Using Strategic Asset management
as
an Infrastructure Strategy Tool

Steve McGrath*

Manager (Project and Asset Management)

Queensland Department of Main Roads

Major Projects Office

McGrath SK, (2007). Using Strategic Asset Management as an Infrastructure Strategy Tool. In *Proceedings of the IIR Public Infrastructure and Asset Management Conference*, Sydney, 2007.

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1. Introduction

This paper draws upon the author's work in both Queensland Transport (QT) and the Queensland Department of Main Roads (MR).

To enable better management of its assets, and to achieve delivery of its $2B per annum works program, Main Roads has carried out an organisational review and realignment process that is nearing completion. The philosophical basis for this work has drawn on the following five management types:

- asset
- project
- program
- portfolio/business.
- organisational/ corporate

This paper first gives the organisational context, then takes a bottom up approach to explain the development of each of the asset, project, program, portfolio/business and organisational/corporate management models into an integrated organisational model for Main Roads. The paper then moves to a top down approach to provide the strategic approach to management of the content, which in this case, is a network of road assets.

2. QT/MR Organisational Environment

The transport portfolio in Queensland comprises Queensland Transport and the Department of Main Roads along with Government Owned Corporations (GOC) which include Queensland Rail (QR) and Port Authorities. Queensland Transport responsibility covers both public transport and freight by land, sea and air. It also handles driver licensing and vehicle registrations.

Queensland covers an area of approximately 1.73 million square km and has a 7,400 km coastline. It is seven times the area of the United Kingdom, is more than twice the size of Texas and five times larger than Japan. Queensland has a population of just over 4.0 million; and its transport task is carried on 174,000 km of road network, over 9,600 km of rail track, over 130 airports (including two of Australia's largest international airports), and 20 trading sea ports and two community sea ports. Queensland has 2.4 million licensed drivers, 3.52 million registered vehicles, over 193,000 registered recreational vessels and over 5,700 registered commercial vessels.

Each year in Queensland approximately 0.6 billion tonnes of freight are moved by road, sea, rail, air and road vehicles travel 34.7 billion kilometres. 1.3 million passengers arrive at Queensland's international airports, an estimated 185 million tonnes of goods pass through Queensland ports, and over 6,400 ships visit Queensland ports (Queensland Transport 2001-2005).

Main Roads has responsibility for the State's declared road network and is a project-based organisation. Queensland Transport is heavily involved in operations and regulation, however its proportion of project-based work had been steadily increasing, with a multitude of business development projects, as well as planning, design and construction of the Busway projects. Project management became an increasing part of QT's business, with projects frequently transcending internal divisional and sometimes departmental boundaries. QT senior management therefore decided to move to a project approach to better manage business development and its associated organisational change. The approach was designed to handle infrastructure as well, resulting in the OnQ framework being formally adopted by MR as well in 2004. Once the first Busway was constructed, QT then became involved with operations and asset management of this new class of asset and developed a conceptual framework for doing this and coincided with the framework used in the current Main Roads' realignment.

Main Roads manages the State controlled road network which has an asset value of $32.5B in 2006/07. This is the largest single asset owned by the Queensland State Government.

3. Asset management

3.1 Management of individual assets

The Queensland Government Asset Management System GAMS identifies four organisational roles for asset management. These are owner, operator, asset manager and service provider. These roles also align well with practice in Queensland Rail, another part of the Transport Portfolio. They also align well with the commercialisation framework of the early 1990's, as shown below:

Organisational Roles under various models

GAMS	Commercialisation Theory	Commercialisation as implemented
Owner	**Owner**	**Purchaser/owner**
Asset Manager	**Purchaser**	
Operator	**Provider**	**Provider/doer**
Service Provider	**Doer**	

Problems with the more simplistic implementation of the commercialisation model in the 1990s as shown in the table above occurred when:

- the need to separate the four roles was not recognized,

- the asset manager role was misunderstood and/or overlooked, and

- internal service providers were forced to seek work elsewhere, consequently becoming less available to the parent organization, whose performance subsequently suffered.

In commenting on what effectively is the governance arrangement for these four roles, GAMS emphasises the need to separate them as follows:

"Where the responsibility for asset management is shared (generally between owner, asset manager and/or user) the roles should be clearly delineated, 'arms length' relationships to avoid situations where those involved become confused about the objectives of each party and to minimise potential conflicts of interest. A service level agreement between parties can define the interests and responsibilities of all parties."

Although GAMS grew out of the Government Land Register (GLR), and deals with buildings rather than with civil assets, the roles it provides are generic and equally applicable to other asset types. This division of roles has found applicability within both Queensland Transport and Main Roads.

3.2 Management of the objectives that the assets achieve

For an organisation that spans a large geographic area, achieving consistency of strategic approach across that area is a considerable challenge. Achieving consistency of purpose, meeting consistent standards, the level of independence given to local offices, and the level and nature of control exercised by central offices are major issues. Organisational and project governance arrangements therefore impact significantly upon the strategic outcomes achieved.

This paper contends that an Asset Management approach can be applied at the business objectives level by applying the same governance roles to objectives as is typically applied to assets.

The key is dissociating ownership of the asset from both ownership of the objectives the assets contribute to and the corporate outcomes they produce. This can be done by controlling program structure and by setting parameters for the individual investments.

3.3 Responsibilities of the area responsible for the business/portfolio objective the asset services

Applying this thinking leads to the following responsibilities for the area responsible for the business/ portfolio objectives the asset serves:

- Pursuing departmental strategic objectives in its area (which may involve regulation of assets owned by others)
- Obtaining any necessary assets
- Integrating these assets into the overall system
- Setting policy and strategy for the various asset types
- Disposing of any assets which no longer contribute to the business
- Obtaining funding for operations and maintenance of existing assets
- Nominating an internal asset owner's representative

3.4 Responsibilities of the position nominated as the asset owner

The responsibilities of the position nominated as the asset owner are then as follows:

- Pursuing the transport outcome the asset is intended to serve through
  - Operation of the asset (as purchaser/operations program manager)
    - Functionality (effectiveness of operations)
    - Performance (efficiency of operations)
  - Asset management of the asset (as purchaser/asset program manager)
    - Functionality (effectiveness of assets)
    - Performance (efficiency of assets)
  - Developing any necessary policy and strategy for the asset
  - Promote usage of the asset
  - Nominating the operator and asset manager

3.4.1 Deliverables required of the nominated asset owner

The following is then a list of deliverables that could be expected of the nominated asset owner:

- Strategic plan for the asset containing
  - Required life expectancy
  - Required operational level
  - Anticipated demand
  - Required presentation standard
  - Budget
- Input into broader level strategic planning, communications and marketing
- Operations plan (produced by the nominated operator) containing
  - Services plan
  - Commercial operations plan (if applicable) containing
    - Leasing/sub leasing charges
    - Usage charges
    - Retained earnings usage
  - Communications and marketing plan
  - Operations and security monitoring plan
  - Risk management plan, including critical incidents, safety and security plans
  - Business continuity plan
  - Environmental management plan
  - Legal compliance plan
- Asset management plan (produced by the nominated asset manager) containing
  - Description of assets
  - Whole of life strategies
  - Preventative maintenance plan
  - Maintenance plan including any backlog

- o Reactive maintenance plan
- o Inspection schedule for above 3 plans
- o Risk management plan, including critical incidents plan and safety plan
- o Environmental management plan
- o Legal compliance plan
- Database of assets, condition inspection and maintenance history
- Valuation of asset (asset, operation, goodwill, government policy, strategic business need).

3.5 Management of the organisation on strategic asset management principles

Road networks are operated in a way that could be described as "passive". Fixed assets are produced and made available for anyone to use, provided the drivers are licensed and the vehicles are roadworthy and registered. In contrast, rail has to be "actively" operated. Train scheduling involves major effort to match demand, as does signalling to ensure the trains do not run into each other.

The need for an organisational structure that caters separately for operations is therefore easier to see in a rail department such as Queensland Rail (QR). However, MR has now organised itself this way, as the operator role for roads is nevertheless still substantial, and includes such things as approval of access to adjacent developments, approval of heavy loads routes and permits to move, control of animals, pests, noxious weeds and fire hazard.

Main Roads has 14 district offices dispersed across the State. These offices perform both an asset management and an operations role as well as a network improvement role and local politicians hold the District Directors accountable for the roads outcomes in their districts.

Over the last couple of years, MR has transitioned its Regional Directors from a command and control of Districts basis to General Managers with portfolio management responsibility. They now exercise control through strategy and budget cycle, rather than through direct control of the assets or resources producing the assets.

The Deputy Director General (DDG) has been nominated as the owner of the outcomes produced by the portfolios he controls, which include asset management (State Wide Planning), operations (Corridor Management and Operations) and service provision (Program Development and Delivery). This follows the four level model for individual assets, applied at the portfolio level, as explained above. Other portfolios provide corporate and support/enabling services, and report separately to the Director General.

4. Project Management

The management of assets is interwoven with the management of projects. Projects produce the assets to be managed, and improvement and some maintenance works are also projects. The relationship between project and asset management is shown in the following diagram showing the asset ownership cycle, as well as the place of the portfolio's project management framework within it.

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The OnQ project management framework developed by the portfolio provides the project model used in the MR realignment. This model has an internal customer service focus. It draws a distinction between the customer and the end user and also between the project customer and sponsor. These distinctions may not be necessary for a sales model where an organisation entices customers to buy its products, however it is essential to understand this distinction in the more complex provision of public infrastructure where the end users are the customer of the Minister and not of the agency providing the infrastructure. End users are very important stakeholders, and while consultation with them is vital, they do not control. It is the Minister who controls, that is, makes the decisions.

The OnQ governance model and its associated roles and responsibilities are outlined below

4.1 Project Governance Model

The following diagram shows the project governance model in the OnQ project management system:
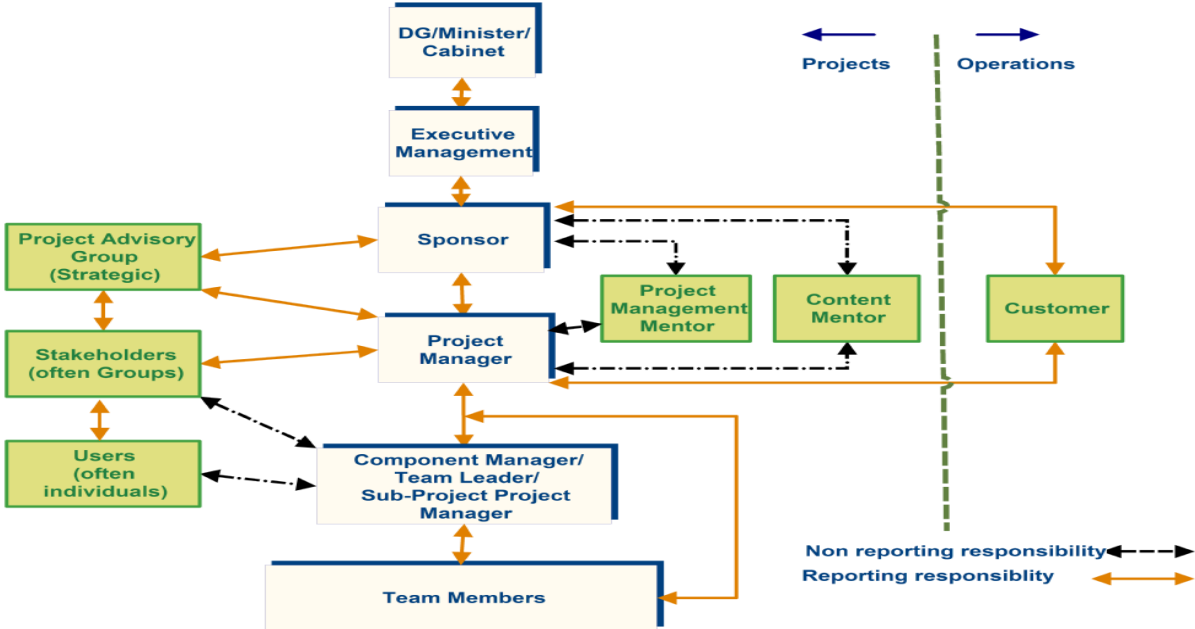
4.2 Project Roles and Responsibilities

The significant roles in the project governance model are as follows:

Role	Role description
Customer	**The person who will "own" the asset the project produces.**
Sponsor	**The head of the entity that delivers the project. Note the Sponsor does not fund the project, so the word is <u>not</u> used in the "benefactor" sense.**
Project Management Mentor	**A person nominated to assist/advise the project manager by providing project management oversight to the project.**
Content Mentor	**A person nominated to assist/advise the project manager by providing content oversight to the project.**
Project Manager	**A person appointed to manage a project from initiation through until project finalisation**

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Component Manager	**A person who manages a project component**
Project Advisory Group	**The group advising the sponsor and project manager**
Users	**People and organisations who will use the output of the project**

.

Note that the Customer and Sponsor are not the same role/person. The customer initiates the project and specifies what is required, the sponsor ensures delivery occurs. Once the project is completed, the customer becomes responsible for the operation and maintenance.

5. <u>Program Management</u>

Projects are collected together into programs to achieve benefits such as:

- administrative convenience/ efficiency

- economies of scale in delivery

- sequencing of delivery

- economies of resourcing

- coordination of related projects

- consistency of purpose

- minimisation of adverse impacts.

These programs can also include maintenance.

A program manager can manage any collection of projects, selected by any means, as a program. Responsibility for developing criteria and recommending a selection of projects and maintenance activities for the program may also rest with a program manager. However, accountability for allocating specific projects or directing project selection methods or accepting/rejecting the program manager's recommendation rests with the program sponsor/program customer/business outcome owner, whose collective responsibility it is to tailor and package programs to best achieve the objectives of the business as well as to best realise the benefits desired from the programs.

All projects and programs, without exception, need to provide benefits that contribute to achieving business objectives, irrespective of whether they are infrastructure or business development projects/ programs.

Corporate management is ultimately responsible for the corporate outcomes and so must ensure that business/ portfolio objectives are set that provide direction to the program customer. (Note that the program customer does not necessarily have to be the ultimate legal owner of the assets produced, if the required outcomes can be achieved through funding or other means of regulation.)

5.2 Program packaging/project selection

It is the responsibility of the business (portfolio management) to package projects, and maintenance, into groups for program (asset) managers to manage. The business may also allocate funding for a purpose to a program manager, and may also indicate selection methods for the program manager to use. The program manager then needs to develop this to a point where the business (program customer or outcome owner) is satisfied that the selection best meets the business need, will contribute to achieving portfolio management objectives, and will optimise delivery benefits for it. The program customer then needs to approve this.

Program managers will be able to provide assistance and recommendation on tools, techniques and

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considerations for doing this, but cannot be held responsible for how well this fits with business (portfolio) objectives. Only the business is in a position to have all the information relevant to making a complete decision on this.

6. Business/Portfolio Management

The guiding principle in developing this part of the OnQ site has been to manage government business in a similar manner to private enterprise. This means substituting the profit outcome driver with a business outcome driver, producing cost efficiency (which may be to the government business or to others) as a consequence. The word "business" has therefore been used, rather than "government" or "department".

Both private and government businesses exist to benefit their owners through providing products or services to a market/ electorate. Both types of business need to acquire/ develop/ improve the necessary products or services (through project management) and ensure their continued existence (through ongoing management of their operations).

Any progressive business, whether it is public or private enterprise, will have two parts; one providing whatever products/services it offers to its customers; the other developing business improvements. This is shown diagrammatically in the following diagram, which also shows the hierarchical relationship between products, projects, programs and the business.

6.1 Generic business structure
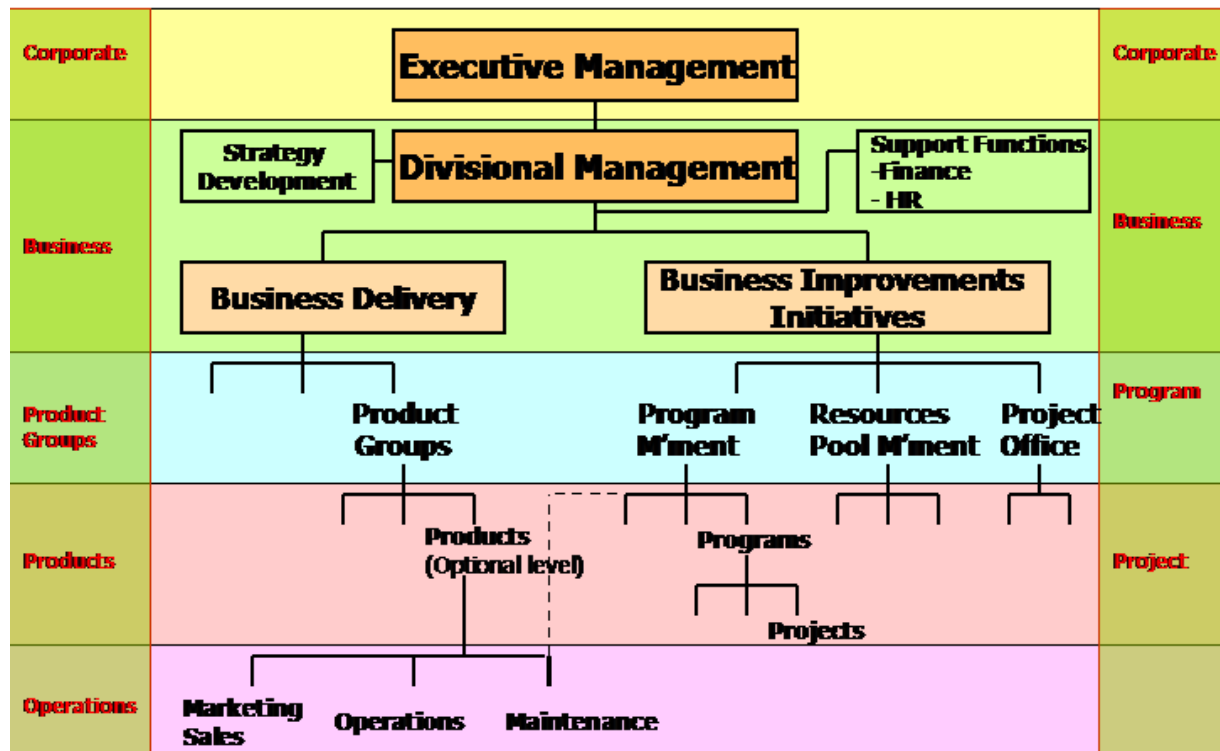
There are any number of MBA courses and texts that deal with the ongoing business operations side of this diagram. This paper will deal principally with the business improvement side. It will cover the operations (business delivery) side only as far as is relevant to a government roads department.

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In project management or business improvement terms, portfolio management sits at the business level and is really a subset of business management. The two terms are interchangeable.

7. <u>Organisational/ Corporate Management</u>

Corporate management is accountable to its shareholders/ minister for delivering the products/ services it was established to provide. It is therefore responsible for determining the structure of its businesses/ portfolios, and for setting the strategic direction for the whole organisation, through developing the organisational strategic plan. It is also responsible for developing the management structure to ensure good governance of the organisation, through ensuring the generic levels of organisational management, as outlined in Section 6, are provided for. It must also ensure that the organisation both provides its products and services, and has an integrated means of improving them.

8. <u>Integration of all five Management Types</u>

Following consideration of the asset, project, program, portfolio/business and organisational management models outlined above, a set of integrating principles was then applied.

8.1 Integration Principles

1. **Responsibility is delegated as low as it can reasonably go.** This means that if two or more people in the hierarchy could be nominated for a particular role, the lowest in the hierarchy should be nominated. The higher ones will have some accountability anyway. This was also a workout objective.

2. **A customer service focus applies.** This means that for example, an SES3 in Major Projects may serve the needs of an SES2 or SO District Director. A customer service focus is inherent in the OnQ project governance model which requires identification of an internal customer.

3. **No person or position should exercise more than one governance role within the one management level.** This means that different people should fill the customer, sponsor and manager roles within each of the project, programme and portfolio management levels.

4. **Ownership of the business outcome does not require ownership of the business resources, organisations or assets that produce business outputs.** Some control over resources, organisations and assets is required but this can be exercised by regulation rather than by ownership. This means that:

   - Districts don't have to "own" the MPO resources that may be delivering some of their projects

   - General Managers don't have to "own" the districts or have them reporting to them. They can "regulate" them by setting statewide targets and directions, and controlling through allocation of funds to achieve these.

   - District Directors can "own" the road assets in their road network. The General Managers don't need to.

5. **The framework needs to be consistent with project management, program management, portfolio management, asset management and organisational management models and terminology.**

   The above principles differ considerably from previous and some current practices. The lack of an internal customer service focus at project, program and portfolio level has led to the conclusion that an outcome cannot be achieved unless a position has the resources under its direct control to do it. This has also had classification and salary implications for individuals, and has led to silo thinking. The change to an internal customer service focus is perhaps the most significant cultural change to be made.

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8.2 Roads Business Group Role Definitions

The four generic levels within organisations (corporate, portfolio, program and project) were then lined up with the OPM3 management types (portfolio, program and project) as well as the asset management roles of asset manager, operator and service provider at both asset and outcome levels as well as with the program roles relevant to projects, program and portfolios.

The following diagram is a result of this alignment:

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Road Business Group - Role Definitions
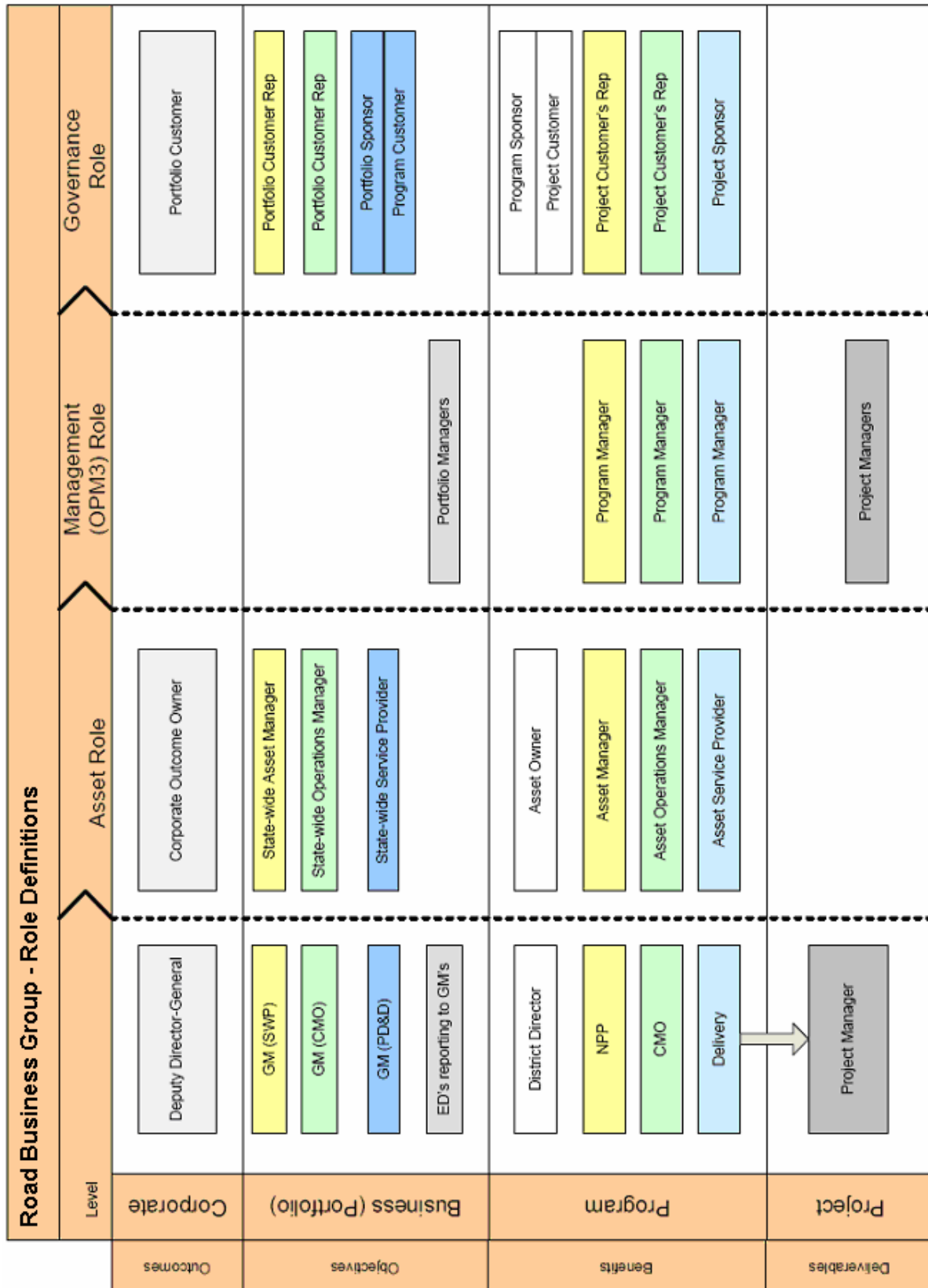
9.   Strategic management of the network of assets

The earlier sections have addressed the issue of how the organisation has been structured to cover all levels of management. However there are also very important questions to be addressed regarding how the strategic objectives for the network can be determined, and how funding should be allocated to asset improvements and maintenance in a geographically dispersed organisation.

The approach that has now been adopted by Queensland Main Roads evolved from a substantial amount of practitioner debate and consultation. Long lists of every possible road feature were developed, analysed and reduced to a workable level. Technical factors and the road user perspective were considered, as well whether the feature could be analysed on a State-wide basis, and whether it represented an issue where the operating environment demanded management that could only occur with investment. A list of items was eventually developed and agreed. These were called elements.

The list of elements was then categorised into two groups, enhancement and MPO (Maintenance, Preservation and Operations), or, very broadly, asset management and operations. Accountability was allocated to the corresponding two general managers, who were tasked with determining the overall network strategic objectives. Competing demands for funding were then resolved between the elements. The guiding mechanisms for achieving this were, and will continue to be, the State-wide Plan that sets the 20 year performance vision and the Road System Performance Plan (RSPP) that sets performance milestones for the next five years. The objective of these plans is to bring about consistency and improvement in minimum asset condition across the network.

Element managers were allocated to manage each of the elements, and were tasked with developing a strategy for their element, setting achievement targets or milestones, and costing these. Element managers were then required to report their desired milestones and costing to the appropriate general manager.

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9.1 Element management

The following elements were used:

Key Outcome Area	Element Category	Elements
Environmental Sustainability	Environmental Rehabilitation	Contaminated Areas Nature conservation Degraded areas
	Environmental & Heritage Management	Heritage preservation Declared pest species Fire risk management Roadside landscape Road traffic noise management
Equity & Access	Sealing Roads Serving Remote Communities	Sealing roads to serve remote communities
Safer Roads for Safer Communities	Treating Crash Sites	Bicycle facilities Pedestrian facilities Intersections with high crash frequencies Hazards close to roads Driver fatigue management
	Risk Reduction	Management of animals on roads Performance of rail crossings Road and environment safety Hazardous grades Roadside barrier management Batter slope management Caging of overpasses Skid resistance management
	Maintaining Safe Road Condition	Routine maintenance (sealed) Routine maintenance (unsealed)
	Providing Road User Guidance	Roadside signing Roadside and surface delineation Route lighting
Effectiveness & Efficiency	Maintaining Road Surfaces	Surfacing treatments
	Maintaining Pavement Service Life	Pavement rehabilitation
	Maintaining Structures	Bridge and culvert rehabilitation
	Providing Enhanced Capacity	Widening sealed roads Realigning sealed roads Providing additional lanes Constructing at-grade dual carriageways Grade separating to motorway standard Constructing intersections to increase capacity Constructing bridges to increased standards Improving flood immunity
	Managing Road Use	Overload management Provision for emergency vehicles Incident management Traffic management Traveller information Other transport initiatives

9.2 Balancing the elements – capital versus maintenance

The perennial conundrum in infrastructure asset management strategy is how to achieve a workable balance between capital works and maintenance. Maintenance is usually the less glamorous and consequently poorer cousin. If a brass plaque could be placed on maintenance, or if a ribbon could be cut, there may be a better chance of redressing the usual imbalance. Holding commissioning ceremonies on upgrades is one approach to this.

The question that allocation by element poses is whether it will make a difference to the long-term capital/ maintenance balance. The experience in the first year has been that it has not had this effect yet. This year's allocation to maintenance was about equivalent to last year's maintenance position across the State. However, allocation by element did focus more attention on maintenance, and made the consequences of cutting maintenance much easier to determine.

The current level of Queensland State Government infrastructure investment is at an all-time high, with the South East Queensland Infrastructure Plan and Program (SEQIPP) providing a level of certainty around many major projects. This funding has been in addition to current allocations, leaving the pre-existing program funding generally intact. This meant that the balancing exercise was able to focus more on the MPO elements (Maintenance, Preservation and Operations) than may have otherwise been possible. However the scale of the larger projects and the increases due to cost escalations in the industry and stakeholder requirements over recent years have tended to erode this opportunity to make significant gains in maintenance funding and outcomes.

9.3 Balancing the elements - operations versus asset management

This issue has not proven to be so difficult for the following reasons:

- The funding required for Main Roads operations is somewhat less than it is for asset management, and so operations was not so difficult to allow for

- All elements were balanced against each other, rather than being balanced between operations and asset management. This tended to reduce internal politics around the funding debate, and focused attention upon the real needs of the network.

- A decision was taken that all elements would get at least some funding.

9.4 Annual strategic asset management process

The above balancing needs to be done to a timescale, and a defined process was therefore necessary to achieve this. The Department's Road System Manager Framework (RSM), shown below, provides the conceptual context within which this annual process occurs.

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The more detailed process flow to implement this to the road network across Queensland is set out in the following diagram.

RBG Business Flow

	Districts	GM(SWP)	GM(CM&O)	GM(PD&D)	RBGB
1	Analyse impact of previous year on future strategy				
2		Set/review 20 yr strategy and 5 yr performance principles	Set/review 20 yr strategy and 5 yr performance principles		
3					Agree 5 – 10 yr principles / priorities & funding
4		Obtain / allocate 5 yr funding			
5		Prioritise between asset management elements (covering maintenance, preservation & enhancement) for next 5 yr period & allocate funding for all elements	Prioritise between corridor management & operations elements for next 5 yr period		
6	Validate milestones & determine 5 yr costs to meet planned milestones				
7		Set 5 yr performance milestones & agree allocations for asset management elements (covering maintenance, preservation & enhancement) for next 5 yr period	Set 5 yer performance milestones & agree allocations for corridor management & operations elements for next 5 yr period		
8		Prepare RSPP			Approve RSPP & element funding allocations & decide budgets for stewardship & capability
9					
10				Advise allocations, prepare & publish RIP guidelines	
11	Analyse district network to determine suitable schemes				
12	Prepare scheme concepts / obtain submissions from LG's				
13	Evaluate schemes against performance principles				
14	Develop draft programs with reasons for any departures from performance principles				
15				Collate program	
16		Review PD&D program against objectives	Review PD&D program against objectives		
17				Resolve any distribution issues between Districts & packaging across Districts	
18					Approve programs for submission to the Minister
19	Deliver porjects			Monitor program delivery progress	
20	Operate & maintain the district road network				
21	Monitor & report program progress to PD&D + manage any changes				
22	Progressively update condition & as constructed data in ARMIS & BIS				
23	Review asset performance	Review asset performance	Review asset performance		

NOTE: The arrows denote the flow at completion of the box step.
The diagram does not attempt to describe the processes necessary to do any step.
Iteration loops between steps are therefore not shown (expect for the big annual one at the end).
It is presumed that consultation will occur before decisions are made and tasks are completed and passed on.
The above enables a simple presentation than would otherwise be possible.

4/30/2007

9.5 Impact of using elements to allocate funding

Analysis of elements across the whole State uncovered differences in practices between districts, and in the minimum and average standards achieved. The program beginning 2006/07 provided the first opportunity to attempt funding allocation based on the element approach. Difficulties encountered included:

- lack of data and defined processes under the new structure;
- matching the level and geographic distribution of existing resources to those required to achieve the State-wide targets;
- lack of stakeholder familiarity with not using the previous financial year as the starting base for geographic funding of element work. Some local communities and politicians had expectations that the level of funding for particular types of works would be maintained or increased. This was handled by making some commitments to maintaining employment levels, rather than work types.

These issues have still to be worked through completely, and it will take some years to transition to the new model because of these practical difficulties. However it was never expected that the transition that could be achieved quickly. Refinements are in progress for the 2007/08 financial year. Furthermore, the initial impact is only in years 4 and 5 of the program, as the earlier years were already committed.

It is of some interest to note that although 80% of the money went to only 8 elements for the 2006/07 financial year (such as reseals, rehabilitation and bridges), no element missed out on funding, as has occurred in previous years.

10. Conclusion

This paper has described the development of asset, project, program, portfolio/business and corporate management models within Queensland Main Roads into a cohesive, integrated organisational model. It has described the organisational change that has accompanied this, and described how this has been applied to the strategic management of a network of road assets.

This work has provided the opportunity to integrate the previous waves of organisational change, from excellence in the 1970s and 1980s, through quality, road reform and commercialisation, into current project, program and asset management models. This opportunity to stand on the shoulders of these ideas and develop an organisational model that adopts their features that worked, and learns from the features that didn't is somewhat unique. Whether this work stands the test of time and provides a stable integrated organisational model for the long term future remains to be seen. At the very least, it will hopefully provide a significant contribution to thinking in the Organisational Development area.