

**Taking a National Approach To
Driving Justified Improvements in
Sustainable Infrastructure Asset
Management (SIAM)**

**A Discussion Paper Designed to Promote
the Adoption of a National Municipal
SIAM Program in South Africa**

**For The
IMESA National Asset Management Strategy (NAMS) Committee**

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Contents

1.	Abstract / Preamble	4
1.1	Abstract	4
1.2	Preamble	4
1.3	The Vision	5
1.4	The Problems With our current Approach	6
1.5	The Needs and Drivers	7
2.	A Potential National Model	10
2.1	Model Outline	10
2.2	Generic Global NAMS Model	10
2.3	Industry Best Appropriate Practice Versions	12
2.4	National Versions	13
2.5	Collaboration Regional or State / Nationally / Globally	14
2.6	Deriving A National Picture	14
3.	Key Success Factors	16
3.1	The Key Success Factors	16
3.2	The Key Stakeholders	17
3.3	The National AM Steering Committee (NAMS.za)	18
3.4	The Regulatory Framework	19
4.	The Benefits of a National Approach	22
4.1	Overview	22
4.2	Typical SIAM Benefits	22
4.3	Additional Benefits of National Programs.	23
5.	Conclusions	25
5.1	Where To From Here?	25
5.2	References	26
5.3	Authors Biography	26

Figure Index

Figure 2-1	The SIMPLE Tool Modules	11
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Figure 2-2	The Life cycle Functions	11
Figure 2-3	Typical Metro Municipal Model	12
Figure 2-4	Roads Industry model showing all categories of asset covered and then how each breaks up into more detail.	13
Figure 2-5	The Global / National / Provincial Model Structure	14
Figure 3-1	The Integrated National Program Elements & Stakeholders	21

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1. Abstract / Preamble

1.1 Abstract

The cost effective and sustainable management of any nation's large infrastructure portfolios is critical to its citizen's standard and cost of living. Implementing an appropriate standard of asset management cost effectively and successful is not easy. Many programs have been started and dropped due to the high cost, however this can be done very cost effectively.

In this paper and presentation IMESA will draw on global experience in how other national bodies have implemented national asset management frameworks and improvement programs. One of the principle authors, Roger Byrne has been heavily involved in the development of national programs for Australia, New Zealand and the United States of America and has witnessed and reviewed approaches in many other parts of the world.

In this paper & associated presentation IMESA will outline:

- The various ways different nations have addressed this issue
- The strengths and weaknesses of their approaches, and misspent efforts
- The lessons learned, and from these IMESA has identify

What he sees as the most successful – best practice approach, and

The benefits & potential savings of a single National Quality Framework Program using a “continuous improvement” concept over a diverse, distributed multiple program approach as is currently being undertaken as pilot studies in Durban South Africa.

In the presentation IMESA has used case studies to demonstrate the approaches, tools and guides that are essential. He will also address issues such as:

- The roles & responsibilities of all the stakeholders involved
- The role for legislation / regulation
- The best forms of national support tools and training
- The roll out from large to small organisations and portfolios
- A National Infrastructure Reporting System – Asset Management Plans

1.2 Preamble

More than thirty years ago, several jurisdictions embarked on a journey that was intended to drive improvements in the way we managed infrastructure asset management throughout various industries. The practices became visible first in Australia and then New Zealand and in the UK with the privatisation of UK Water Industry. Since then other countries have joined the movement. However most have done it on their own, in isolation. Many have failed to raise sufficient interest, and in some cases even failed to start. Many have progressed only to have it retreat or be abandoned after significant effort has been wasted.



The IMESA team have been involved in all or significant parts of this journey, which has now spread to cover much of the developed world. We all know it could be done better than it has been.

We also understand that good asset management is only practiced in less than 10% of the municipal sector globally.

This paper is aimed at raising discussion on the development of a National Program Model for sustainable infrastructure asset management or SIAM. To be more specific, the authors now believe that the creation of an ISO based standard is likely in the not too distant future. (ISO 55000 Asset Management). The principle intent of this model is to improve infrastructure asset management progress and collaboration across the South African Municipal sector and hopefully it can also be done globally.

This paper addresses the application of this approach to individual Nations and how they would best roll it out in their jurisdictions. It is intended as a discussion / debate generator and we all look forward to your feedback on this proposition.

This discussion paper forms the fourth in a suite of papers on a future vision for infrastructure asset management.

- 1. Lessons Learned in Infrastructure Asset Management from around the globe**
- 2. The AMPLE Tool Suite – A response to the lessons learned**
- 3. Taking a Global Approach to Driving Sustainable Infrastructure Asset Management**
- 4. Taking a National Approach to Driving Sustainable Infrastructure Asset Management – (This paper)**

It is suggested that readers would have a better understanding of these issues if they were to have read the previous papers in this order.

1.3 The Vision

The idea of a National Program Model for infrastructure management seems like a daunting suggestion, but one, which, if correctly applied, could have a dramatic impact on the well being of infrastructure service users in South Africa, as well as the world / earth (environment) in general. We can manage our extensive and valuable community infrastructure assets far better than we do currently, and there is no valid excuse not to do so, especially as we can have a great impact on the standard of living and its related cost of living for millions of people in this developing nation.

We can also have a positive impact on our planet by looking at our infrastructure management with a triple bottom line approach, which assesses the impact of our decisions in economic, environmental (including climate change) and social terms.

It seems illogical that we can have an ISO standard for Environmental Management Systems, yet not have a similar standard for the proper management of the infrastructure assets and their use, which in turn together with our human activities represents a major contributor to these global environmental issues.

We not only owe it to our nation, and ourselves, as workers and managers or current stakeholders in the infrastructure industry, but to our customers, communities of interest, and in particular to future generations of people and users of infrastructure services in our country.

Should we proceed down this path, it is important to do so using a logical ISO type quality framework approach, which ensures that efforts in this area are not wasted and that our scarce community



resources are spent in the most effective way providing infrastructure services that are effective, efficient and sustainably managed to an appropriate level of expertise / quality required.

The basic premise for this approach is:

- ▶ The key issues and drivers relating to infrastructure portfolio management are essentially the same all over the world. E.g. Demand & Supply at an affordable & sustainable cost.
- ▶ The best practice management of infrastructure portfolios and the whole of life cycle processes are common for all infrastructure assets, from conception to end of life. ,
- ▶ The practices related to individual asset types are different e.g. condition assessment practices / maintenance & rehabilitation techniques etc.
- ▶ The other key variables involve different regulatory frameworks, national, regional and even individual agency issues; however, these variables are capable of being delivered under a common “quality based framework”.
- ▶ The currently available quality frameworks have proven they are capable of achieving these objectives.
- ▶ Across the nation regional groups and individual agencies are spread across the quality spectrum; therefore, we need an approach / methodology that allows any agency or jurisdiction to improve in a step-by-step approach to suit their individual ‘best appropriate practice’ (BAP) or ‘appropriate maturity level’ (AML) in the most cost effective and sustainable way
- ▶ We spend significant resources all over the world on the subject of infrastructure asset management, especially in the areas of research and system development. We believe that we could foster broad improvements in how we manage these infrastructure service delivery businesses on a global scale by improving in the way we engage each other and share knowledge and leverage our learning experiences. E.g. stop reinventing the wheel – take the best wheel and work to improve it, and use this in South Africa.

1.4 The Problems With our current Approach

As with other nations, South Africa is moving towards improved asset management or SIAM. We have the advantage of texts and guidelines / manuals like the IIMM and some parts of the professions doing best appropriate practice AM. However, in general, the bulk of SA’s municipal infrastructure assets are being managed at below the level 1 or basic level. Roger Byrne has made the following observations following his time in South Africa and his detailed work with the Cities of Durban and Cape Town and broader National experience, namely:

- ▶ There appears to be over 25 different approaches being taken to AM
- ▶ Only a few organisations have adopted a quality framework or maturity assessment approach to identifying a logical improvement program
- ▶ Training programs are being developed and undertaken by different groups using different approaches across many industry groups. There are various private consulting groups and government departments undertaking different training for the same industries
- ▶ Every industry or asset type is being done differently by different groups



- ▶ Asset valuations and depreciation activities have been undertaken without appropriate guidelines and approaches that would have drastically reduced the cost of this activity and delivered a better (higher confidence) outcome. That could be more easily expanded into good asset management.
- ▶ Condition assessments are being undertaken using a variety of methodologies that prevent national comparisons being made.
- ▶ All this work has been undertaken without ensuring the full integration with the inputs / outputs required for future SIAM activities.
- ▶ There is no real co-ordination in this area. IMESA has tried to direct attention to these issues in the municipal sector from a technical perspective, however few organisations have tackled the issue logically with a structured improvement strategy
- ▶ National co-ordination requires the participation of all key stakeholders. This is not solely a technical issue. It requires the collaboration of both finance, economics, audit and regulation to work effectively
- ▶ I have watched many nations go through this process. I believe that it has been done better and can be done much better

This paper is intended to raise the issues involved and start the discussion / debate about adopting a national approach for South Africa.

1.5 The Needs and Drivers

Modern society demands a high standard of living. Infrastructure services provide a significant part of this standard of living, while contributing significantly to the cost of living. The effectiveness and efficiency with which these asset portfolios are managed is therefore critical to our economic performance, and our future standard and cost of living.

Because of the environment we live in, we will need infrastructure for decades and even centuries to come. Many factors drive the cause of failure, but the four critical ones are:

1. Capacity - The increasing demands for assets due to:
 - Population growth
 - Demands for more equitable standards of living / and the backlog in infrastructure service provisions (additional assets)
 - Demographic changes (shifts of population)
 - Increased demands for improved levels of services including the triple bottom line issues of better social, environmental and economic performance
 - These demands come in terms of quantity / capacity and quality of service. In the case of wastewater systems the critical issue maybe quality of our environment with greater waste loads being placed on the environment.
 - The realisation of the need for greater level of review and audit / regulation of the management of these valuable community assets.
2. Reliability - The rate of decay of our existing infrastructure assets and the services they deliver resulting in the need for increased:
 - Maintenance – both planned and corrective
 - Rehabilitation – by intervention at the most optimal time in their life
 - Replacement – when justified



- Enhanced performance or quality of outputs to match the levels of service outlined above.
- Augmentation of capacity (in line with the above increasing demands)
- The adoption of new practices, technology and support equipment that will improve efficiency and reduce the costs of service delivery.

What we do know is the direct link between a community's quality of life, the cost of living and indirectly the wealth and economic viability of the community in general is directly related to the quality with which our infrastructure asset portfolios are managed. This is not the only driver or link, but in terms of typical public services it is the single key input.

3. **New Regulations:** In many instances assets require upgrades to meet new government regulations. They still may be good assets but need to be replaced or upgraded to suit the new requirements. E.g. Higher wastewater discharge standards may require new technology / treatment processes.
4. **Business Efficiency** – For all well run businesses there are investments that need to be made to continue to provide their services in the most efficient manner. In some cases asset component replacement can be justified by considering the future benefits available, even though the asset may continue to perform well, E.g. Computer systems, electric motors etc.

The Skills / Resources Gap

Infrastructure rich industries worldwide have recognised the need for better skills and knowledge in the unique area of life cycle infrastructure asset management. The key issues driving this need are:

- ▶ An ageing workforce due primarily to the post World War II baby boom & professional emigration
- ▶ Greater workforce mobility both nationally and internationally
- ▶ The shift in attitude from “job for life” to “job for now”
- ▶ Demands for skilled workers from other developing sectors :
 - Across the world e.g. China & India and in different industry sectors e.g. Oil & Gas
 - Locally the ESKOM power failures & 2010 effects)
- ▶ Smaller governments and down sized agencies meaning less staff to complete internal training and mentoring programs that were the basis of skills transfer in the past including trade apprenticeships.
- ▶ The fact that these LCAM skills are not readily available in the current education systems
- ▶ The need for more specialist skills for the new and more complex assets and facilities we are now expected to manage
- ▶ The need for a fully accredited training program with multiple levels to suit the new roles and responsibilities that are necessary to properly manage these valuable community asset portfolios
- ▶ The need for senior managers to have a broader range of skills other than the original qualification that they started with e.g. Accountancy, Engineering, etc.
- ▶ The distribution of personnel that can now be located over a huge geographic area and cannot be easily trained by the old methods we used to employ.

A new form of learning is required and web based tools and distance learning offer a great avenue for this to take place when combined with whatever on the job mentoring and support we can muster.

Few academic institutions neither recognise the need nor have developed the programs to meet the life cycle or life extension needs of infrastructure assets. The demands on their services have been growth



and the provision of staff to design and construction of new assets. Few have addressed the issues related to whole of portfolio life cycle asset management. In fact, outside of the multiple maintenance courses, it has been the professions and industries that have developed all key courses in this new area globally, and not our academic institutions.



2. A Potential National Model

2.1 Model Outline

We consider that the model should be based upon the premise listed previously:

- ▶ To achieve this National SIAM the model must be nationally driven and coordinated through a collaborative approach with input coming from the various key stakeholders involved in SIAM activities. Not just engineers, but all professions and interested parties. See section on Stakeholders for more information. The model itself would:
- ▶ Involve a Standard Basic Quality Framework model. An ISO based quality framework for LCAM is being developed using inputs from the existing examples with over 23 countries participating or observing. Note : PAS 55 and SIMPLE/TEAMQF/ Gap Ex are examples of inputs at this time
- ▶ Reflect a common framework that covers life cycle processes for sustainable generic life cycle AM. This material is now readily available globally.
- ▶ Incorporate common 'best appropriate practice' models developed to cover all individual industries and specific asset types e.g. Industry or infrastructure asset type models for roads, rail, water, sewer, electricity, drains, buildings and all others etc. These should describe the 3 step by step levels in maturity that are considered best appropriate practice for those industry or asset types.
- ▶ Involve all stakeholders via national committees or centres of excellence ensuring the most effective national collaboration.
- ▶ Participation in the global activities being undertaken in the same areas. (See separate proposal)

One of the significant benefits of this approach will be through global and national collaboration and coordination. We do not have to reinvent the wheel. We should not be spending scarce research and development dollars repeatedly on the same subject all around the world. We acknowledge there are unique differences in terms of asset types, materials, ground conditions, operating environments; and regulatory structures and approaches; however, we believe that they can be catered for in the customization of the tool to suit individual national and regional circumstances.

The proposed model would be created in two distinct parts, namely:

2.2 Generic Global NAMS Model

This would be a generic model that holds all of the world's best practice information. A global network of National Asset Management Steering Committees would manage this. E.g. (NAMS) type organizations, who's sole focus would be on the common framework model for SIAM. This model would involve all life cycle process aspects related to advanced life cycle asset management of entire infrastructure portfolios, the life cycle functions, and the ISO quality framework that underpins the entire tool set. E.g. Total Enterprise Asset Management Quality Framework (TEAMQF)

The key elements of this version would include:

- ▶ All the generic Quality Framework modules (see figure below):
 - All the Quality Elements that support the SIAM practices
 - The generic best practice processes for portfolio management



- The asset related best practices based on industry models
- The Gap Analysis tools suites
- The benefit / cost modules
- The Asset Management Improvement plan module
- The effective Implementation module (change management)
- The Learning Experience Modules – the eLearning modules that take users through a structured training program in a step by step process with both generic and industry / asset based training programs.

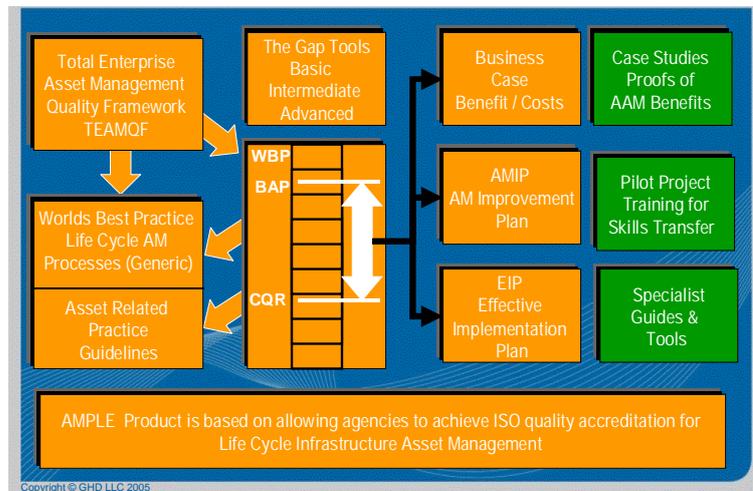


Figure 2-1 The SIMPLE Tool Modules

The quality framework model should cover all aspects of life cycle functions as best reflected in the SIMPLE wheel below:

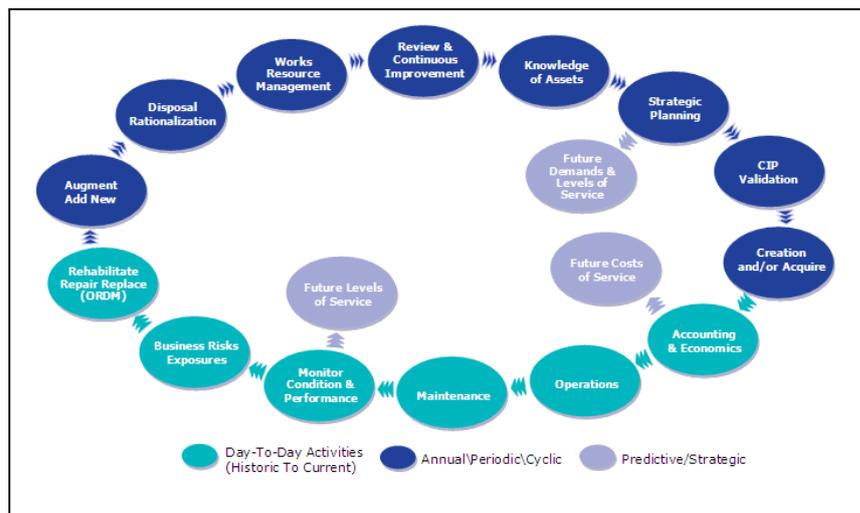


Figure 2-2 The Life Cycle Functions



2.3 Industry Best Appropriate Practice Versions

(Multiple) – These versions would be the ones customized to suit the various industry or service delivery models. They would be modified to include all the best practices and other information related to the individual asset types associated with a particular industry. E.g. Potable Water, Electricity, Gas, Rail, Seaports, etc.

These Industry models (e.g. Water) would be managed by a global network of national NAMS industry based type organizations whose sole focus would be related to the industry and the asset types managed by them. These industry based NAMS groups would be clearly linked with the industry type associations on both a National and International perspective. (e.g. South African Water Association (SAWA) and the International Water Association (IWA)). These industry-based models would develop best practice in the areas of difference from the generic model by including the key industry issues and case studies, levels of sophistication, references etc... Access to these industry models would be gained as the user accesses the relevant industry version of the generic tool. This is best shown by the following figures, which demonstrate how the generic model expands to a Municipal Industry model and then further expands into a roads model.

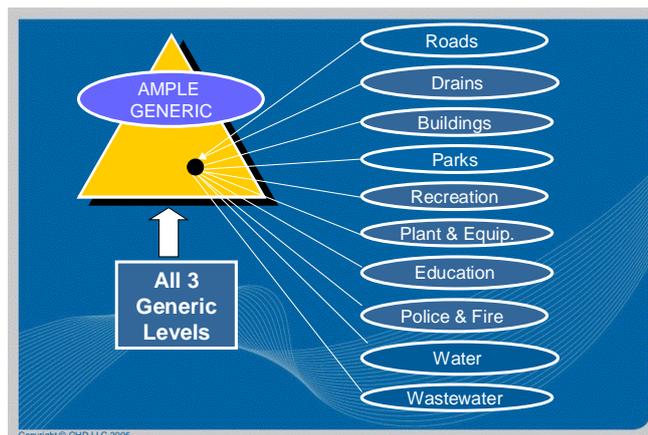


Figure 2-2 Typical Metro Municipal Model

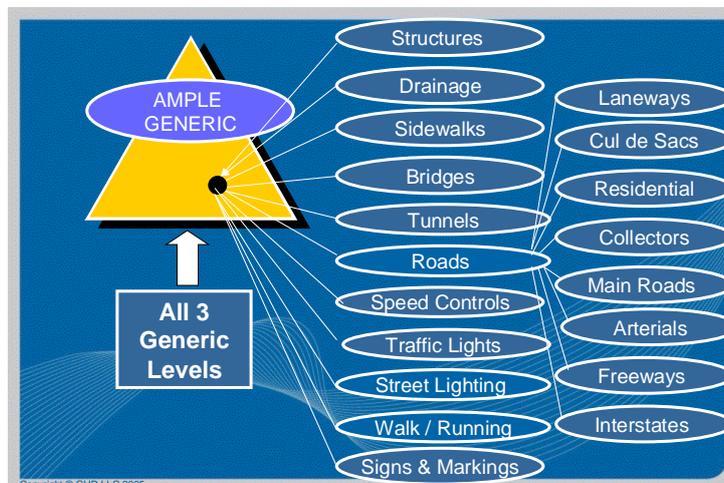




Figure 2-3 Roads Industry model showing all categories of asset covered & how each breaks up.

The key life cycle processes of all infrastructure assets are the same. In fact the same processes can manage all physical assets, both living and inert. E.g. we follow the same processes to manage a lion at a zoo and a tree as we do a road pavement or a sewer. However the practices we use to carry out the various functions of the life cycle are different.

- ▶ The key differences for each industry group and asset types are:
 - Asset hierarchical structures and data standards
 - Condition Assessment Practices (e.g. SEWERAT or PACP rating for CCTV of sewers)
 - Key performance indicators (KPI's)
 - Performance monitoring equipment
 - Valuation / Depreciation techniques
 - Maintenance practices and strategies
 - Rehabilitation techniques
 - Non Asset solutions (e.g. Demand Management)
 - Specialised support equipment
 - Specialised Information systems
 - Disposal issues and strategies

These practice models would also decide on issues that they believe is required for their jurisdiction, where this would be vetted through the global network to ensure that no other jurisdiction has the same issues and may have completed work in this area. The decision would then be made as to whether this could be adopted, or should it be further improved and added to the global suite.

2.4 National Versions

(Multiple) We see that the above generic models would have these national additions in the form of special appendices automatically included in the web-based tool for users in these jurisdictions.

The key variables that will most likely be required for National and Provincial groupings are:

- ▶ National and Provincial based
 - Policies and strategies
 - Local Legislative requirements
 - Regulatory requirements and performance standards applying to the industry or asset type
 - Unique organisational structures and situations.
 - Funding models and rules
 - Occupational Health and Safety issues

The key variables that may be required for Regional and Local (individual) Agency variations:

Regional and Local Agency based:

- ▶ All of those listed above
- ▶ Practices relating to unique- conditions (local):
 - Ground conditions



- Weather conditions
- Materials used in assets (locally cast concrete pipes)

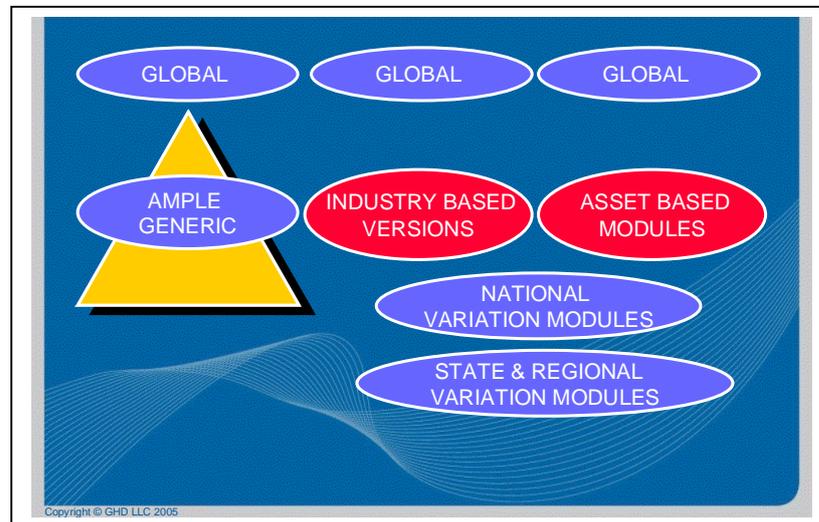


Figure 2-4 – The Global / National / Provincial Model Structure

The key advantage of this uniform national approach is that all services can be rolled up to give a clear picture of the condition, performance (levels of service), sustainable long term costs, utilisation / capacity issues, risks and future liabilities of all infrastructure services across the nation. This data can be viewed vertically from and an asset component up to a Whole of Service, then Whole of City, then Whole of Province to a Whole of Nation perspective.

With all views providing a high level of confidence as the outputs are built from the asset components up to the whole views listed above. This is essential for all levels of Strategic Planning especially the National ones, etc...

2.5 Collaboration Regional or State / Nationally / Globally

Involving all stakeholders and co-coordinating these inputs is a significant task. However it has already commenced. Initially in Australia and then New Zealand, this approach is now evolving around the world. The UK, EU, Canada, the USA and South America are now moving down this path as are South Africa.

It is a massive task that will accommodate different requirements across Nations, but it can be done if we keep our mission in mind:

“To support and help drive sustainable improvements in sustainable (life cycle) infrastructure asset management successfully and most cost effectively”

2.6 Deriving A National Picture

It is now recognised that infrastructure assets and the services they provide are critical to:

- ▶ The national and regional - state economies



- ▶ The national standard of living
- ▶ The national cost of living.

It is therefore vital that they are managed effectively and efficiently. It is also important that we are able to understand the relative performance and capability of these assets to continue to provide the services required by and willing to be funded by the relevant stakeholders.

Asset Management Plans with 25 – 30 year visions that derive the following outputs:

- Asset renewal programs.
- Asset growth and augmentation programs
- Maintenance programs
- Operational programs
- Understanding the real risks of all predicted asset failures from both growth and renewal / reliability perspectives.
- Predicting future levels of service and costs of service

With this information available from every municipality it is relatively easy to roll this information up to provide accurate pictures for 'whole of city', 'whole of province' and 'whole of nation' perspectives. Because they have all been formed by a uniform approach to asset management then the outputs derived will have great value in allowing us to judge where the real issues lie and how we can better address the greatest risks and liabilities.

It is only then that National Governments can really address the delicate balance between keeping the existing economic driving assets going against the need to overcome the significant service backlogs that exist for many of the South African population, with basic housing and services.



3. Key Success Factors

3.1 The Key Success Factors

The key success factors for implementing a successful National AM Program for municipalities are:

- ▶ The shared understanding that SIAM is critical to our national, regional and local economies, and our standards and cost of living.
- ▶ This understanding is backed up by the commitment of all levels of government and the private sector (where applicable) to ensuring that these valuable community and national assets are managed most effectively and efficiently.
- ▶ That all key stakeholders are involved in the co-ordinating body that will and drive this national program. E.g. The National Asset Management Steering Committee of South Africa (NAMS.za)
- ▶ An appropriate quality framework by which these assets should be managed, that is based on a 'continuous improvement philosophy' that is tailored to the individual organisation and its situation but is capable of ensuring it meets national goals and objectives.
 - This quality framework enables a uniform approach to be taken to these issues and that enables the information to be compared across different industry / asset types (horizontally) and 'rolled up' (vertically) to provide valid data that can be compared on key indicators such as
 - Valuation and condition
 - Actual performance against targeted levels of service
 - Full economic costs in TBL terms
 - Predicted Future Expenditure & Performance
 - Critical Business Risk Exposures
 - Horizontally across the different industries and service provisions (at different levels) such as:
 - Rail, Roads, Water, Electricity, Sewer, Buildings, Drains, Schools, Health facilities. Airports, Ports, etc. etc.
 - Vertically to provide comparable answers at the following levels:
 - Locally (suburb or township area)
 - Whole of City
 - Provincial / Regional
 - National
- ▶ That the SIAM quality framework is capable of being implemented in a step by step approach in such a way as to be suitable for application to assets from simple / basic townships up to Metro cities such as Johannesburg, Pretoria, Cape Town and Durban. The proposed model outlined previously has the capability of catering for this step-by-step approach. See the following figure for more information
 - Level 1 – Basic SIAM
 - Level 2 - Intermediate SIAM



- Level 3 – Advanced SIAM
- ▶ A competency model that is based on the quality framework maturity levels (above) for all the life cycle asset management activities. This competency model is fully linked to a set of certifiable training programs that can be delivered by the normal educational authorities or via eLearning techniques.
- ▶ That we balance this drive for the professional quality of management with an appropriate regulatory framework that helps ensure that all assets are managed to a suitable standard. We need an audit framework and suitable regulatory legislation that ensures this minimal standard is achieved by all municipalities.
- ▶ Undertake the programs in a uniform way across all asset types / service provisions to get a sound understanding of all infrastructure service driven programs. This ensures that we get a clear picture of all organisations in a uniform way. One of the key problems identified with the initial national programs was that other jurisdictions concentrated on single issues such as underground water and sewer pipelines assets or electricity generation only (ESKOM). Those countries identified problems with these assets and justified extra budgets for them. Then they repeated the process for roads and then drains. Each time they found critical issues we were not aware of prior to this point. The elected officials and public became annoyed with this approach. Had they done a step-by-step approach to all assets on a whole of city basis they would have been able to identify the critical assets earlier and work on them rather than all assets across a single service program or business unit. This is why IMESA are promoting this whole of city perspective so that all issues and risks are fully identified.
- ▶ Realising that there are key vested interests involved in the current approaches and looking at ways that ensure any national program has a real chance of success we must address this issue. The current vested interests involve some or all of the following:
 - Engineering Consultants
 - Management consultants
 - Training program owners and educators
 - Software developers
 - Data collectors
 - Condition assessment contractors

3.2 The Key Stakeholders

The key stakeholders in this area as seen as:

- ▶ Government / Policy Makers – All levels
- ▶ Regulators / Auditors – Multiple
- ▶ Professional Associations - Multiple
- ▶ Industry Sectors – Associations – Multiple
- ▶ Government Departments
- ▶ Educators – Multiple Levels
- ▶ Users, ratepayers and communities



- ▶ Council staffs and consultants
- ▶ Contractors and Suppliers

We currently have many consultants (both Engineering and Management types), government departments, information system developers and salesmen, private conference / training organisers, educational organisations and professional associations all undertaking some forms of asset management awareness raising and training in how to do it.

All of these organisations are developing approaches to asset management, developing training programs and software applications. They are all reinventing the wheel in a form that provides them with copyright potential and secures their involvement for many years with the clients they assist.

The most appropriate and cost effective and efficient (timely) approach is for all resources being directed to the formulation of a single National Program and then accredit all capable stakeholders to assist with the successful implementation of this single program across the entire Nation.

Many consultants have made wonderful contributions to the issues and the progress of asset management to date. This fantastic (but scarce) resource should be fully employed to assist in the successful implementation of improved asset management, and not to reinvent or duplicate processes and training that ends up weakening the final product and is a diversion of key resources needed in the implementation phases.

3.3 The National AM Steering Committee (NAMS.za)

The NAMS committee would be responsible to the SA Government through the Department of Strategic Planning for the development and implementation of the necessary programs, tools, guides and other activities to ensure the successful implementation of AM in South African Municipalities.

The Committee should include representatives of all the key stakeholders including:

- ▶ Department of Strategic Planning
- ▶ Accounting General / Treasury
- ▶ Auditor General & Governance
- ▶ Department of Finance
- ▶ Commerce and Innovation
- ▶ SIAM Division of IMESA
- ▶ South African Asset Management Association (SAAMA)
- ▶ Engineering Council of SA or Engineering Institutions of South Africa (Rep)
- ▶ Institute of Financial Officers – IMFO
- ▶ South African Local Government Association (SALGA)
- ▶ Department of Education & Training
- ▶ Industry Associations / Asset Type Representatives – for Best Practice Models (3 Levels)
 - Municipal



- Roads
- Water, Wastewater,
- Electricity and Gas distribution
- Facilities (buildings) Management
- Drainage, rivers and flood mitigation
- Electricity - Generation and Transmission
- Gas - Generation and Transmission
- Rail
- Telecoms\
- Public Housing
- Airports / Seaports

It is important to recognise the importance of the Municipal sector to the South African Nation. With the latest restructuring we now have over 60% of the nations community infrastructure (community wealth) is managed by this sector through the six Metro Cities and nine Emerging Metro's alone.

Note: As a leader on the African continent South Africa could help the roll out of this approach across other nations in Africa should the opportunity arise? The approach being put forward is easily transferable to other national groups. This could represent a substantial economic income from the export of this expertise, and the associated workload.

3.4 The Regulatory Framework

A fully legislated regulatory framework is an integral part of the key success for National programs.

A blend of best practice management (in search of excellence) promoted by the industry and the professions involved, underpinned by good legislation is essential to achieving success in this area.

The most successful results in this area have been achieved in New Zealand where legislation requires the following key elements to be produced by each municipality, and independently audited:

- ▶ The production of a best appropriate practice (BAP) set of guidelines that suits a continuous improvement philosophy and makes allowance to the difference between organisations in terms of their size, population served, asset values and asset /service issues / problems involved and financial capability. .
- ▶ The production of long-term (25-30 year) asset management plans covering growth, renewal, operations and maintenance for the whole of their asset portfolio. These AMP's need to be constructed in accordance with the IIMM (2006) - the same as what is available in South Africa through IMESA and the above BAP guides. These cover demand, supply, and levels of service and risk management as well as the above issues
- ▶ A future expenditure model (FEM), which is based on the above AMP's and includes all capital expenditures as well as the predicted operations and maintenance costs necessary to give the required levels of service
- ▶ The resulting future funding model (FFM) or options / strategies to derive the funds required and who pays- e.g. rates versus grants etc.



- ▶ An independently audited IAM quality framework assessment or maturity model that assesses the above and develops a continuous improvement program that ensure the organisation are continuing to aim at and achieve over time, the ' best appropriate practice' for their industry / service program and size
- ▶ A specified Stakeholder Consultation Program (SCP) that presents all these materials in 'full transparency' to all stakeholders and seeks their agreement to one of the strategies and funding models contained therein. This then indicates the stakeholders (users/ customers, the community and the regional and federal governments) willingness to pay. Once this is established the AMP, FEM and FFM are amended to suit the overall budget / tariff's approved, by Government, councils, customers or regulators
- ▶ Asset accounting & valuation regulations. However we don't see these as important as the above items which give a much better assessment of the quality of management and the present and future condition / performance of the asset portfolios. Knowing the replacement value and depreciations of assets represents only 15- 20% of the benefits of doing advanced asset management. This is why we have put it last, even though it is often the first regulation in the steps towards SIAM. Just as has recently occurred in South Africa.
- ▶ All the other typical regulations related to:
 - Occupational Health and safety
 - Water quality and waste discharge
 - Safety regulations - Electrical / Gas / Rail / Road
 - Many others

Utility businesses across the world (both private and public) are generally regulated in terms of performance and price. Regulators have found that these other elements are proving most successful in achieving the desired results. The UK (Ofwat) and other European Utility Industries also follow most of these requirements.

NZ has slowly implemented these regulations over a 10 / 12 year period, as they learnt from their experience. South Africa can do better by studying these other examples, eliminating the mistakes and adopting the successful elements over a timeframe to suit their needs and capabilities. But it is important to set a vision that includes all the elements that you expect to include and thereby give those involved time to plan for their introduction, including both the regulators and the regulated organisations and industries.

Most global private businesses (e.g. BHPB, Rio Tinto, and Conico Phillips) now have adopted variations of this approach to ensure that they can show their key stakeholders / shareholders, their true position in respect to their productive infrastructure assets, the risks involved and the future costs required to achieve predicted production levels. This is now called 'proof of asset integrity and future liabilities". The public sector owns 65% of the world's infrastructure assets. Local Government controls about 45% and so one can easily see the need for its effective management.

3.5 In Conclusion

We really believe that by bringing all these success factors together with the key stakeholders involved that South Africa can derive the benefits described in the following section. If the steps outlined in the



previous sections are adhered too then South Africa can implement this National Program better than any other country and therefore derive greater benefits than have been experienced in the past.

The following figure best describes how these key success factors and the key stakeholders can be integrated to achieve the outcomes desired

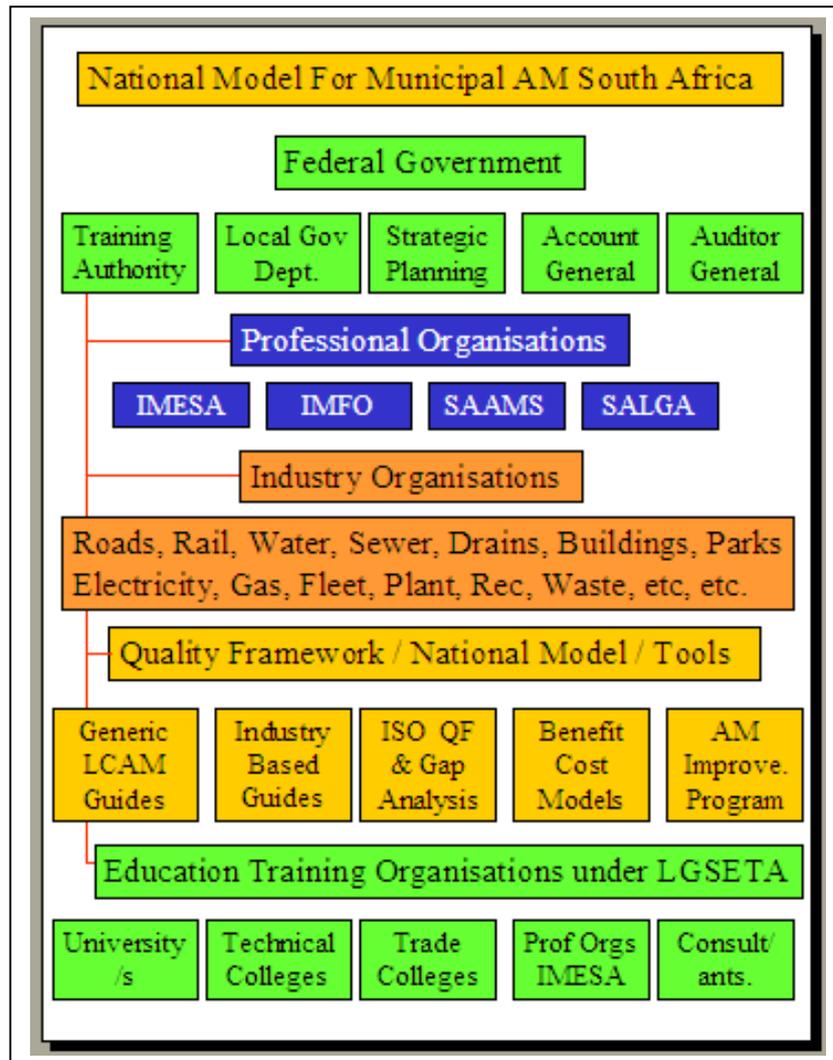


Figure 3-1 – The Integrated National Model Structure Elements & Stakeholders



4. The Benefits of a National Approach

4.1 Overview

Several countries have adopted a national approach to SIAM. Not all have been successful. However we have learnt from these events and have developed the 'key success factors' to ensure that the problems encountered are overcome. These factors are discussed in detail in the previous papers listed in the introduction.

South Africa has the chance to learn from these lessons and undertake a program that will:

- ▶ Be more successful,
- ▶ Be more cost effectively implemented
- ▶ Achieve key results and benefits
- ▶ Complete it more quickly
- ▶ Be more sustainable over time
- ▶ Do it smarter using web based technology
- ▶ Does it as a Whole of Nation approach.

4.2 Typical SIAM Benefits

The benefits of adopting Advanced SIAM approaches have been identified as:

- ▶ Reduced Cost of Service (80%). This is made up of the following key elements:
 - Extending the life of existing assets cost effectively
 - Optimising maintenance activities and costs
 - Deriving better planned / unplanned maintenance blends
 - Improving asset / system reliability and performance
 - Optimising Capital Investment Validation and approval processes
 - Improving Operational Efficiency
 - Better demand management processes
 - Improving Management Efficiency – Smart analysis and automation.
 - Reduced Business Risk Exposure – Mitigating critical failures
 - Greater management flexibility and response times to fast changing world

The average savings achieved in this area are between 15% and 40% (average 25%) of future costs depending on current maturity and issues relating to asset systems.

- ▶ Improved Levels of Service (20%) This is made up from the following elements:
 - Higher levels of service for less unit cost
 - More reliable asset performance
 - Faster response times for asset failures and shorter outages



- Improved customer (and staff) safety
- ▶ Greater Stakeholder Satisfaction (Benefits not valued as yet)
 - Greater accountability on organisations
 - Greater transparency of operations and performance
 - Higher community trust and respect
 - Greater ability to meet changing customer expectations

It is important to realize that these benefits (savings) are based on 'the future life cycle cost savings', which can be achieved over the costs that would likely be involved if the organization, were to continue to manage their assets in the way they do now. They are not saving in terms of reductions against current costs. They are reductions in future costs and better performance through the better management of these vital community assets.

4.3 Additional Benefits of National Programs.

The additional potential benefits of a National Program approach have been identified as:

- ▶ Ability to roll up all organisations and services / from base assets to whole of city, to provincial and to form a valid national picture. It should also be recognised that this then enables a roll down to the assets that need the investment. Too many times I see organisations and national programs that justify an increased budget, but then don't know where to spend it.
- ▶ Increased skills of workforce to meet growing need and overcome critical shortage in SA
- ▶ Reduced mentoring and on the job training costs
- ▶ Targets scarce resources for the areas of greatest need
- ▶ Ability for leading organisations to help drive AM improvement across industries and assist the roll out of SIAM nationally E.g.
 - Larger organisations helping smaller organisations e.g. Metro's help regionals
 - Within Cities across each business unit e.g. Roads help water and they help drainage
 - Within provinces between organisations e.g. Durban assists Dolphin Coast
 - Across the Nation as a whole between the leading organisations
- ▶ Overcomes local and regional parochial attitudes that often cause additional unwarranted costs and delays
- ▶ Ability to roll out new cost reduction programs (smart new practices) country wide through power of web based tools
- ▶ Understanding of good AM information systems and their operations
- ▶ Efficiency in staff transfers across all industries in South Africa (both private and public) due to base knowledge of standard process
- ▶ Ability of National strategic planners to better understand:
 - Current asset performance and capabilities



- Current issues and risk exposure
- Future costs and liabilities
- Understand and quantify greatest national infrastructure needs



5. Conclusions

5.1 Where To From Here?

This proposal was intended to raise awareness and to start meaningful discussion on the development and implementation of a National Program for SIAM in the municipal sector across South Africa

It represents significant benefits for the Nation and the individual municipal organisations

We are not sure that it will be possible.

It will require significant collaboration and coordination amongst the stakeholders.

It will require participants to give up existing positions, parochial attitudes.

It will require giving up vested interests and thinking of the bigger picture and the common good, rather than our individual programs and positions.

This is not to say you should stop what you are doing. We are not suggesting this. But we are clearly suggesting that we should not be duplicating other efforts and wasting scarce resources by all doing it independently

We suggest that all interested parties get together to discuss these issues and:

- ▶ Assess all available ideas and approaches.
- ▶ Identify which of these represent “best practice”
- ▶ Identify the weaknesses or missing pieces in this approach and materials
- ▶ Start to tailor our individual development and research programs fill these ‘gaps’ to support this suite of generic models
- ▶ Investigate the potential of forming the global network as outlined in this paper.
- ▶ Continue to collaborate in Global, National & State forums for both generic, Industry based models
- ▶ Participate in the development of the industry based global networks. E.g. Join NAMS Global

It should be noted that the eThekweni Municipality (Durban) is piloting this program and is making all materials available to the Nation through the IMESA web site and its activities.

For the latest information on the progress of this work please refer to the web site and regular updates in the IMESA Magazine

So, the IMESA Asset Management Sub Committee is interested to hear from you.

- ▶ Do you think it is possible?
- ▶ Would your organisation or you like to be involved?
- ▶ What do you see as the roadblocks?
- ▶ How should we get it started and progress it?

GET INVOLVED – SUPPORT THE PROCESS – JOIN THE IMESA SIAM SUB COMMITTEE



Please send your feedback and comments to rogerbyrne2@bigpond.com

We thank you for taking the time to read this paper and hope you enjoy the associated presentation

5.2 References

This is the fourth paper in a suite of papers relating to Improving Infrastructure Asset Management around the World. See earlier section. Here are some excellent web sites in relation to this paper

- a. AMQI Asset Management Quality International <http://www.amqi.com>
- b. SIMPLE - http://www.werf.org/AM/Template.cfm?Section=Strategic_Asset_Management
- c. TEAMQF Gap –Ex 1 Assessment Tool - <https://www.gap-ex.com/User/Default.aspx>
- d. Institute of Asset Management (IAM) UK PAS 55 documentation www.iam.org.uk
- e. NAMS Australia is an initiative of the IPWEA www.ipwea.org.au/nams and in particular the Asset Management Manuals
- f. NAMS New Zealand - the development of asset management best practice within New Zealand. www.ingenium.org.nz/nams and in particular the Asset Management Manuals
- g. IMESA – IIMM Manual 2006 <http://www.imesa.org.za/>
- h. If you want a copy of the other papers referred to in this paper please contact the IMESA Mentor Roger Byrne at rogerbyrne2@bigpond.com

5.3 Authors Biography

Roger Byrne

Roger Byrne has recently retired following a 40-year career in asset management in which he rose to be the International Manager of GHD's Global Asset Management Group. Over these years he has worked for many infrastructure rich businesses in Australia, New Zealand, SE Asia, USA, Canada, UK, Ireland and more recently Africa. He was the principal author of the original Australian Manual (1993) and the Advanced AM Manual (New Zealand 1997) and one of the principal authors the International Infrastructure Management Manual (IIMM) 2000 & 2005 working with both the Australian & NZ NAMS teams. He has written many associated texts on asset management and has assisted in the development of the worlds first published quality framework and assessment process TEAMQF / Gap-Ex. In recent years he has concentrated on the development of the AMPLE / SIMPLE web based tools that are assisting infrastructure asset owners & managers around the world to implement sustainable, cost effective improvement strategies most successfully. Roger has develop innovative approaches including business value chains, confidence level rating processes, the step-by-step approach, and methods to identify what is best appropriate practice for different organisations and assets. Roger is in



the 'legacy years' of his career and is concentrating on really understanding the reasons or causes for AM failures and driving AM improvements collaboratively around the world. He is now in semi retirement working privately on interesting & challenging opportunities. He has been advising / mentoring councils in both Cape Town and eThekweni where he is now the independent mentor and auditor for their AM program: Contacts Email: rogerbyrne2@bigpond.com Mobile phone +61 419 509 873

Jannie Pietersen

Jannie Pietersen is the Head of Project Management Unit (PMU) in the Engineering Services Division at eThekweni Municipality (EM) in Durban. He is the convenor and responsible manager of the Corporate Asset Management Steering Committee (CAMSC) and has been charged with the task of driving AM improvement within the municipality. Jannie has long been involved in asset management activities within the municipality and across Southern Africa through his various roles with IMESA and other professional organisations. He was a prime contributor to the SA edition of the IIMM 2006. Contacts: Email – pietersenj@durban.gov.za

Krish Kumar

Krish Kumar is the Deputy City Manager – Finance at eThekweni Municipality (EM) in Durban. He is Chief Financial Officer and the regulated 'Asset Officer'. He is joint Chair of the Corporate Asset Management Steering Committee (CAMSC) with the Deputy City Manager – Engineering Services - Adrian Peters. He was responsible for the asset valuation project and is a keen advocate (together with Adrian) of the better management of infrastructure assets across the municipality. He is a Vice President of the Institute of Municipal Finance Officers (IMFO) where he has been an advocate of the SIAM approach and the thoughts contained in this paper: Contacts: Email – kumark@durban.gov.za

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