COLLABORATION AND PARTNERSHIP IN MANAGING SKID RESISTANCE FOR TMR QUEENSLAND

Justin Weligamage, Queensland Department of Transport and Main Roads, Australia

Dr. Noppadol Piyatrapoomi, Queensland Department of Transport and Main Roads, Australia

ABSTRACT

An objective of the Queensland Department of Transport and Main Roads (TMR) is to provide "A safe transport system leading to improved health and well being for Queenslanders" .(TMR's Corporate Plan 2010-2014) Managing skid resistance is an essential part of the department's responsibility to ensure public safety. The development of the department's Skid Resistance Management Plan (SRMP) has evolved over a number of years through research studies and collaboration and partnership with national experts, Australian state road authorities and other stakeholders. Collaboration and partnership supported by relevant research studies have proven to be essential elements in the success of managing skid resistance for Queensland's state controlled road network. This paper outlines the achievements and obstacles in developing and implementing the SRMP.

INTRODUCTION

Managing skid resistance on Queensland's state-controlled road network is an essential part of TMR's responsibilities in minimising road crashes. In Queensland, there was a reduction in road fatality rates from 1992 to 2003. In 1992 the rate was 13.73 (per 100,000 population) compared with 8.19 in 2003. The fatality rate marginally increased to 8.32 in 2005.

Supported by the release of Austroads' Guidelines for the Management of Road Surface Skid Resistance in 2005, TMR called for urgent and sustained actions to address issues rising from skid resistance related crashes. The call emphasised the need for coordinated action through effective partnerships to address these issues. Specifically, the management approach should be synergised with those of multilateral organisations, and made coherent to deal with the continuum from urgent to longer term.

The Austroads guidelines prompted TMR to review its skid resistance management strategy. TMR have been engaged in various partnerships in the past with organisations such as Austroads, Australian Road Research Board (ARRB), Australian state road authorities, universities, and industry organisations. This provides a solid foundation for the partnership needed to meet the challenges. Building on this foundation, TMR has sharpened its approach to partnership to contribute effectively to renewed actions to increase management effect and improve road safety.

The review process, supported with a solid foundation of collaboration and partnership began with extensive consultation with internal and external stakeholders, national and international expert groups to identify gaps in skid resistance management for the department. Internal stakeholders included TMR staff that had experience in managing skid resistance within the Department. This included staff who work in the areas of skid resistance management, pavement surfaces, road condition data, road safety, as well as regional representatives and staff from road infrastructure asset management. External stakeholders included the Australian Motorcycle Council, Australian Asphalt Pavement Association, police, safety professionals, legal professionals, Austroads, research institutions including universities and the general public. In this regard, expert groups were developed to include road authorities from other jurisdictions such as VicRoads, Road and Traffic Authority (RTA) of New South Wales, South Australia's Department of Transport, Environment and Infrastructure (DTEI), Tasmania's Department of Infrastructure, Environment and Resources (DIER), Northern Territory's Department of Infrastructure, Planning and Environment (DIPE) and the ARRB Group Ltd. (ARRB).

The purpose of this paper is to describe the approach to partnerships and collaboration during the development and implementation period (2006-2010).

WHY PARTNERSHIPS ARE IMPORTANT

There are several reasons why partnerships are essential to the effectiveness of TMR's work.

These include:

i. TMR supports government projects and programmes, and seeks to contribute to the development of enabling policy frameworks for management of skid resistance at the state and national level.

   In doing so, it works as a partner of those governments, society, various industries, as well as the private sector and other national and international agencies.

ii. Many challenges of skid resistance management are becoming increasingly complex because of scientific and technological advances, social and economic developments, among other factors. Traditional single-sector approaches to managing skid resistance are giving way to multidisciplinary and trans-disciplinary approaches to address new complexities. No single institution can possess the expertise and infrastructure needed to address these. Collaboration has become a prerequisite for success.

iii. It has become increasingly clear over the past few years, with challenges of legal impacts, those technological innovations in the form of new vehicles, new data collection equipment, treatment methods, will be essential to road asset managers. Achieving such breakthroughs will require strong and effective linkages between research, innovation, adaptation and delivery systems that can respond to new and rapidly changing needs in real time. New and systematic partnership arrangements between organisations engaged in research and development are no longer a matter of simply efficiency gains; they have become the key to relevance and effectiveness.

iv. Linkages are needed for sharing experiences, insights and good practices to improve program impact and to bring ground-level concerns and perspectives to bear on policymaking processes. Partnerships that facilitate such collaboration can contribute to more relevant and responsive practices and policies and strengthen the capacity of the asset manager to influence decisions that contribute to effectively managing skid resistance issues.

v. The scale of financial, technical and infrastructure resources required to address the challenges indicated above almost certainly exceed those currently available. Collective, collaborative arrangements are essential to optimise the value of investments. The sum must become greater than the total of its component parts.

FRAMEWORK FOR REVIEWING TMR SKID RESISTANCE MANAGEMENT PROCESS

Figure 1 displays the framework developed for the review of TMR's skid resistance management process. This was supported by collaboration and partnership throughout the process. Close collaboration and partnership with national bodies, state road authorities and external stakeholders were vital in the success of the review and development of a skid resistance management strategy.

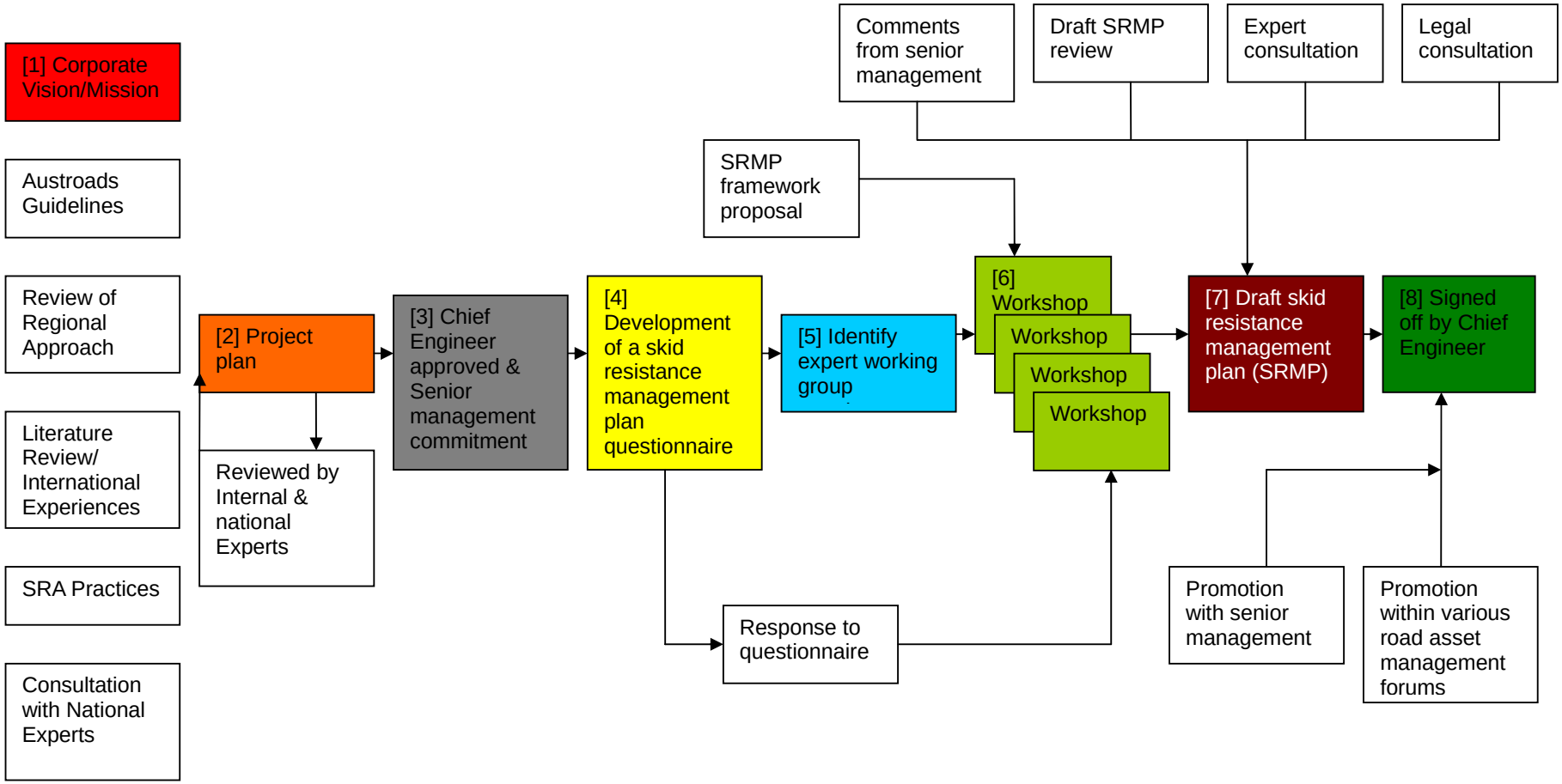

Figure 1: Framework for TMR Skid Resistance Management Process

The boxes in colour outline key elements in the review process. Input from national experts, state road agencies, and internal and external stakeholders were important in the review. It must be noted that underpinning the success of the review was the commitment of the organisation, which is the corporate vision and mission as displayed in red [1] in the framework. An important part of TMR's corporate vision and mission in 2006 was "Safer Communities". As a result, TMR adopted "Safer roads to support safer communities'" as one of its four identified key outcomes. This corporate vision was the key element that drove the success of the skid resistance management review.

The project plan displayed in orange [2] was developed through extensive reviews of national and international skid resistance practices, consultations with internal and external stakeholders, state road agencies, national experts, international experts and from literature reviews in the area of skid resistance management. The project plan was then reviewed by internal and national experts. The engagement of internal and external stakeholders, state road authorities, national and internal experts at an early stage of the project proved to be beneficial to the project. Individuals from these groups later formed the expert working group for the project.

Once the project plan was completed, it was signed off by the TMR Chief Engineer and was fully supported by senior management. The project plan clearly stated the purpose of the project, project customer, sponsor and project manager, who were the stakeholders, the current situation, in scope and out of scope of the project, link to corporate vision, constraints, urgency, assumptions, impacts, project control, risk and issues, procurement management, environmental management, cultural heritage management, safety and operational issues.

The next stage was to develop a skid resistance management questionnaire. National experts were involved in the review and in the development of the questionnaire. The questionnaire included questions relating to vision, strategic and management plans, systems and processes, standards, maintenance program development and issues. Expected outcomes from the questionnaire were:

- provide direction in developing overall objectives and central strategies
- establish key performance indicators
- describe actions necessary to achieve the overall objective and to implement the central strategy and
- Identify TMR's process for managing skid resistance.

Copies of the questionnaire were sent to internal stakeholders, including asset managers, safety managers, technical experts and regional staff who are responsible in managing road networks. An expert working group comprising of internal stakeholders from TMR and national experts was established to collate information and participate in the workshops.

Four workshops were held with TMR internal stakeholders and regional expert staff to review technical aspects for skid resistance management and examine responses from the questionnaire. This was used to develop the skid resistance management plan framework and to seek consensus in the skid resistance management process. It is worth noting that the workshops provided TMR regional stakeholders with a sense of ownership in the skid resistance management plan.

A SRMP was drafted and was structured around TMR's asset management framework, which comprised of a six step process, namely:

- Consistent measurement of skid resistance and surface texture;
- Consistent management of data on skid resistance and surface texture;
- Consistent analysis of data on skid resistance and surface texture;
- Consistent use of data in reaching decisions about remedial actions;
- Consistent design, construction and maintenance practices; and
- Quantified performance targets, regular reviews and feedback.

The draft SRMP was distributed to internal and external stakeholders and expert groups for comment and feedback. After agreement by all parties, the SRMP was signed off by the Chief Engineer and released in June 2006.

SRMP identified 38 items for future research and development. Over 95% of the recommendations set out in the SRMP were completed by TMR. Achievements included:

- Developed consistent testing regimes for data collection with innovative key performance indicators. This has been incorporated into the Department's Pavement Condition Data Collection Policy (PCDCP);
- Formalised the format for uploading skid resistance data to TMR's corporate database, and included it in training programs to assist regional personnel in developing familiarity in skid resistance data;
- Developed a standard presentation style for data on skid resistance in CHARTVIEW (a TMR graphical presentation tool for use with asset data);
- Developed a site inspection process and related it to existing inspection processes for asset management and safety auditing purposes;
- Developed and implemented new guidelines for "slippery" and similar signage after resurfacing or other corrective treatment;
- Developed a technical specification on line-marking and on crack sealing that included skid resistance criteria;
- Developed a technical note and technical standard on skid resistance friction coating for steel road plates; and
- Developed and delivered skid resistance management training for regions across the Queensland.

FRAMEWORK FOR IMPLEMENTING THE SRMP

After publication of the SRMP in 2006, the next stage was to implement within TMR. A framework for implementation of the SRMP was developed with consultation and collaboration with internal and external stakeholders. Figure 2 shows the framework for implementing the SRMP.

Processes in the implementation of the SRMP included:

Promotion through technical forums: The first task in implementing the SRMP was to promote and to launch it to TMR staff that are responsible in managing skid resistance. The SRMP was launched in various technical forums across Queensland, interstate and selected skid resistance related technical forums.

Workshops and training for operational staff: Six workshops were organised and held within TMR throughout Queensland to promote the role of the SRMP for skid resistance management. The aim of the workshops was to reinforce the implementation of the SRMP to regional staff. TMR staff who attended the workshops included regional directors, regional staff and corporate staff who were responsible in managing skid resistance. Content provided in the workshops included:

- Overview of the SRMP and Element Management Plans;
- Skid resistance data, collection, processing and interpretation;
- Developing a prioritised program of works;
- Field inspection procedures;
- Determining remedial treatments; and
- Case studies in managing skid resistance on the State-controlled road networks

The workshops proved to be effective in reinforcing and raising awareness with regional staff and regional senior management staff in the implementation of the SRMP.

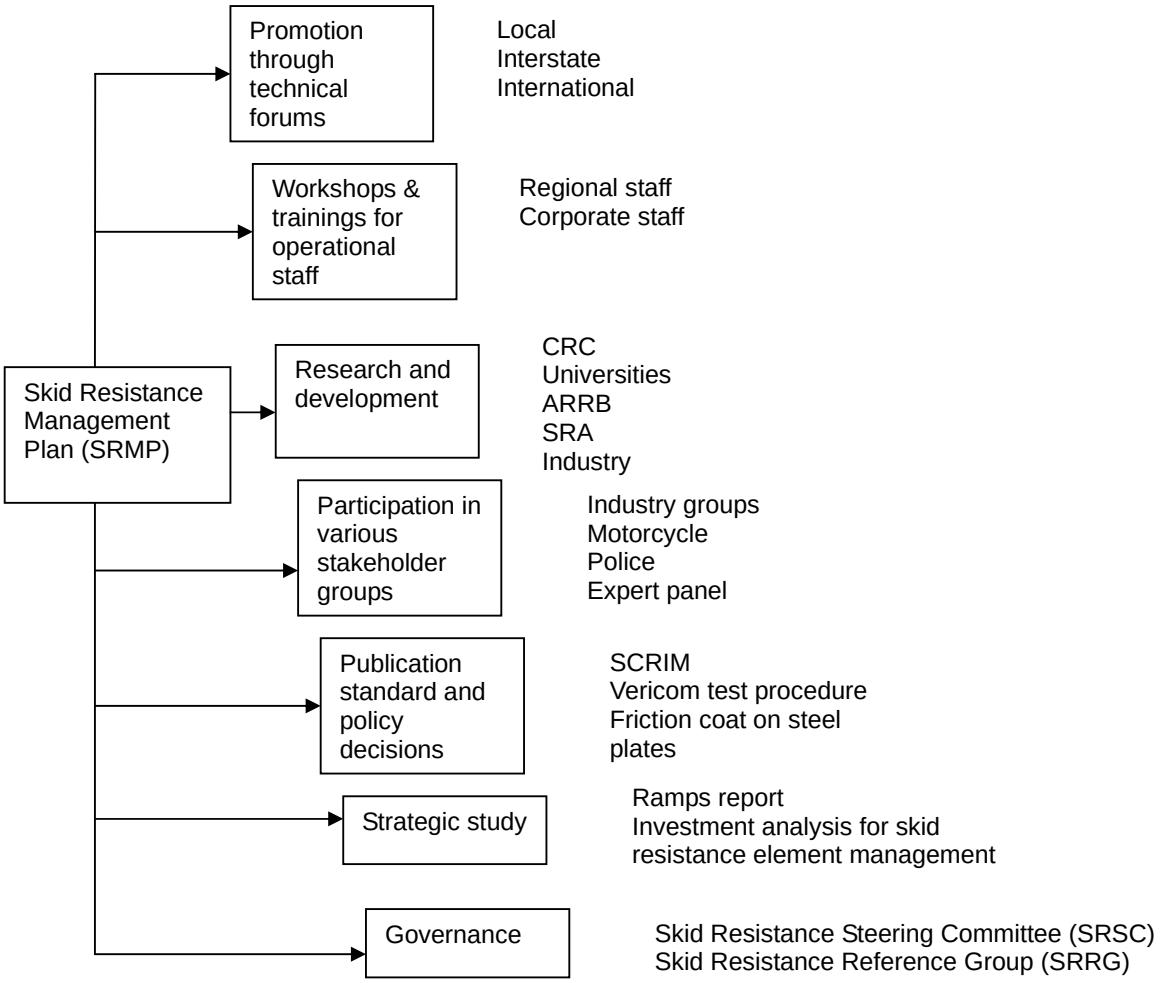

Figure 2: Framework for Implementing the SRMP

Research and development: A number of research studies were identified in the SRMP. Funding from TMR was secured to support cooperative research studies among TMR, universities and other research institutions such as CIEAM (Cooperative Research Centre for Infrastructure Engineering Asset Management). A risk-based methodology for managing skid resistance was developed as a result of the cooperative research studies. Data mining techniques for managing skid resistance were also explored to identify other alternative methods. Software for risk assessment of road crashes in relation to low skid resistance was developed. However, further research studies and more data on crash and skid resistance are required to support initial findings.

A strategic alliance project between TMR and AAPA (Australian Asphalt Pavement Association) was established to assess skid resistance performance on Queensland's state controlled road network. AAPA also supported funding in developing a test procedure for the Vericom device. The Vericom VC 4000 multi axis accelerometer is a device for measuring 'in vehicle' friction supply and demand in the road network used mainly by police. TMR adopted the device and made it available for regional staff to conduct skid resistance tests for crash sites. AAPA financially supported this project to standardise test procedures for Vericom testing. An interim test procedure was endorsed by the TMR skid resistance steering committee.

Austroads in partnering with ARRB and state road authorities, including TMR developed national guidelines for managing skid resistance.

Participation in various stakeholder groups: TMR staff responsible for skid resistance management participated in different stakeholder groups. These included: the motorcycle lobby group, industry reference group meetings, state road authority skid resistance related meetings and workshops, and police, which looked at matters relating to skid resistance problems.

Publication standard and policy decisions: A number of standards and policy decisions have been made as a result of the implementation of the SRMP. These include:

- Policy on data collection regimes;
- Standard methods for skid data analysis;
- Technical notes and technical standards for surface friction coating for steel road plates;
- Interim test procedure for the Vericom test device; and
- Adoption of Sideway-Force Coefficient Routine Investigation Machine (SCRIM) for network testing.

Strategic study: TMR conducts strategic investment analysis for skid resistance management annually for road networks and high speed ramps to support investment decisions. Where skid resistance data was available it was used in the analysis; where skid resistance data was not available, texture depth data was used in the analysis. TMR conducts texture data collection annually covering most of the network using laser profilometer devices.

Governance: A Skid Resistance Steering Committee and a Skid Resistance Reference Group was established to oversee the implementation of the SRMP and to deal with issues relating to managing skid resistance for Queensland's state controlled road network.

The Skid Resistance Steering Committee (SRSC) members included TMR senior management staff, including deputy chief engineers and directors. The initial responsibility of the SRSC was to make recommendations such as:

- Changes to department practices as a result of progress and findings from research and development;
- Training programs on improving traffic safety by managing skid resistance and surface texture; and
- Changes to the scope, relative priority, completion dates and resourcing of actions in the SRMP.

A Skid Resistance Reference Group (SRRG) was established in 2006 to represent key Departmental stakeholders and, in particular, the Departmental Skid Resistance Element Leader in managing skid resistance on a consistent and sustainable basis. It oversees and facilitates the management of skid resistance management on the Queensland road network in compliance with the terms of the Element Management Plan, the SRMP and relevant Austroads guidelines. Members of the SRRG comprised of:

- Director (Road Asset Management)
- Director (Pavements and Materials)
- Principal Engineer (Pavement Testing)
- Regional asset management representatives (2 or 3 including Metro Region)
- Principal Engineer (Road Safety)
- Principal Crash Investigations Officer
- Regional safety representative
- Manager (Road Asset Strategy) and
- Senior Engineer (Road Asset Strategy)

Roles and responsibilities of the SRRG included:

- Provide advice to the Skid Resistance Element Leader;
- Review, in collaboration with the Element Leader, the Skid Resistance Element Management Plan;
- Identify and address issues within the context of network-wide skid resistance management including project implementation, project delays, data collection slippage, and non-conforming skid resistance practices;
- Provide a forum for all stakeholders to contribute comments, concerns, innovative developments and improvements, and to identify risks to the successful management of skid resistance;
- Monitor the achievement of identified outcomes; and
- Undertake the development of key studies and associated reports as required.

CURRENT PARTNERSHIPS

In recent years, TMR has developed and strengthened a range of important partnerships – including Austroads, Corporative Research Centre for Infrastructure and Engineering Asset Management (CIEAM), the ARRB Group Ltd., Universities, AAPA and state road authorities in Australia. The establishment and management of such strategic partnerships involve significant investment of human and financial resources.

Partners provide an important source of knowledge and require regular review to determine the extent to which they are contributing to the achievement of TMR's goals. TMR endeavours to further strengthen collaboration and partnership with internal and external organisations. The current collaboration and partnership include.

CIEAM

The strategic partnership developed with CIEAM will enable both institutions to work with university researchers and quicken the pace at which they identify, develop and implement innovative technology solutions to understand complex relationships between crashes and skid resistance.

It will link research with operations to identify and test innovations, engage asset managers, safety professionals, policymakers and other actors to translate insight and findings into concrete actions.

AAPA

The objectives of TMR's strategic partnership with AAPA is to provide effective leadership within the asphalt industry by working together on policy development and advocacy and achieving greater impact on the ground by working together in operations, research; and improve efficiency through shared knowledge and operation systems.

The two organisations have identified four areas for deepening existing collaboration: (i) public safety; (ii) policy formulation, capacity building, knowledge management and advocacy; (iii) risk management and sustainability; and (iv) administration.

WDM Limited – SCRIM+ (Sideway-Force Coefficient Routine Investigation Machine +)

This agreement provides an excellent opportunity to assess the operating and data collection capabilities of a WDM SCRIM+ vehicle. It will also give TMR an opportunity to compare the results from the WDM survey with results from the previous surveys that were done by RTA and VicRoads.

ARRB

TMR continues to support funding to ARRB for a number of research studies.

THE WAY FORWARD IN PARTNERSHIP

TMR needs to develop further in the areas of sound governance principles. Partnerships should be built on principles of equity, mutual trust, accountability, respect, shared values and transparency.

A well defined systematic institution approach reflects defining needs, outcomes, objectives, strategies and criteria for evaluation.

Relevant knowledge and skills, institutional capacity for learning and adopting: building partnerships requires positive attitudes and strong interpersonal skills, including communication, negotiation, alliance-building and brokering, and conflict resolution. TMR needs to be flexible and adaptive, able to take risks, reflect on experience and modify strategies.

Appropriate institutional structure, systems and tools: tools to support the establishment, resourcing, management and evaluations are essential for improvement of any organisation or partnership. This should include regular reviews, and clear procedures for development of strategies.

CONCLUSIONS

Partnerships are central and essential to TMR's effectiveness in fulfilling the need for multi-sectoral, multi-functional approaches to address increasingly complex challenges in the management of skid resistance.

Stronger partnerships are required to link research, innovation, adaptation and delivery systems to bring critical technological breakthroughs.

Partnerships are also needed for sharing experiences, insights and good practices to improve programme impact and to bring ground-level concerns and perspectives to bear on policymaking processes.

Given the scale of resources needed to address current challenges, collective arrangements are essential for optimising the value of investments.

TMR will continue to strengthen its capacity for effective collaboration and partnership in priority areas and will build on its experience to undertake a more systematic and strategic overall approach to partnership. It will continue to develop its strategic partnerships. It will work to increase the volume and effectiveness of co-financing. It will also strengthen partnerships and participate in networks to link ground-level innovations and best practices with stakeholders that can replicate and scale up initiatives for greater results.

TMR will continue to collaborate with others to inform and influence policy, strengthen harmonization and improve standards, norms, and measures of development effectiveness.

REFERENCES

Weligamage, J. (2006) Skid Resistance Management Plan. *Road Asset Management Branch, Queensland Department of Main Roads*, Queensland, Australia

Austroads (2005) Guidelines for the Management of Road Skid Resistance, *AP-G83/05, Austroads*, Sydney, Australia

ACKNOWLEDGEMENT

The authors wish to acknowledge the Queensland Government Department of Transport and Main Roads. The view expressed in this paper are of the authors and do not represent the views of the organisations.

AUTHOR BIOGRAPHIES

Justin Weligamage is currently Manager (Road Asset Strategy) with the Department of Transport and Main Roads, Queensland, Australia. He has over 25 years of consulting, research and industry experience in the areas of road and civil infrastructure. Justin has been involved in several initiatives for developing and implementing road asset management initiatives, including the publication of "Asset Maintenance Guidelines" and “Skid Resistance Management Plan”, strategic application of the Highway Development and Management System, or HDM-4 within Queensland Main Roads, and road investment decision support research within the Cooperative Research Centre for Construction Innovation. He has written a number of research papers and technical reports, and has published and presented at various refereed international conferences.

Dr. Noppadol Piyatrapoomi obtained his MEngSc and a PhD from the University of Melbourne. He worked as an academic at RMIT University and Queensland University of Technology. He currently works for the Road Asset Management Branch of the Queensland Department of Transport and Main Roads. He has extensive experience in road asset management and has published over 30 national and international publications in the form of book chapters, technical reports, conference papers and journal articles. He has taken on leadership of project teams which have won many engineering excellence awards in road asset management in Australia.