

## International Best Practice of Asset Management in a Electricity Utility.

### *Do you manage your Assets?*

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## 1 Introduction

The Electricity Distribution Industry in South Africa has three distinct groups of players, Eskom, the Metropolitan Councils and a multitude of Municipal distributors that each face a set of unique asset related challenges. These challenges include amongst others:

- **An aging network** compounded by poor maintenance procedures.
- **Rapid growth in demand** and geographic expansion.
- **Overloaded infrastructure** with limited redundancy.
- **Limited capital investment** in past five years due to the growing uncertainty in the industry.
- **Higher cost to maintain** and operate the networks effectively
- **Poor maintenance practices** leading to outages and negative public perception
- **Availability of qualified and experienced resources** to manage / maintain network assets

The National Government's initiative to restructure the Electricity Distribution Industry into Regional Electricity Distributors [REDS] will have a positive impact on service delivery in the country. The impact of restructuring of the industry on service delivery will be minimised by implementing the basic principles of good asset management consistently throughout the industry.

The internationally accepted best business practice of Enterprise Asset Management (EAM) was introduced and adopted by key Utilities in the South Africa from the late 90's already. However these practices are perceived to be time consuming, complex to manage and require dedicated resources to create sustainable value to the Utilities Business. The critical resources required for EAM, include: skills (people), mature operating practices (processes), information systems and mobility (technology) and accurate, up to date Network equipment data (asset content).

Due to perceived complexities, not all the Utilities have adopted the EAM practices. This leaves room for improvement, in preparation for consolidation of the respective Wires Businesses through EDI restructuring. This paper will explore a simplistic approach to managing Network Assets effectively. We will define the approach, based on PAS 55, the respective organisational roles required in the Wires Business, and provide pointers on how to establish and improve your EAM system.

## 2 Definition of Asset Management

Enterprise Asset Management is a pragmatic approach to managing organisations assets, across the enterprise, to achieve its strategic goals while providing tools for making decisions which allow a utility to meet a required standard of service in the most cost effective way.

**Thus, asset management encompasses the strategies, technologies and processes to optimize lifecycle value contribution from an asset or portfolio of assets.**

Effective Asset Management is all about the optimisation of :

- **Physical Assets:** Ensuring that assets operate at designed parameters with optimal, off-normal operations.
- **Life Cycle Costs:** Optimising initial and ongoing investment to extract the maximum operating and financial value from the asset over the course of it's lifecycle
- **Resources:** Maximising the contribution from those who manage the asset through review and assessment of physical and personnel performance against key measures
- **Risk:** Balancing engineering, operational and financial risk of the assets with expected return.
- **Asset Value Source:** Developing alternatives sources of value derived from physical assets, management and operations competencies and/or financial engineering.

The standard of service not only relates to reliability but also to supply capacity availability, and should provide the following long term benefits:

- **The financial results of the utility** can be improved due to the extension of the useful life of assets.
- The **technical performance of the network** will improve due to the improved planned maintenance.
- **People will be more productive** as a direct result of improved planning and better targeted Human resource development.
- The **organizational efficiency will increase** due to improved and optimized business processes.
- **Decision making** will be improved because better information will be available with respect to infrastructure, people and processes.
- **Cost of maintain** network assets will decrease over time, also resulting in an much more effective workforce.

## 2.1 Who is involved in Asset Management

Asset Management is the optimal management of assets to deliver the required level of service, to achieve the best or most appropriate trade-offs between competing factors such as performance, costs and risk.

In the Municipal environment this refers to the dichotomy of the relationship between the Engineers desire to maintain assets and the Financial Managers desire to limit fruitless expenditure and the Client Relationship Manager that has a relentless passion to service clients professionally.

The whole organisation including the senior management illustrated below should be involved in the asset management programme, as it will impact on the full business process of an asset centric organisation.

- The Board of Directors or the Councils Executive Committee
- The Chief Executive or Managing Director of the organisation
- The Chief Information Officer
- The Chief Financial Officer
- Maintenance Managers
- Maintenance Staff.

The Retail Business (customer services division) being separated from the Wires Business (assets management division) as the organisation is based on a “split wires and retail” concept. The asset manager however will provide a service to the customer services manager in connection with the connection of new customers and common issues of planning and system reinforcement.

There are three distinctive roles that need to collaborate in harmony to bring about an Asset Management Organisation. Each of these roles has a unique set of responsibilities to ensure that Asset Management is enforced, sustainable and ultimately create business value. These roles are:

- **Asset Owner:** The asset owner is the license holder, equity participant and investor that holds the Portfolio of Assets and set and manage performance requirements for each.
- **Asset Manager:** The manager is the asset steward, has a reliability focus, plans and monitors the operating activities carefully. The Asset Managers make fact-based decisions on optimising customer needs, operational status and financial returns. Managers are key to delivering value to all stakeholders
- **Asset Operator:** The operator is the work manager, has a strong cost and service excellence focus and performs physical activities. The operators are order fulfillers and data suppliers.

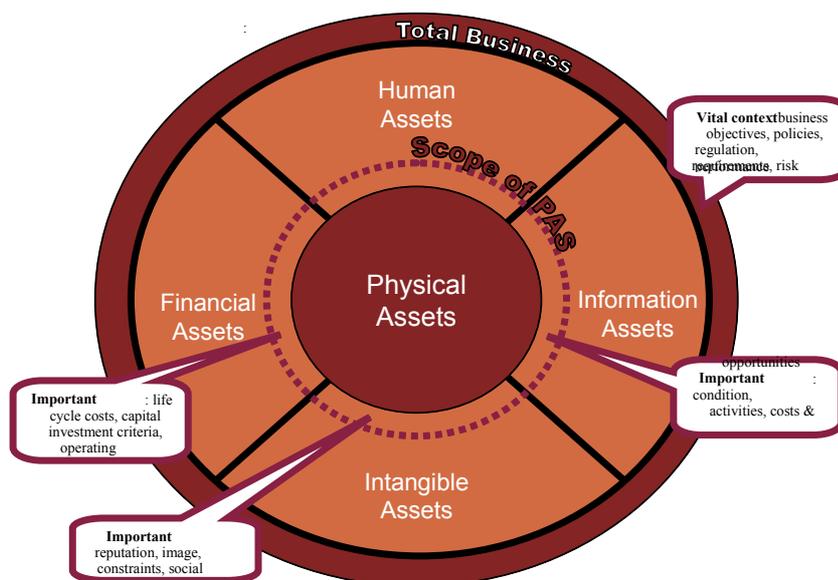
The challenge that a lot South African Utilities face, is that these roles above are overlapping, is not clearly defined and most of the time not exist. We believe the key to effective Asset Management is the dedicated Asset Manager role, that will be responsible to realise the benefits defined above. This role is currently not well defined, and can make a huge impact, on all the utilities in SA.

## 2.2 What is asset Management

The critical elements of a business are those that are required to deliver a utilities’ business mission, strategy, policies and objectives.

For the purpose of asset management, these critical elements have been summarised into five categories as follows:

- **Physical assets** (Electricity transmission and distribution infrastructure, machinery, plant, and equipment, buildings, IT systems)
- **Human assets** (management, workforce, skills and experience)
- **Financial assets** (cash, investments, equity, credit rating)
- **Data** (data, information, and knowledge)
- **Intangible assets** (customer service reputation, customer and staff impression, public image/relations, brand value, NERSA licence, copyrights and culture)



*Figure: 1 Taken from Pas -55 is a diagrammatic description of an asset centric business such as an Electricity Utility*

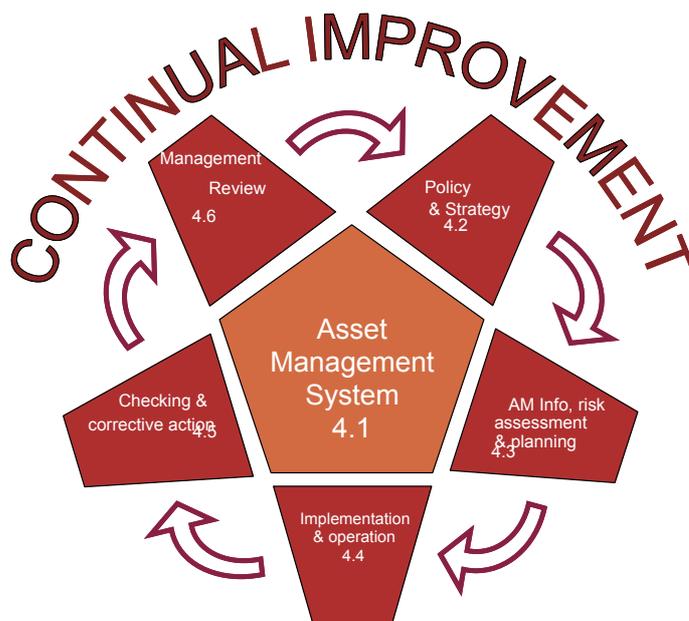
In any physical-asset intensive business, such as the electricity distribution industry, the greatest expenditure, effort, dependency and risks are invariably associated with the physical assets.

Although the other four families of asset types are also critical and require appropriate consideration, they are considered only insofar as they affect the optimal management of the physical assets.

- ❑ **The behaviour, attitude and capabilities** of the workforce have a fundamental influence on the performance of the physical assets,
- ❑ **Good quality data/information/knowledge** is essential to develop, optimize and implement Asset Management plans
- ❑ **Financial resources** are required for infrastructure investments, operation, maintenance and materials
- ❑ **The organization's reputation and image** can have a profound impact on infrastructure investment and operating strategies and associated costs.

### 3 The elements of Asset Management

For an Electricity Utility, the distribution infrastructure is required to provide a continuous and permanent supply to its customers, and hence the asset Management is based on a permanent service to customers and therefore continual improvement of the distribution infrastructure.



*The illustration above taken directly from Pas-55 illustrates the critical elements of an asset management system.*

The organisation should establish, document and maintain an asset management system in order to collate and record credible information about the assets.

- **The senior management** of the undertaking should authorise an overall asset management policy which is consistent with the organisations strategic plan.
- **The organisation shall establish and maintain** an asset management information system in order to provide credible information about assets, and provide adequate support to management and staff
- The organisation should establish an **organisational structure** that clearly defines management practices for all asset classes and incorporate them into asset management planning
- The **organisation should institute measures** to ensure a proper feedback mechanism to provide corrective action and continually improve / optimise asset management practices

### 3.1 Asset management Process

The process of asset management is one of ‘*continual improvement*’ as illustrated in the PAS-55 document

*In terms of PAS-55, the organisation's Board of Directors should instruct top management to implement an asset management system. The Board must then approve the Policy and Strategy proposed by the management team.*

### 3.2 Strategy and Policy

Asset management involves the coordination of activities that manage the organisations assets over the full lifecycle of the assets for the achievement of organisations business objectives. This alludes to optimally managing these assets in terms of performance risk and expenditure.

Good Asset Management therefore begins with the Board, or Council approving the Policy and Strategy which will then permeate throughout the organization and eliminate the dichotomy which often develops between Financial and Engineering managers that have different ideas about what asset management really is.

Next would be the establishment of an asset management framework that will operationalise the strategy by integrating the AM requirements into the key related business processes

### 3.3 Asset Management Information, risk assessment and planning

*Pas-55* stipulates that the organization shall establish and maintain:

- **An asset management information system.**
- **Risk Identification, assessment and control**
- **Legal, regulatory, statutory and other asset management requirements**
- **Set and maintain asset management objectives**
- **Asset performance and condition targets**

- **Asset management plans**

In order to introduce lifecycle management of assets, the system would control asset procurement and registration in terms of the approved financial policy and immediately scheduled and tracked to ensure that its use is optimized in terms of the maintenance policy.

### **3.4 Checking and Corrective Action**

*Pas-55 States that the organization shall establish and maintain procedures to monitor and measure the performance of the asset management system (processes)*

In South Africa up until now, NERSA has been fairly lenient with the application of the quality of supply standards [NRS 047 and 048] however this will change with the establishment of the REDS and distribution utilities will be held to task regarding quality of supply. It is essential therefore that the AM systems should be carefully monitored to ensure compliance with company policy.

The same methodology could be used for forensic investigations to determine reasons for the failure of assets

### **3.5 Management Review and Continual Improvement**

The organisations senior management shall review the asset management systems and processes from time to time to ensure suitability, and confirm the information integrity, and verify that AM techniques are modern and relevant to the organisation

The Management review should address the possible need for changes to the policy strategy and objectives and other elements of the management system in respect to changing circumstances and the commitment to continual improvement.

In a municipal environment, the changing circumstances may be due to City Planning variations such as modifications to the integrated development plan, or rezoning. To quote an example the 2012 Soccer World cup or the Gautrain development may force major redesign of the city infrastructure, and hence changes to the asset management policy. Other changes may include the establishment of the REDs which will change the management and staff of the organisation.

## **4 Asset Management Information, Risk Assessment and Planning**

### **4.1 Asset management information system**

*PAS-55 The organization shall establish and maintain an asset information system which shall be designed and maintained to provide adequate support and information to the organization to meet the strategic plan.*

An asset information system is essential for achieving effective and efficient asset management processes and for continual improvement of the system

There are several different types of asset information systems available, and the more sophisticated versions integrate many of the following functions which are essential to sound asset management practices

- **Asset Registers**
- **Document management systems**
- **Work management/programme planning and scheduling systems**
- **Materials Management systems**
- **Purchasing systems**
- **GIS Geographic information and spatial analysis systems**
- **SCADA, or interconnection to existing SCADA systems**
- **Condition monitoring systems**

An asset management system should provide both technical and financial information in order to facilitate choices in respect to:

- Lifecycle cost comparisons (How much does one spend on an asset before replacing it )
- Financial benefits of planned improvements
- Valuation of Assets NPV DRC etc (for acquisitions and mergers)
- Identify the physical position of the asset (GPS coordinates)
- Comply with statutory and regulatory obligations (NERSA)

## 4.2 Risk Assessment and planning

**Pas-55** The utility shall establish and maintain procedures for the on going identification and assessment of asset related risks and the identification of suitable control measures.

The risk assessment shall consider the probability of the event occurring and the severity of consequences.

It is incumbent upon a well managed utility to ensure that all risks are well managed during the full life cycle of the asset to ensure continuity of supply, such risks shall include

- Risk of physical failure of the asset
- Operational risks including control of the asset, human factors, malicious damage or terror activities
- Natural environmental risks (Flood and storms etc)
- Asset related design, specification procurement and construction, operation and maintenance during the lifetime of the asset, and finally decommissioning and disposal risks
- This will even go so far as to include stakeholder risks such as failure to meet regulatory performance requirements etc

The organization shall ensure that the results of these assessments and the effects of the controls are considered and provide input into the asset management strategy and plans

## 5 Conclusion

In conclusion, we believe that the restructuring of the Electricity Distribution Industry in South Africa will ultimately benefit the community and the Electricity Supply industry holistically.

However, it is essential for the utilities to be prepared for this restructuring by means of detailed self examination and enhancement of current business practices. We recommend that in preparation for the establishment of REDs each utility/ municipality must establish a strong focus on Enterprise Asset Management, by modifying organisational structures, business processes and implementation of effective Asset Information Systems – supported by best practice frameworks such as PAS 55.

In implementing Asset Management practices, the following key roles must be established in order to manage an effective Asset Management System, as per PAS 55. The distinctive success factors for each of these roles are:

- **The Asset Owner is responsible to:**

- Assess the South African regulatory requirements and influences,
- Develop a investment strategy based on geographical supply demand
- Perform an asset, financial and operating performance analysis.
- Establish and manage asset valuation and acquisition methods
- Perform market, economical and regulatory analysis

- **The Asset Manager is responsible to:**

- Develop asset strategies, and optimization plans
- Optimize capital allocation through long term capital planning
- Ensure regulatory compliance and improvement actions to this effect
- Perform full life-cycle financial and operational analysis
- Contact and risk management
- Develop asset standards and specification – data specifications standards
- Macro work planning through prioritization
- Real-time fact-based decision making, based on accurate asset performance data
- Manage technology enablement and information analysis

- **The Asset Operator is responsible to:**

- Conduct effective workforce scheduling and deployment
- Manage construction and maintenance project management
- Work practice design, deployment and monitoring
- Materials sourcing and inventory management
- Reliability and standardisation of network assets.
- Budget management and analysis
- Labour relations
- Third-party interface and outsourcing of operational activities
- Effective application of Technology solutions, data collection and maintenance

It is our view that there are pockets of excellence in Asset Management, and differentiation in these roles embedded South Africa, and that a national Wires Business workgroup can consolidate the best practices knowledge and experience, and leverage this to the ailing and non performing utility businesses.

This paper has been an attempt to make a contribution to the management of assets in the industry, and the reduction of power interruptions in the future restructured EDI.

## 6 Bibliography

This paper has written with extensive reference to *PAS-55*, and with some reference to BS 3843-2:1992 Guide to terotechnology and ISO 9000:2000 and NRS 089-2007 Maintenance of Electricity Networks