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A STRATEGIC APPROACH FOR SAFETY: PUTTING KNOWLEDGE INTO PRACTICE

D. de Grasse
Transport Canada
Ottawa, Ontario, Canada
Deborah.degrasse@tc.gc.ca

M. Zayoun
Transport Canada
Ottawa, Ontario, Canada
mustapha.zayoun@tc.gc.ca

1. ABSTRACT

Like many countries from around the world, Canada has been making increasing efforts to establish the Canadian road network as one of the safest in the world. Through various nationwide plans and strategies, Canada aims to reduce the number of fatal and non-fatal collisions that occur on our roads. This report outlines progress that has been made on Canada's Road Safety Vision 2010 (RSV 2010) and also what it hopes to achieve through the successor plan, Road Safety Strategy 2015 (RSS 2015). With a new strategy in place, the main focus will continue to be to achieve the safest roads in the world, but the approach in which we hope to attain this goal changes to some degree. Through research, evaluations and lessons learned from previous plans and strategies, new road safety policies, strategies, and action plans are in the process of being developed to best suit Canadian roads. Although the RSS 2015 has similar goals to RSV 2010, there are many aspects that have changed. RSS 2015 has been designed in a way that allows for the development of individual jurisdictional plans to meet their specific environments. Creation of the newly developed successor plan allows for the inclusion of recent best practices and technologies. Some good examples are the replacement of 4-legged intersections with roundabouts, promotion of road safety week, the systematic installation of rumble strips, and the implementation of traffic calming devices. These initiatives, among others will help road safety authorities to achieve Canada`s vision of having "the safest roads in the world".

2. INTRODUCTION

Canada adopted its first formal national road safety direction in 1996, Road Safety Vision 2001 (RSV 2001) (Transport Canada, 2000). This was followed by the RSV 2010, which has now come to an end.

RSV 2010, which was adopted by the Canadian Council of Motor Transport Administrators (CCMTA), was designed to be carried out over a 9-year period, making particular effort to emphasize the importance of partnerships and incorporate a wide variety of initiatives that focus on motor vehicles and road users. A nationwide target and several sub-targets were put into place through this vision that addressed the major issues on Canadian roads, which were the leading cause of fatalities and serious injuries.

A midterm review in 2007 was conducted in order to assess the progress that was being made towards the vision. It was found that although some sub-targets had seen positive results, others had not.

Canada is at the stage where new strategies will need to be established. RSS 2015 is a five-year direction that commences in 2011. Although Canada has had a similar focus on all of its Road Safety Plans, and many of the same ideas have been transferred over in the creation of successor strategies, the RSS 2015 has tried to take the best aspects of previous plans and develop a methodology that works in its current environment.

3. PREVIOUS CANADIAN ROAD SAFETY PLANS

Since the RSV 2001, Canada has been observing closely the success of its visions in order to develop and better the upcoming plans and strategies. Although all the goals worked towards the primary vision of making Canadian roads the safest in the world, the method in which they went about achieving this goal varied. The method of updating, evaluating, and reporting has varied among the plans. Even though the guiding direction

has varied from iteration to iteration, they still all keep the same guiding principles, which are to (Transport Canada, 2000):

- Raise public awareness and commitment road safety
- Improve communication, cooperation and collaboration among all stakeholders
- Enhancing enforcement
- Improve road safety information in support of research and evaluation

3.1 Road Safety Vision 2001

RSV 2001 was Canada's first official road safety vision, which was adopted by the Council of Ministers of Transportation and Highway Safety in 1996 (CCMTA 2000). It was supported, by all federal and provincial levels of government as well as by the majority of key public and private sector stakeholders. Positive results occurred during the tenure of this six-year plan as fatalities decreased by 10 per cent and serious injuries by 16 per cent (CCMTA, 2000). Aside from these observations, there was also an increase in seat-belt use in urban areas of 90 percent, and a 6 percent decrease in the number of fatally injured drivers who had been drinking (CCMTA, 2000). This plan's primary method of implementation was to make use of a broad range of initiatives that address primarily motor vehicles and road users.

In 1999, Canada ranked 9th in road safety among OECD-member (Organization for Economic Co-operation and Development) countries (CCMTA, 2000).

3.2 Road Safety Vision 2010

RSV 2010 was the successor plan that was put into place after the termination of RSV 2001. It was a 9-year vision that worked towards making Canadian roads the safest in the world. This vision retained the strategic objectives first introduced under RSV 2001.

In 2000, CCMTA adopted RSV 2010 and the Council of Ministers Responsible for Transportation and Highway Safety officially endorsed the targets intrinsic to the plan.

The CCMTA is a non-profit organization in Canada responsible for coordinating matters dealing with licensing, registration and control of motor vehicle transportation and highway safety. It includes membership from federal and provincial/territorial levels of government as well as associate members from transportation related organizations and groups.

RSV 2010 set a national target and sub-targets that it hoped would be achieved during the time frame of the vision. The national target was a 30 percent decrease in the average number of road users killed or seriously injured in traffic collisions (CCMTA, 2010). After assessing where the majority of the problems were occurring on Canadian roads, sub-targets were specifically created to deal with those problematic areas. Sub-targets that addressed occupant restraints, impaired driving, commercial vehicle safety, vulnerable road users, speed and intersection safety, rural roadways, young drivers and high-risk drivers were established.

The targets of RSV 2010 were also intended to provide road safety stakeholders with broad-based benchmark data of key road safety indicators, against which intervention efforts could be measured. Fewer than 2100 road users would be killed in traffic collisions by 2010 if all these target objectives were achieved (CCMTA, 2001).

Along with the quantitative targets, several other national priorities were recommended, including public education campaigns that promoted safe cycling, graduated licensing schemes in all jurisdictions, the use of innovative community policing protocols, and the enhancement of crash and exposure data capturing.

When RSV 2010 was reviewed at the end of 2007, positive performance was seen from many jurisdictions, particularly Northwest Territories, Yukon, Prince Edward Island and Nova Scotia (CCMTA, 2010). The level of success varied form jurisdiction to jurisdiction and from sub-target to sub-target.

The review also emphasized the importance of putting more effort into road safety infrastructure as well as a stronger link between infrastructure and vehicle-related road safety programs. Although there are several black spot programs carried out across Canada, the review outlines the importance of implementing road safety programs that reduce risk on the rural road network, as rural roads are a major issue when it comes to fatalities and injuries (CCMTA, 2010).

4. ROAD SAFETY STRATEGY

The Road Safety Strategy 2015 is the newly developed strategy that commenced once RSV 2010 concluded.

4.1 Strategy Overview

The success of RSS 2015 will greatly depend on the commitment from stakeholders in government, industry, and non-government organisations. Input was needed from all the contributing parties as to how the RSS 2015 should be formed. In 2008, a web-based questionnaire was sent out to a broad cross-section of government members and road safety stakeholders to obtain their views and ideas on the successor strategy (CCMTA, 2010). Once the questionnaire responses were received they were consolidated and presented for discussion at a CCMTA Road Safety Forum attended by stakeholders, in order to lay the foundation for the successor plan. A base for the foundation of the new road safety strategy and the framework was presented to the Council of Deputy Ministers in July and received acceptance in October 2009. For the full development of the strategy's framework, the CCMTA Road Safety Plan Oversight Committee directed and managed the expertise input from CCMTA government members, representatives from the Engineering and Researching Support Committee, the Policy and Planning Support Committee and the Canadian Association of Chiefs of Police. The strategy was endorsed by the Council of Deputy Ministers in April 2009 and by the Council of Ministers in October 2010 (CCMTA, 2010).

While the RSS 2015 also focuses on the primary goals from past plans it also differs in several ways (CCMTA, 2010):

- The strategy will be considerably more flexible than its predecessor
- The strategy will take a much holistic approach to road safety
- Hard percentage reduction targets will not be established at the national level
- Progress will be measured at the national level using rate-based measures.

While there are many different rate-base measurements that jurisdictions may adopt, the most frequently used is the numbers of deaths and injuries per number of vehicle kilometres travelled, per number of population, and per number of motor vehicles

registered. Other potential rate base measures are deaths per 100,000 population or deaths per number of licensed drivers.

- Core to the strategy is a framework of "best practice" strategies that jurisdictions may use to address key road safety risks and risk groups.
- While CCMTA will manage the oversight and maintenance of the strategy, each jurisdiction (federal, provincial/territorial) will use the strategy and the "best practice" framework to develop their own jurisdictional plans
- The strategy will have a shortened five-year time frame

The strategy provides flexibility when it comes to the best practices and initiatives that jurisdictions can adopt depending on their suitability in their respective operating environments. Due to Canada's vastness and diversity, jurisdictions may vary from one another in terms of their road safety challenges. RSS 2015 has provided a list of effective initiatives that the jurisdictions may adopt or implement based on the potential effectiveness they observe in their respective environments. Once the jurisdictions have developed individual plans that best suit their environment, annual reports of progress may be provided by jurisdictions, at suitable forums (e.g. federal/provincial/territorial meetings).

Strategies carried out under RSV 2010 were frequently focused on road user initiatives, but in this newly developed strategy, initiatives will address vehicles, drivers, and the road environment, all of which have been proven to contribute to collisions. The aim is to move the strategy towards a more "safe systems" framework. This strategy outlines the outcome of very strong collaboration between CCMTA and members of the Engineering Research and Support Committee (ERSC).

RSS 2015 will not have national quantitative targets set like the previous plan but instead allows individual jurisdictions to set individual goals for themselves. However, RSS 2015 will focus on achieving downward trends in fatalities and serious injuries. Assessing the downward trends will be measured using rate-based measures. Provincial and territorial jurisdictions will continue to report all fatalities and injuries that occur on their roads on an annual basis to Transport Canada. Although no hard targets are included in this strategy, jurisdictions are not restricted from establishing their own.

RSS 2015 provides a framework of best practices, which is designed to address key target groups and contributing factors that influence fatalities and serious injuries on Canadian roads. This framework will be regularly updated throughout its five-year duration, with information that has been discovered through other strategies from other OECD countries as well as work that has been conducted in Canada.

The CCMTA will be responsible for updating the Strategy through its work with the jurisdictions and its committees. These updates may include progress reports on new research projects undertaken, identification of new initiatives which address contributing factors by key target groups, and revision of the framework of proven best practices and reporting on its progress. Jurisdictions will be able to easily and effectively obtain useful information on road safety initiatives and countermeasures through a web-based tool, which is currently being developed (CCMTA, 2010).

RSS 2015 is a five-year strategy, with midterm review in 2013. The hope is that RSS 2015 will inspire road safety stakeholders from all levels of government as well as key public and private sector stakeholders to work together towards the common goal of making Canada's roads the safest in the world.

4.2 Guiding Principles

The main guiding principles that led to the development of the strategy are the following (CCMTA, 2010):

- Year over year down trends in fatalities and serious injuries
- Safer systems concept
- A five-year timeframe
- A continuation of collision reporting by province/territories and a framework of best practices

This newly developed strategy aims to inspire road safety stakeholders from all levels of government and key public and private sector stakeholders to work together towards a common goal of making Canada's roads the safest in the world.

4.3 The Matrix

The specifically chosen initiatives found in section 4.4 are intended to address the key target groups and the major contributing factors. A table that outlines the framework of this strategy, developed by road safety professionals is presented below (CCMTA, 2010).

Table 1 – Strategy Framework Matrix

	Contributing Factors			
	Impaired Driving (alcohol, drugs, fatigue, distraction)	Speed and Aggressive Driving	Occupant Protection	Environmental Factors
Young Drivers				
Medically-at-risk-drivers				
Vulnerable road users				
Motor Carriers				
High-risk drivers				
General Population				

In this strategy the key groups of drivers that are being targeted are young drivers, medically-at-risk-drivers, vulnerable road users, motor carriers, high-risk drivers, general population. Each of these driver classifications has seen high numbers of fatalities and serious injuries, thus they will be the targets for the new strategy. Descriptions of these target groups are provided in the table below.

Table 2 – Target Groups in Strategy Framework

TARGET GROUPS FOR THE RSS	
Young Drivers	Drivers under the age of 25
Medically-at-risk-drivers	Drivers whose existing medical condition may affect the safe operation of their vehicles, their occupants and the safety of other road users.
Vulnerable road users	Pedestrians, motorcyclists and persons in personal mobilized devices.
Motor carriers	Person or entity who is responsible for a commercial vehicle
High-risk drivers	Repeat offenders with patterned illegal driving behaviours
General Population	Road users who benefit from strategies/interventions/regulations/legislation introduced to make roads, vehicles and road users safer.

The main contributing factors that have been observed as the key causes of collisions are impaired driving, speed and aggressive driving, occupant protection, and environmental factors. The table below outlines these factors (CCMTA, 2010).

Table 3 – Contributing Factors in Strategy Framework

CONTRIBUTING FACTORS FOR THE RSS	
Impaired Driving	All forms of impairment, including impairment resulting from the ingestion of a substance.
Speed and Aggressive Driving	Drivers travelling at speeds beyond legal limits on all road types.
Occupant Protection	Issues pertaining to proper restraint use among all road users, vehicle technology enhancements and safer roads.
Environmental Factors	Issues/factors that may affect the likelihood of crash occurrence (e.g.: roadway configuration, work-zone safety, road surface condition, road and roadside design, weather conditions, urban versus rural infrastructure, etc.)

4.4 Initiatives

A major step in the development of this strategy was to create a list of initiatives that were proven to be effective. These initiatives may be focused on the road user, infrastructure or the vehicle Once a primary list was developed through the initial scan, each initiative was then further reviewed and assessed to determine which ones would be optimal, having been proven effective. Aside from the proven initiatives list, a list of promising initiatives that have not yet been proven was also developed and included in the strategy.

When it comes to the challenges of dealing with those who drive impaired, speed and drive aggressively, or refrain from buckling up, a number of initiatives that have proven to be effective will address these issues. The list of “proven” initiatives are best practice countermeasures that have been implemented nationally and internationally and have

been shown effective in reducing fatalities and serious injuries. Jurisdictions have the freedom and flexibility of implementing any of the proven countermeasures from the list, based on their respective operating environments. These initiatives can also be from the user-based and infrastructure-based category.

Several of the proven initiatives are (CCMTA, 2010):

- Random breath testing
- Automated enforcement
- Speed reader boards
- Selective Traffic Enforcement Programs
- Automated license plate recognition
- Jaywalking awareness
- Zero BAC

The infrastructure initiatives associated with the environmental factors contributing factor were chosen with the main objective of reducing the likelihood and/or severity of a collision, recognizing that despite efforts to educate and control road users, driving errors will be made. The infrastructure initiatives chosen for this strategy are very diverse and some have the ability to address both rural and urban areas, focussing on the road and the roadside. Along with the infrastructure initiatives, other vehicle-based or user-based initiatives may also be appropriate for this contributing factor.

Several of the proven road infrastructure initiatives are (CCMTA, 2010):

- Rumble strips
- Divided highways
- Median treatments
- Forgiving roadsides
- Transition zones

Many of the road safety advances for vehicles are realized and implemented at the vehicle manufacturing level and through the Canadian Motor Vehicle Safety Standards (CMVSS).

Research is underway in Canada to evaluate the effectiveness of vehicle technologies that have emerged over the years.

Some of these emerging technologies include (CCMTA, 2010):

- Crash avoidance technologies
- Electronic stability control
- Seat occupant sensors

In addition to the lists of “proven” and “promising” initiatives, the strategy also includes an Appendix of potential projects that may be considered to further assess some of the key initiatives. The Appendix is split into two parts. One of which includes the initiatives for which work is underway by the CCMTA, Transport Canada, or others. The second part is a list of projects that have been identified but not yet undertaken (CCMTA, 2010).

The Strategies

There may exist more than one strategy that may address each target group and contributing factor. These strategies can address users, infrastructure, or vehicles or some combination of these factors. A wide range of strategies has been recommended to address road safety issues and they include (CCMTA, 2010):

- Education/Training
- Communication and Awareness
- Enforcement
- Information/data/research
- Policy/Legislation/Regulation
- Technologies
- Road Infrastructure
- Linkages

4.5 Managing the Strategy

Due to the nature of RSS 2015 and the ability for jurisdictions to each take on a unique individual strategy specific to their own needs, the governance and management of this overall strategy will be very crucial in its success. Updating, reporting, and evaluating this strategy will play a key role in its potential to reduce fatalities and serious injuries on Canadian roads.

The CCMTA will manage the strategy through collaboration with the jurisdictions as well as with its committees and task forces. The Road Safety Strategy Task Force will be responsible for updating the national plan every six months. CCMTA's standing committees will provide the Task Force with updates, and in turn the Task Force will communicate with each of the standing committees on the advances of the strategy. The Road Safety Strategy Oversight committee and the CCMTA Board of Directors will carefully examine the updates before they go on to the Council of Deputy Ministers responsible for Transportation and Highway Safety (CCMTA, 2010).

The updates that are provided to the Council of Deputy Ministers may include information on research projects being undertaken, the introduction of new initiatives, the addition of new initiatives into the strategy's matrix, adjustments to the strategy's framework, and also reports on progress and advancements that each jurisdiction has been making.

Reporting on progress from all jurisdictions is very important in assessing where Canada stands in regards to its main goal of making Canadian roads the safest in the world.

Jurisdictions will be responsible for reporting to the CCMTA the number of fatalities and serious injuries on their roads, which will allow for the comparison on progress using similar indicators as those used in OECD member countries.
While individual jurisdictions will be responsible for reporting on specific initiatives implemented and success achieved within their own jurisdiction, the CCMTA will have the responsibility of reporting on the overall progress of the strategy.

5. PUTTING INFRASTRUCTURE KNOWLEDGE INTO PRACTICE

The road safety engineering community has greatly contributed to the advancements of road safety infrastructure and will continue to look into what has been proven effective in other countries. The contribution from the engineering community to the development of RSS 2015 has increased significantly in comparison to previous plans.

Road authorities have been encouraging innovation through various road safety infrastructure measures for many years. The systematic installation of rumbles strips, traffic calming techniques, and the increase in the number of installed roundabouts have all seen positive results following their implementation.

5.1 Rumble Strips

Rumble strips are raised or grooved patterns that can be installed on the shoulder, edge, or centre of a road in order to provide a sudden audible and tactile warning to the driver. Rumble strips have proven to be effective to counter driver fatigue or inattention. They are a very effective road safety countermeasure that can reduce the frequency of off-road collisions by up to 76 percent (Transport Canada, 2003). While rumble strips are usually installed on the outside line of a road, their installation along the centreline has grown in popularity due to its effectiveness in reducing head-on collisions. With rumble strips being applied more frequently and covering a larger portion of the Canadian road network, the amount of single vehicle collisions and head on collisions will decrease on a national level.

5.2 Traffic Calming

Traffic calming has been widely used in the road safety engineering community with the main goal of slowing and reducing motor-vehicle traffic in areas with high collision rates. The Institute of Transportation Engineers has defined traffic calming as the combinations of physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour and improve conditions for vulnerable road users (City of Calgary, 2007). Traffic calming measures may include devices such as speed humps, speed cushions, vehicle activated speed limit signs and road narrowing. Such measures have proven to slow vehicles by speeds of 15-40 km/hr. Along with the engineering aspect of traffic calming, education and enforcement increase its positive effect. In 1998, the Canadian Institute of Transportation Engineers joined with the Transportation Association of Canada to publish the Canadian Guide to Neighbourhood Traffic Calming. This guide is useful in Canadians' understanding of traffic calming principles and applications. Since the introduction of this publication many Canadian cities have moved forward in applying traffic calming solutions.

The Insurance Corporation of British Columbia (ICBC) conducted a study in the mid 1990's to assess the impact of traffic calming measures in several Greater Vancouver neighbourhoods. The study found that both annual collision frequencies and insurance claims decreased by approximately 40 percent (ICBC, 1996). Combining the research done by ICBC and information from European countries led to findings that traffic calming measures, such as speed humps, road narrowing, and chicanes can all reduce site specific collisions by 75 percent. A study was also conducted to review 85 cases of traffic calming implementation in countries around the world in order assess the international safety benefits of traffic calming. The study found that through traffic calming implementation there was an average decrease in collision frequency from 8 percent to 100 percent (ICBC, 1996).

The practice of implementing traffic calming measures on Canadian roads has grown significantly over the last decade and will continue to grow based on what has been achieving positive results in collision reduction.

5.3 Roundabouts

A roundabout is an effective intersection control device that involves traffic flowing in a counter clockwise circle around a centre island. Modern roundabouts have been gaining in popularity since the 1990's due to their ability to control traffic flows at intersections without the use of stop signs or traffic signals. They have been shown to reduce fatal collisions by 90 percent, injury collisions by 75 percent, and pedestrian collisions by 30-40 percent (Ourston Roundabout, 2010). This can be attributed to the slower speeds, and the lesser conflict points. While a four-legged intersection contains 32 conflict points, a two-lane roundabout only contains 8. The region of Waterloo has made significant progress in the area of roundabout installation and has been named the roundabout capital of Canada. They have installed 13 roundabouts on major commuter roads, as well as other roundabouts on smaller streets. When roundabouts were first installed it was a learning curve for drivers to learn this new road design, but in recent years drivers have shown a significant improvement in the ease of roundabout manoeuvring. The improved experience that drivers have with roundabouts will play a positive role in 2011 when several three-lane roundabouts are scheduled to be constructed.

6. CONCLUSION

The success of the progress made over the last 15 years can be attributed to the commitment and dedication of the stakeholders including engineers and road safety professionals. Their continuous involvement and collaboration with the jurisdictions has led to a steady decrease in the fatalities and serious injuries that occur on Canadian roads.

With the exchange of valuable information between jurisdictions road safety professionals, Canada was able to develop a strategy that will certainly contribute to making its roads among the safest in the world.

7.0 RERERENCES

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