>Ask others for info</i>  <i>Sometimes difficult to access readily available information about current vehicle mods</i></p>
		4.5	<p>Provides the client with information about provision and installation of aides/ adaptive equipment or VMs</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- Professional/experienced vehicle engineers/modifiers, other OTDAs</li> <li>- Where possible, 2 or more options for installation</li> </ul> <p><i>More appropriate for engineer/installer/supplier to provide information about current vehicle mods – would be better informed</i>  <i>OT can direct client to the appropriate resources. OT is providing functional advice not technical advice</i>  <i>Supplier duty of care – warranties etc.</i></p> <p><i>unclear - functional advice only not technical</i>  <i>liaise with engineers/supplier all the time</i>  <i>where to go for installation</i></p>

	Elements		Performance criteria
5	Evaluation of modifications – general		Post installation, the OTDA evaluates/ensures that...
	Essential		
		5.1	<p>Driver/family knows how to use the adaptations safely (**see also specific items below)</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- documentation, explanation, training, on-road evaluation, feedback from DI</li> <li>- closed circuit/car park in-vehicle assessment, on-road assessment</li> </ul> <p><i>only include family if relevant</i>  <i>if complicated and can't rely on client/installer otherwise rely on them to do this</i>  <i>primarily training and on road evaluation</i>  <i>use supplier / installer to assist/ supplement</i></p>

	Desirable		
		5.2	<p>Client/family advised re; considerations related to use of modified vehicle by other drivers</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- restrictions or responsibilities when vehicle driven by a non-disabled driver</li> <li>- insurance implications, activation/de-activation, installation/de-installation</li> </ul> <p><i>OT provides a general statement so other drivers are aware of implications of mods</i></p>
	For consideration		
		5.3	<p>Fitted aides/VMs match the prescription provided and suit the driver's capabilities</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- type/location of modified controls appropriate, within UL reach envelope, driver capacity/strength to generate forces required to safely, reliably operate the controls</li> <li>- Detailed requisition order/Quote for services, diagrams/photos showing installation location</li> </ul> <p><i>Don't always get a chance to sight the fitted modifications if privately funded</i></p> <ul style="list-style-type: none"> <li>- <i>If VMs funded can do</i></li> <li>- <i>Sometimes say will get with new car</i></li> <li>- <i>If it's a simple mod OT doesn't usually follow up</i></li> </ul> <p><b>**wording**</b></p> <p><i>Rely on client after OT set up the initial prescription</i></p> <p><i>Not a lot of evaluation after the vehicle mods fitted</i></p> <p><i>Minor aids – makes assumption client/installer will install correctly/appropriately</i></p> <p><i>If too complex need to refer to another OT</i></p> <p><i>If complex mods OT can Ax function</i></p> <p><i>OT recommends to Vic Roads – Vic roads are our licencing</i></p> <p><i>Do not follow up for simple mods e.g. spinner</i></p> <p><i>always for SWEP not if privately funded mods</i></p> <p><i>not always possible ?client consent</i></p> <p><i>wording - depends on mod and funding</i></p>
		5.4	<p>Driver/family is aware of any operational limitations of the VMs</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- what adaptation will/won't do, installation/de-installation issues</li> <li>- instructions for other drivers/mechanics when driving/servicing vehicle</li> </ul> <p><i>Installer should provide the technical information</i></p> <p><i>OT doesn't necessarily know technical info or don't see client</i></p> <p><i>Advise only if aware yourself</i></p> <p><i>Do not always see clients post installation</i></p>

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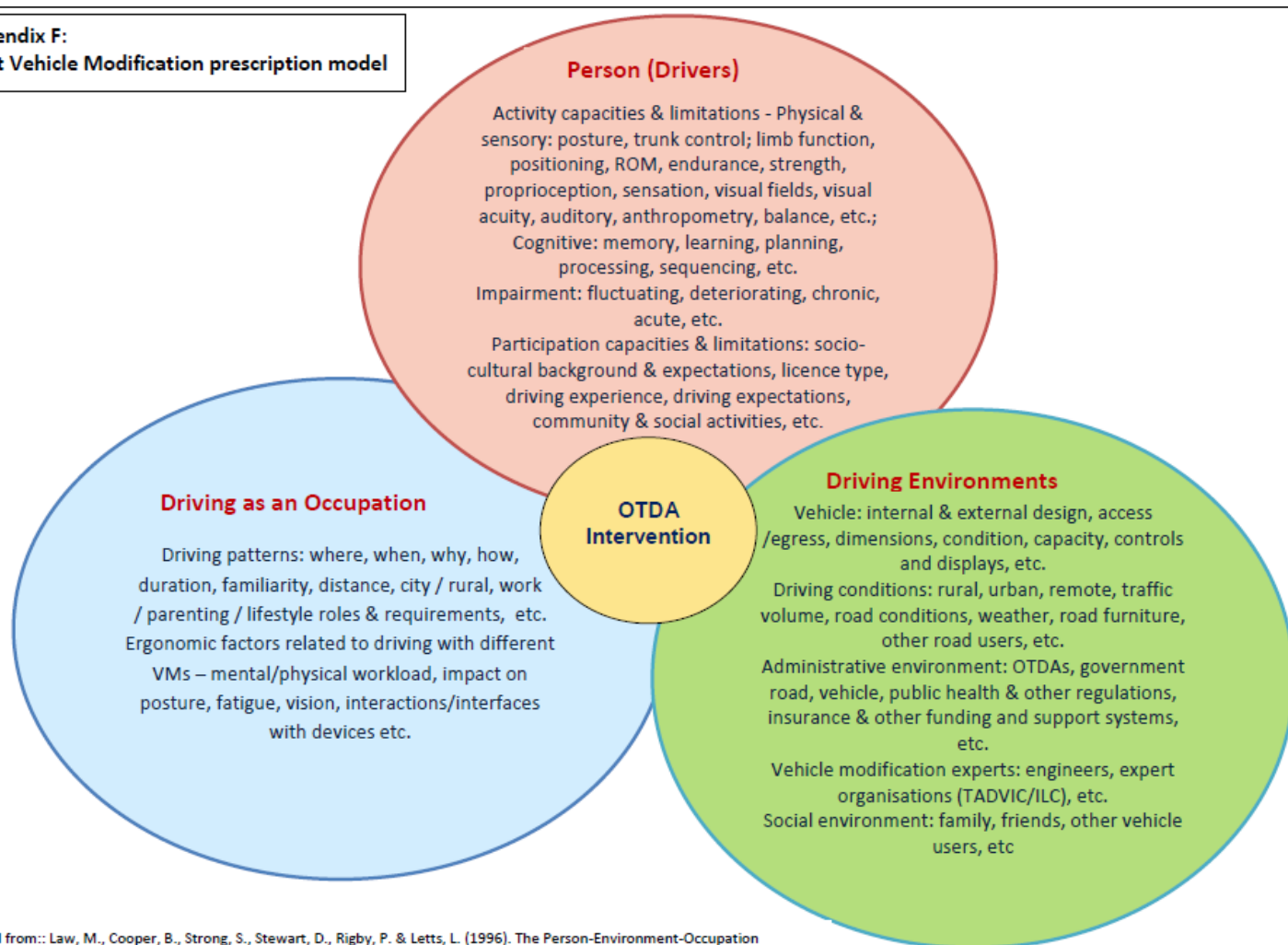
	Elements		Performance criteria
6	Evaluation of VMs – specific issues evaluated during “stationary” in-vehicle component  <i>Just put ‘on-road’ ‘stationary’ needs clarifying – does it include the stationary bit mid-assessment?</i>		OTDA evaluates/ensures that during stationary in-vehicle assessment...
	Essential		
		6.1	When driver is seated correctly and uses the VMs they have appropriate <b>field of view</b> inside and outside the vehicle Cues: <ul style="list-style-type: none"> <li>- safe &amp; adequate range for forward view, rear and side views (left and right) outside vehicle</li> <li>- visual access to seat, seat belt, dashboard, accelerator/brake/steering controls and displays</li> <li>- driver can correct any field of view related features in case these are out of position</li> </ul>
		6.2	If relevant, driver can access, activate, and correctly use modified accelerator Cues: Driver can <ul style="list-style-type: none"> <li>- operate the accelerator control over its full range of application movement without any difficulty, obstruction or interference with other controls or parts</li> <li>- operate the accelerator in a graduated manner</li> <li>- release the accelerator smoothly, completely and repetitively</li> <li>- operation with no fatigue, as required for relevant trip length duration</li> </ul> <i>Can't know this when stationary at start of ax</i>  <i>fatigue N/A at start of ax when stationary</i>  <i>within reason ax length</i>  <i>driver can engage accelerator if shared with able bodied driver.</i>
	Desirable		
		6.3	Driver understands how to switch on, calibrate (if relevant) and operate adaptations/VMs Cues: <ul style="list-style-type: none"> <li>- Driver verbalises checking and switch-on/off procedures during assessment (yes)</li> <li>- driver aware of possible breakdown issues/trouble shooting/problem solving options (no)</li> </ul> <i>Difficult to interpret question</i>

			<p><i>OT can't always know if driver knows about troubleshooting etc</i></p> <p><i>not necessarily problem solving options</i></p>
		6.4	<p>Driver can independently access, activate, apply &amp; remove driver safety restraints correctly</p> <p>Cues:</p> <ul style="list-style-type: none"> <li>- demonstrate use of seat belt/safety restraints/wheelchair lock down system</li> </ul> <p><i>or with help from another person if appropriate</i></p>
		6.5	<p>If relevant, driver can access, activate, and correctly use modified brake system</p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- exert enough force to actuate the brake</li> <li>- operate brake control quickly with a smooth and well-directed movement</li> <li>- avoid simultaneous actuation of brake and accelerator</li> <li>- operate brake over its full range of application (including range for an emergency brake)</li> <li>- operate brake without obstruction or interference with other controls or parts</li> </ul> <p><i>most of the time emergency brake completed 'on road'</i></p> <p><i>quantify force to actuate the brake</i></p>

	Elements		Performance criteria
7	Evaluation of VMs – on-road component (driving in traffic)		OTDA evaluates/ensures that during open road in-vehicle assessment...
	Essential		
		7.1	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted steering</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- steer the vehicle in a straight line, round bends, carry out left and right turns, change lanes in moving traffic</li> <li>- keep a steady lane position at various speeds</li> <li>- smoothly steer the vehicle while braking, changing gear or operating switches</li> </ul>
		7.2	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted vehicle accelerator</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- accelerate/decelerate the vehicle appropriately to meet speed limits/environmental demands</li> <li>- keep the speed constant for a prolonged period of time</li> <li>- release the accelerator completely and in a timely manner when braking</li> </ul>
		7.3	<p>If relevant, driver demonstrates safe, consistent use of adapted braking</p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- brake fluently, accurately and forcefully</li> </ul>

			<ul style="list-style-type: none"> <li>- avoid applying accelerator at the same time as braking</li> <li>- brake appropriately under different conditions (e.g. emergency brake, different speeds)</li> </ul> <p><i>Reactions</i></p>
	Desirable		
		7.4	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted access/egress system</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- use keyless entry system, activate door opening/ ramp lowering systems</li> <li>- keep a steady lane position at various speeds</li> <li>- smoothly steer the vehicle while braking, changing gear or operating switches</li> </ul> <p><i>Don't need to assess keyless entry during on road ax or access issues but must assess lane position, steering, braking, changing</i></p>
		7.5	<p>If relevant, driver demonstrates safe, consistent use of <b>adapted clutch/gears</b></p> <p>Cues: Driver can</p> <ul style="list-style-type: none"> <li>- operate the clutch and gears so that the vehicle drives without jolting or jerking</li> <li>- change gears without adversely influencing the steadiness of steering</li> <li>- change gears appropriately for the external driving conditions, speed etc.</li> </ul> <p><i>car control + road conditions</i></p>
		7.6	<p>If relevant, driver can operate modified ignition, switches/secondary controls without undue effort, in a timely manner and safely whilst driving</p> <p>Cues: Driver can operate ignition/switches</p> <ul style="list-style-type: none"> <li>- comfortably without undue effort, without adversely impacting steadiness of steering</li> <li>- retaining suitable body posture/stability</li> <li>- during on-road assessment, feedback from DI/family/other trainers</li> </ul> <p><i>modified ignition can be assessed separately to main on road ax.</i></p>

**Appendix F:**  
**Draft Vehicle Modification prescription model**



Adapted from:: Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P. & Letts, L. (1996). The Person-Environment-Occupation Model: A Transactive Approach to Occupational Performance. *Canadian Journal of Occupational Therapy*, 63(1), 9-23.