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ESTABLISHING INTER–AGENCY REGIONAL INCIDENT MANAGEMENT IN BRISBANE AUSTRALIA

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Summary
An outline of the lessons learned and keys to success in establishing a cooperative inter–agency regional incident management in Brisbane Australia, involving public safety and transport agencies along with academia and the private sector, covering planning, institutional relationships, governance structure, sharing infrastructure, information and systems, with ITS being a key component.

BACKGROUND

Within densely populated urban areas, traffic congestion can have significant adverse economic, social and environmental impacts. As traffic volumes increase, managing traffic is becoming an increasing priority of transport infrastructure agencies. A key means of reducing congestion and improving safety is the rapid response and clearance of traffic incidents – traffic incident management.

Brisbane, the capital city of the state of Queensland Australia, is located in state's south east region, currently has a population of about 1.7 million people in the greater metropolitan area. South East Queensland comprises only a small proportion of the state's land area, but houses two-thirds of the state's population. Based on current trends, the greatest population growth over the next twenty years will continue to be focused on south-east Queensland. Traffic growth, increasing congestion and the number of incidents are all related to population growth.

Many of the highly trafficked roads within Brisbane are currently operating at or close to capacity for periods longer than five hours per day, resulting in an increasing potential for traffic incidents. As a result, over the past five years the number of major traffic incidents that close down major urban arterial roads (including any of the limited river crossings) for hours at a time, has been increasing.

A *traffic incident* refers to any event that degrades safety and slows traffic, typically including disabled vehicles, crashes, adverse weather conditions and debris on the roadway. While not yet analysed in detail, traffic incidents, plus planned road works, maintenance activities and special events, are estimated to cause up to 50% of traffic congestion and cost Brisbane $A200 million each year. Improving response to incidents could save up to $A50-60 million per annum (based on estimates in Cox 1997 that recurrent and non–recurrent congestion cost Brisbane $A400m pa). There are more than 2,500 incidents in the Brisbane area each year, half of which are minor or non-injury, taking in excess of 2,000 hours to clear.

Traffic incident management (TIM) is defined as the systematic, planned and coordinated use of human, institutional, mechanical and technology resources to reduce the duration and impact of incidents and getting traffic moving again as soon as possible, to ensure the safety of motorists, crash victims, and incident responders. These resources are used to systematically reduce the time to detect and verify the occurrence of an incident, implement the appropriate response, investigate and safely clear an incident, while managing the affected traffic until full capacity is restored.

Incident management is the process of managing multi-agency, multi-jurisdictional responses to road traffic disruptions. Efficient and coordinated management of traffic incidents improves safety, reduces traffic congestion and vehicle emissions, improves mobility and the efficiency of traffic movement and limits the impact on the local economy. Incident management approaches are also a key component of being able to effectively respond to national security incidents.

This paper describes lessons learned and keys to success in cooperative inter-agency regional incident management.

TRAFFIC INCIDENT MANAGEMENT IN BRISBANE

Regional incident management has been progressed in the Brisbane area since 1999 by a number of initiatives that have been undertaken. Within Brisbane City, the Queensland Department of Main Roads (QMR) manage traffic on a limited number of state-controlled roads, primarily major arterials and freeways, and Brisbane City Council (BCC) manages traffic on all other major and local roads. Brisbane City is the third largest local government agency in the world, managing and maintaining over 6,000 kilometres of sealed road and associated traffic infrastructure.

While the initial efforts have focused on the Brisbane City area, QMR has operational responsibility of the major road network across the south east region and work closely with the other 17 councils within the region. Within the last three years QMR has established new traffic management centres to the north (Sunshine Coast) and south (Gold Coast) of Brisbane. Improvements in practices and procedures implemented within Brisbane area are progressively being extended across the region.

There is widespread deployment of intelligent transport systems in Brisbane to manage traffic, including traffic incidents. Sophisticated traffic management systems are extensively deployed across the region, with both QMR and BCC having their own coordinated traffic signal systems (STREAMS and BLISS respectively), and traffic management centres in Brisbane City, with a large number of traffic signals and loop detectors.

Video cameras (CCTV) are being progressively deployed across the major traffic routes, with widespread coverage of the inner city area. Variable message signs (VMS) have only been deployed on some of the major traffic routes, with radio broadcasts and web sites being used to provide on traffic incidents to road users. Call centres and traffic hotline numbers are used as a primary means of incident detection through mobile phone calls and roadside emergency telephones are installed on the freeways.

Service patrols are being extensively deployed, using four specially designed and purpose built Traffic Response Units (TRU) and towing contractors. BCC has been progressively fitting transponders (and increasing use of GPS tracking) to it’s entire fleet of 650 buses and over 100 of its vehicles to monitor travel times and detect abnormal congestion.

The greatest challenges have been building institutional cooperation, integrating incident management operations and programs across jurisdictional boundaries.

One institutional initiative was the Cooperative Road Management Centre (CRMC) project, led by QMR, which aimed to progress a regional transport management centre for south east Queensland (SEQ). One of the areas of activity for this project was raising the profile of incident management in SEQ, however funding for this project ended in 2002 and the level of activity reduced. The other significant events were the establishment of the Brisbane Incident Management Coordination Group (BIMCG) in June 2002 to progress regional collaboration and the signing of a Memorandum of Understanding between major stakeholders in 2003.

It is instructive to examine some of the significant events that have occurred over the past four years in the development of regional traffic incident management in Brisbane, these include:

- Issues papers on *Incident Management of Planned Events* and *Incident Management of Unplanned Events* were commissioned by the CRMC project in December 1999

- BCC introduced Traffic Response Units in January 2001 to manage the traffic and assist with incidents on roads managed by Brisbane City, in conjunction with Police and emergency services. Services were extended to include selected state-controlled roads managed by QMR in Brisbane metropolitan area in March 2001. The service focuses on the Brisbane CBD and its immediate environs

- QPS and QMR jointly funded a three-month police incident response demonstration project, *Operation Freeflow* on Brisbane motorways, starting in April 2001

- *Smart Traffic: Deploying Incident Management* two day international conference was held from 1-3 May 2001 in Brisbane. The Chief Executives of QPS and QMR jointly opened the conference, providing a very strong signal that cooperative incident management was a priority

- Leveraging on traffic management and security arrangements for the Commonwealth Heads of Government Meeting initially planned for Brisbane in October 2001, fibre optic cabling was installed linking the QMR traffic management centre and the Police Communication Centre enabling sharing of information, particularly video images

- *Advanced Incident Management Operations* one day training courses, run by J O'Laughlin (USA) were held in May 2001 and again in May 2002 in Brisbane

- Inter-agency review and debrief of each major traffic incident resulting in road closures in excess of three hours commenced in June 2001

- QMR and BCC both expanded their Traffic Management Centre operations to 24 hour/7days in October/November 2001

- The *Brisbane Incident Management Coordination Group* was established in June 2002 comprising key stakeholders in incident management. The Group currently meets monthly to exchange information and conduct joint planning and training exercises

- QPS established an internal traffic incident management project in June 2002

- *Smart Traffic 2002: Operations and Partnerships* two day international conference was held in July 2002 in Brisbane

- BCC introduced incident site liaison officers in November 2002 to provide a communications link between police and emergency services and traffic management centres at major incidents

- *Memorandum of Understanding on Incident Management in Brisbane between Brisbane City Council, Queensland Police Service and Department of Main Roads* was formalised in December 2002. This outlines an objective, governance arrangements, roles and responsibilities and management processes

- QMR prepared a 5 year *Incident Management Operational Plan* that articulated priority actions, complete with performance targets

- Planning for the potential co-location of BCC and QMR traffic operations by 2005 was underway in February 2003 addressing issues of governance, functionality, roles and responsibilities, area of coverage, shared funding models, inter-agency communication networks and multi-agency centre management

- *Queensland Traffic Incident Management Strategy, including national security incidents*, draft released in March 2003 by QMR. This contains a framework for regional incident management strategies and action plans, including best practice candidate action items

- *Use of Photogrammetry in Incident Management* workshop on how to reduce crash site investigation time was run by L DeChant (USA) arranged by QMR and QPS was held in March 2003

- Workshop on *Legislative Requirements for Quick Clearance* identifying issues and priorities was facilitated by QMR in May 2003

- Interagency desk top training exercises are being held on a regular basis

- Research projects on *Traffic Incident Management and Security Benchmarking* and *Evaluation Framework* being undertaken by University of Queensland (UQ) during 2003

- Collection of incident management related data has progressed, to assist with performance monitoring, evaluation and preparation of benefit cost analysis to support future capital funding submissions

As can be seen from this list, much has been achieved in building a regional incident management coalition demonstrating a strong commitment by key stakeholder agencies.

So what lessons have we learned in the process of these developments that may be instructive to others wishing to build regional incident management institutional arrangements?

LESSONS LEARNED

Successful regional traffic incident management depends on strong interagency involvement and commitment. Some of the challenges and lessons learned to date in developing a regional incident management approach in Brisbane are outlined below.

Leadership

Leadership in incident management means developing and maintaining a priority for incident management, in the face of increasing congestion challenges and resource constraints. This requires raising the awareness of the transport challenges being faced, the impacts of incidents (economic, social, environmental) and the benefits of coordinated incident management to transport professionals, key stakeholders, decision makers and elected officials.

This has been achieved through a range of initiatives including developing issues papers, establishing demonstration projects, running international conferences to share information on best practice, arrange training courses, seminars and workshops, establish an inter-agency

forum and developing agreements between key agencies. Keeping the level of interest of decision makers and elected officials in incident management in the face of their numerous responsibilities is an ongoing requirement. This can be facilitated with regular reports on activities and achievements, including annual reports on performance.

One of the critical challenges faced in progressing inter-agency traffic incident management is maintaining continuity, enthusiasm and 'corporate' knowledge of the limited number of people involved in incident management. There are two components to these challenges, firstly, key people who are champions or advocates move on to other jobs, responsibilities – or retire – and are no longer available or to able to be involved. Secondly, the level of effort and activity drops off considerably at the end of a demonstration project, because of their limited duration and funding constraints.

Demonstration projects provide opportunities to test the strategic approach, build working relationships and inter-agency understanding of each other's role and gather data to assess the benefits. *Operation Freeflow*, jointly undertaken by QPS and QMR was a good example where additional Police motorcycle patrols were made available through joint funding to rapidly respond to incidents in peak periods on motorways in the Brisbane area.

Sharing experience and best practice through conferences and training courses is an ongoing long term objective, as each event only involves a limited number of people and it takes time for new ideas to be implemented.

In Brisbane it was determined in the early stages that successful incident management programs must have a regional perspective, because incidents have a regional impact and can only be effectively addressed through an inter-agency and inter-jurisdictional approach. The approach taken was to start with a minimum number of critical responsible agencies, in this case Police and the state and local road transport agencies. This coalition is being expanded to other key agencies and organisations.

Establishing the inter-agency forum, the *Brisbane Incident Management Coordination Group*, has been critical to maintaining interest and enthusiasm, with regular monthly discussions on policy and technology issues and developments and agreement on coordinated action. Fortunately at this stage a senior Police officer chairs the meetings, which has positively influenced commitment from other responder agencies.

Having an agreed governance structure is also important, in Brisbane's case a high level strategic committee was established comprising top management of the critical responsible agencies, under the Memorandum of Understanding, to meet only a few times per year and receive reports on achievements and performance and consider matters requiring high level decisions, such as changes to the legislation and policy.

Agreement has been reached on responsibilities for all aspects of incident management, including who is in overall command of an incident and which agency is responsible for what. To achieve this requires all agencies to be aware of the capability and responsibilities of other agencies and making staff aware of the agreements on roles and responsibilities.

QPS is responsible under state law for the overall management of traffic incidents, and rather than have specialist traffic units, their policy is for police officers to be able to respond to any form of public safety incident. Therefore one of the challenges being faced is that a range of

different officers are involved in managing incident scenes, many who may not be fully aware of traffic incident management procedures, practices and protocols. Awareness and training of appropriate Police personnel is being progressed to build an understanding of the impact of and the need for priority in responding to traffic incidents.

It is difficult to sustain incident management programs because they depend on scarce operations funding, which typically have to be reallocated annually and are susceptible to loss of the program champion and other competing programs.

Strategic direction

Ad hoc progression through issues is fine but will lead to inefficient use of resources and result in people losing interest, as incident management will not appear to be professionally managed. A more effective approach has been to develop a strategic direction based on key stakeholder consensus. This was achieved by collating best practice approaches that are applicable to the local context and then subjecting this strategic framework to a detailed review and discussion by all stakeholders.

Such a strategy needs to contain agreed objectives, strategies, roles and responsibilities, and performance criteria, so that each participant has realistic expectations of other participants and agree on their own obligations and commitments.

QMR commissioned a state level incident management framework – *Queensland Traffic Incident Management Strategy, including national security incidents* – which provides a useful checklist of actions for stakeholder agencies to include in their incident management programs, as well as inter-agency activities. This means there is clarity in the objectives of incident management and over time will result in a consistency of approach and facilitate inter-agency cooperation. Different stakeholders have different charters, eg emergency services are charged with public safety, while transport agencies are about moving people and goods (moving traffic), so the strategy needs to balance and align these often competing objectives.

The strategic *outcomes* being sought are numerous and often conflicting and the suggested framework in the above strategy include:

- *reduce safety risks to acceptable levels*
- *reduce traffic delays*
- *rapid recovery and treatment of injured*
- *keep road users informed of traffic conditions*
- *reduce the probability/risk of secondary incidents*
- *efficient use of multi-agency resources*
- *ensure safety of responders*
- *provide effective/safe diversions around incidents*
- *ensure the appropriate investigation of incidents*

It was also important to agree on *measures of performance* to evaluate incident management programs on a regular basis. Measures suggested include:

- *time to respond to incidents*
- *time for clearance of incidents*

- *level of safety at the scene*
- *effectiveness of diversions*

One of the major challenges facing agencies implementing best practice traffic incident management programs is limited resources (funding and skilled people) and there is an uncertainty of benefits or lack of data making it difficult to provide robust business cases. Undertaking evaluation of incident management programs, as well as developing alternative evaluation processes to assess the feasibility of proposals, such as multi-criteria approaches will help to address these issues.

Successful incident management during the construction of the Pacific Motorway (under traffic), a major inter-urban freeway, showed the benefits of pre-planning and establishing strategic outcomes. Keeping traffic flowing along the route was a priority and key objectives during the construction and operation phases (with sections progressively opened to traffic) were to reduce costs to the community, traffic delays and safety risks to acceptable levels (Charles 2002).

Detection and verification of incidents

Video surveillance of major traffic routes has been effective in reducing incident verification time, confirming the location and guiding the appropriate response. Video images also have considerable value in managing incident sites and managing the flow of traffic around the site. Sharing infrastructure, particularly camera images between transport agencies (BCC and QMR) and with QPS has been an important development in better management of incidents, including providing images to the QPS Accident Investigation Unit so they can determine the appropriate response, as investigations often make up the longest proportion of closure times of major incidents.

The high use of mobile phones in Australia have become the primary means of first identification of incidents and among transport professionals it is often said that three reportings of an incident by mobile phone is more reliable, quicker and accurate than any current incident algorithm approach.

So while technologies are under development for automatic detection of incidents, using either video images from cameras or by using loop detectors, these technologies are not yet sufficiently accurate or reliable, funds are not necessarily available to ensure complete coverage of the road network by field devices and the technologies can not be relied on in all circumstances (eg poor light for camera images), so verification of incidents still requires trained operators.

One if the difficulties being faced in Brisbane is technology incompatibilities, as Police, Fire and Ambulance agencies operate separate despatch systems, and the Police Control Centre, which receives emergency calls does not have direct communication links to provide this information to transport agencies. Use of internal state government intranet to transmit messages relating to traffic incidents has gone some way towards overcoming this, however Brisbane City Council is not currently connected to the state intranet system. Another area of incompatibility is all responder agencies use different communications systems and are not to communicate inter-agency at the incident scene. Using the Police Control Centre as the coordination point overcomes this, but it is inefficient and causes problems when communication traffic is high.

Incident response and management

Service patrols, such as Brisbane City's Traffic Response Units, have consistently generated extremely positive public perception, documented through many letters received from motorists who have benefited from their assistance. Most of these programs are seen as both responsive and preventive incident management measures, as the situations they clear prevent distraction and secondary incidents for passing traffic.

Protocols for the control of the incident site have been agreed with the inner cordon, or immediate incident scene, being managed by Police (or the Fire agency in the case if a fire) and managing traffic through and around incident scene, or the outer cordon, being managed by the relevant road traffic agency. Diversion plans and principles for diverting traffic in major traffic corridors are progressively being developed and processes for special events are well developed.

Sharing communications infrastructure, video images, traffic data and other information between QMR, BCC and QPS and examples of co-location of operations have also been beneficial to building a regional approach. While sharing of some camera images and limited data has been occurring for some time, many technological, network security, funding and institutional issues need to be resolved to progress forward.

The move to establish separate commercial business entities by transport agencies to progress development of ITS systems can (unintentionally) create issues, particularly commercial interests can hamper collaboration if full costs are charged.

Provision of information to road users and travellers through existing variable message signs, traffic reports to commercial radio stations and the internet have been well received. Internet traveller information is available, as well as applications for real time traffic information via mobile phone. A better appreciation of the benefits in provision of internet based information in highly urbanised areas is needed.

The coordinated response and focus on ensuring safety and getting the traffic moving has improved the response and clearance times.

Review and performance monitoring

One area that has been successful is the post-review of major incidents, with responder agencies collecting & sharing of data for interpretation and analysis. Inter-agency debriefs after major traffic incidents on management of traffic have identified institutional and policy issues and lessons for subsequent implementation.

A benchmarking project has been initiated to identify current progress and achievements of each of the key agencies and recommend potential areas for improvement.

Additionally work is being undertaken to develop a evaluation model to readily assess, on a network wide basis, the cost of the traffic incident in terms of traffic delays, lost productivity, secondary crashes and increased emission level. The model is being customised to enable evaluation of pre-planned diversion routes to test the effectiveness of such routes and identify in advance potential problem areas.

KEYS TO SUCCESS

A number of keys to success can be identified from considering the lessons learned so far.

- Establish governance mechanisms, such as a stakeholder forum to exchange information and discuss policy and technical issues and a decision makers group to review achievements and take decisions on policy and funding issues
- Identify and facilitate champions in stakeholder organisations at operational and senior management levels
- Seek commitment from executive and/or elected official levels in key stakeholder agencies
- Identify key experts who can provide facilitation and independent review of activities and progress
- Agree roles and responsibilities and use the incident command approach used by police and emergency services, and extend to transport and other agencies
- Promote education and awareness of key staff and decision makers in incident management
- Establish the strategic direction in terms of objectives, strategies and performance measures through best practice review
- Jointly funded demonstration projects facilitate working relationships, test concepts and gather information on performance, costs and benefits
- Regular exchange of information through regular meetings of stakeholders, workshops, seminars and conferences and gathering information on costs and benefits of incident management programs to support establishment of future programs
- Encourage people involved to be open to learning from experience
- Encourage sharing of resources by participating agencies
- Have facilities and resources, including traffic management centres, available 24 hours a day 7 days a week
- Utilise service patrols to quickly respond to incidents, make them safe, direct traffic and clear them quickly
- Joint training exercises allow development of working relationships and understanding of each agency's roles and responsibilities in a non-critical situation
- Consider the inter-relationship of incident management with national security to make better use of infrastructure in place and increase the priority of future infrastructure.

NEXT STEPS

Where is incident management in Brisbane headed? Incident management programs in Brisbane are moving more toward formal, regional and interagency coordination, making effective use of resources available.

Effective, long-term relationships among all key players need to be created and sustained, which often involves several agencies working jointly at multiple organisational levels. The

challenge of establishing and continuing communications should not be underestimated. One of the areas being seriously considered is co-location of control centres at least for incident management, with BCC and QMR looking at the potential for a combined facility, together with QPS crash investigation and other transport related agencies, such as bus transport operations.

Selecting an optimal mix of field devices, such as traffic management systems, variable message signs, cameras, detection systems and service patrols, requires careful consideration of budget, integration, operations and management requirements. The system must be flexible as additional agencies are involved and are linked to the systems. Combined consideration of future funding programs to deploy the highest priority infrastructure would be beneficial, using the governance mechanisms already established, ie a regional inter-agency incident management funding program.

Key policy and legal requirements are being progressed, particularly a quick clearance policy enabling rapid movement of vehicles, including requiring vehicle drivers in minor crashes to clear their vehicles off the road, towing or pushing disabled vehicles from traffic lanes and providing liability protection for agencies.

Reduction in the time to clear incidents is also a priority, the major areas being considered including provision of more extensive priority at traffic signals across the network for emergency vehicles (and advice on less congested routes), reducing the time to investigate serious crashes, and improving the flow and movement of traffic through and around incidents. One of the challenges is building awareness and knowledge of incident management among a wider proportion of responder agencies, especially Police (who do not have specialised traffic units), as officers responding to incidents currently may have limited understanding of traffic.

Increasing emphasis on inter-agency training, building on initiative already underway, both specialist training aspects (eg photogrammetry for crash investigation) and more general education and training, such as the basic principles of effective incident and traffic management, particularly for non-traffic personnel in responder agencies.

Greater involvement of other stakeholders, including other road user groups not already involved, such as motorist and trucking associations, public transit, vehicle insurance and towing industry and the media, are progressively being targetted, to raise their awareness of the implications of incident management and identify their needs and potential contribution.

One area requiring increased emphasis is greater consideration of national security requirements and increasing the awareness of the synergies between incident management and security with both transport, public safety and security agencies and involvement of relevant agencies in planning and training exercises. This will require consideration of the intelligent transport systems infrastructure (eg hardening and providing redundancy for communications and control centres) the development of route and operational plans for mass evacuations.

CONCLUSION

Much has been achieved in Brisbane in developing regional traffic incident management in the past few years, many successes can be identified and the level of response is improving. However as the potential for incident increase with increasing traffic, increased emphasis on incident management will be required. The current planned developments should go some way towards addressing these issues. A number of lessons and success factors have been identified which should be useful for other regions wishing to progress traffic incident management in their area.

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GLOSSARY

BCC	Brisbane City Council (local transport agency)
BIMCG	Brisbane Incident Management Coordination Group
CRMC	Cooperative Road Management Centre project led by QMR
ITS	Intelligent Transport Systems
QMR	Queensland Department of Main Roads (state road transport agency)
QT	Queensland Transport (state transport agency)
QPS	Queensland Police Service (public safety agency)
QF&RS	Queensland Fire and Rescue Service (emergency services agency)
QAS	Queensland Ambulance Service (emergency services agency)
RACQ	Royal Automobile Club of Queensland (motorist association)
SEQ	South East Queensland
TIM	traffic incident management
TRU	Traffic Response Units (operated by BCC)
UQ	University of Queensland