ASSET MANAGEMENT: INTERFACE BETWEEN THE BUSINESS AND THE SYSTEM YOU USE

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1. Introduction

An integrated Asset Management structure is the key to the success of any structure or business. Without a formal framework in place, you will not succeed in getting the benefits you require from the system.

One of the reasons that service delivery fails in a municipal environment is that it does not work with an integrated system (a lot of stand alone systems) or the system in use is not correctly implemented. The system that we use does not support the management of assets. It gives preference to financial issues rather than make sure that the building blocks integrate and support each other and focus on master data. *Definition of master data: stable data that remains constant, reflects as build configuration and used for preventative plans.*

Despite numerous requests to increase the maintenance of assets, the question still remains "Why does it not improve?" This is across the board, not only relating to Electricity. Why don't we use the system as part of the decision-making process, the answer is clear, we cannot trust the information for decision-making purposes and this is why businesses start to buy stand alone systems.

The bottom-line is that the focus is not about master data in all aspects. We must make certain that what we do is built around master data, to ensure that the confidence level is such that it is trusted and used by ALL. Due to the volumes of data, one cannot perform asset management without a system which supports your business and when using a system, make sure it is correctly packed to support your business. What we want is to use the system data to take business decisions.

The results are clear:

- No common data base
- Implementation of an asset scrapping process. To identify assets on the system is virtually impossible, due to there being no one-to-one match on the different modules, misalignment between technical and financial view of the asset
- Life cycle cost of assets cannot be determined
- No forward planning, especially at the lower levels
- Stay in re-active mode (when it breaks, fix it.)
- Cannot take strategic decisions regarding budget cuts, staffing levels, training, tariffs and equipment replacement
- Cannot do budgets from zero base

2. Background

In 2003 the City of Cape Town changed over to a new system. Four years later a risk assessment was performed after it was discovered that we could not get proper reports from the system. Each unit operates on its own and the confidence level on data is extremely low. Although there are pockets of excellence in the system, it is not across the whole system. We identified Medium Voltage (MV) and Low Voltage (LV) as a pilot project to identify the problem areas and to drill-down into the problems.

3. Risk Assessment

3.1 Cannot follow a top-down approach to report on our assets

Include:

- No common approach
- Cannot determine total number of assets
- No financial reports on assets
- Value of assets
- Progress reports (work orders – open/close)

3.2 Cannot determine full life cycle cost of assets

- Engineering does not have an accurate centralised database to work from
- No centralized database on load profiles

3.3 Cannot determine tariffs (tariff structure) if:

- your asset database is not in place

3.4 Cannot do pro-active maintenance if:

- database is not in place
- there is no proper planning
- it results in each department creating it's own database

3.5 Equipment tracking

- Any equipment developing a problem – corrective action needs to be taken (unknown where it is installed)

3.6 Do not have a common database to work from (no integrated system)

- Finance has it's own database (assets)
- Insurance
- Plant Maintenance (PM)
- Departments work in silo's
- GIS

3.7 Processes do not support our business

- Restructured half-way, then stopped
- No common approach to capture data

3.8 Cannot determine number of staff required

- Asset database is supposed to predict number of staff required

4. What do we want to achieve?

- To have one source available to capture data
- To maintain equipment
- Draw statistics
- Get reports from (performance data); and
- Data available to all

Can only have an accurate version of the truth

5. Developing a business plan - SAP System for City of Cape Town

5.1 Master Data Management

5.1.1 Functional location structure and coding convention

- 5.1.1.1 Off-line governance and design documentation (Master Data Control)
- 5.1.1.2 Classification of functional locations (nameplate data)
- 5.1.1.3 Responsibility areas and actual set-up in SAP
- 5.1.1.4 Measuring points defined at appropriate levels for conditional assessment
- 5.1.1.5 Catalogue defined for FMECA (Failure Mode, Effect Cause Analysis)
- 5.1.1.6 Task list assigned based on classification
- 5.1.1.7 Scheduled Maintenance
- 5.1.1.8 SAP roles: Re-profiling and role design

5.1.2 Spares Management

5.1.3 Outsourcing Master Data

5.2 Process Design

5.2.1 Asset Acquisition/Disposal

- 5.2.1.1 Asset take-overs
- 5.2.1.2 Construction via project
- 5.2.1.3 Replacement upgrade
- 5.2.1.4 Asset Disposal

5.2.2 Maintenance and Operation

- 5.2.2.1 Corrective Maintenance
- 5.2.2.2 Preventative Maintenance (PM)
- 5.2.2.3 Condition Based Maintenance (CBM)
- 5.2.2.4 Refurbishment
- 5.2.2.5 Work Clearance Management

5.3 Alignment between Register

5.3.1 PM to functional locations

5.3.2 AM Asset Register

5.3.3 Insurance Register

5.4 Key Performance Indicators (KPI)

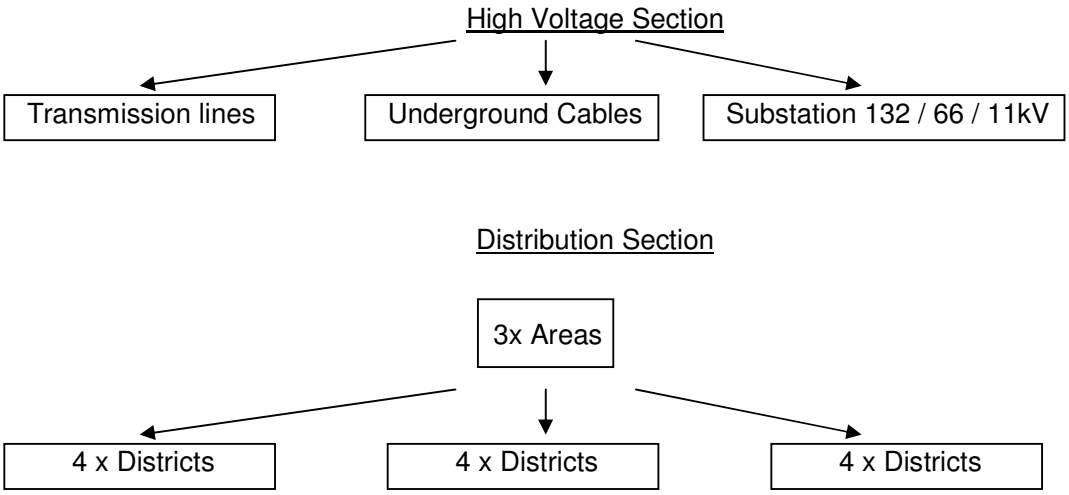
5.4.1 Maintenance Performance Analyses (MPA)

- 5.4.1.1 FMECA (Damage Analyses)
- 5.4.1.2 Object stats (How much of what?)
- 5.4.1.3 Planner Group Analysis (Planner efficiency and number of breakdowns
- 5.4.1.4 Manufacturer Analysis
- 5.4.1.5 Backlog of orders
- 5.4.1.6 Mean Time Between Repairs (MTBR) and Mean Time To Repair (MTTR)

5.4.2 Accounting Standards (GAMAP/GRAP)

- 5.4.2.1 Asset Value
- 5.4.2.2 Remaining Useful Asset Life

6. Existing Operational Structure



7. Districts Data (MV)

Districts	Demand MW	Protected Sub	Unprotected Sub	Minisubs	MV line	MV Cables
Atlantis	97	21	94	168	82	*99*
City	275	189	256	147	10	*38*
Mowbray	284	160	361	250	0	*55*
Vanguard	148	86	105	110	12	*60*
Gugulethu	52	16	63	204	86	*122*
Mitchells Plain	148	57	365	250	59	*292*
Muizenberg	134	84	291	315	40	*182*
Wynberg	175	119	308	308	2	*353*
Bloemhof	264	96	296	1051	50	781
Helderberg	122	25	30	831	24	449
Oostenberg	135	50	215	845	12	538
Parow	162	81	276	597	0	486

8. THE INTERFACE WITH THE SYSTEM THAT YOU USE

8.1 What is the key to a successful interface?

- You must have a clear-cut framework to start the process
- You must work with a team that knows how the system operates and with those within the business. (Specialists within the business and from the system.)
- Business must live up to the system
- The system must support the business
- Support teams that constantly monitor system activities and business requirements, continuous business improvement, essential to drill in the importance of accountability.
- The confidence level must be the same across the field
- Management must be involved.

If you don't have a common goal (that all departments focus on), specifically master data, don't start as you are wasting your time.

What we have found is that those people (in the organisation) who drive the system you use must give clear-cut guidelines on a high level regarding:

- key staff your business requires
- processes that must be in place to support the business

You will find that the business creates a structure that suits the business, but it does not line up with the system you use.

If you like it or not, on a high level the system you use dictates how you need to structure your business.

Departments get themselves consultants on board, collect and pack their data, just to find that after a couple of years they must start all over again because the system does not support the business and the correct processes are not in place to guarantee a high confidence level.

Asset management fails in most instances because the business does not know how to put the building blocks together. The building blocks operate in silos and there is no integration between the building blocks; meaning that data which has been captured is duplicated and most important there are no one-to-one matches.

The focus is wrong. Where at the moment each department focuses on their own department, making life easier for themselves without determining the impact on the other departments. This focus must change to master data, in other words it must be able to take a problem to a person and not blame the system. The impact at the end of the day is that line, or those who must execute the work, suffer. The aim is to throw one ball at them – not a lot of balls.

8.2 Framework

This is the key, and in my opinion, one of the most important building blocks needed to be in place before starting the process, especially the technical asset hierarchy. This forms the basis of the project, without it you are doomed.

A word of advice:
- don't underestimate the magnitude of the project
- don't rush it, and
- get the commitment of top management

The different philosophies, standards and processes from the formal Municipalities (before restructuring into bigger municipalities) play a major role. This is where we were stuck for a long time before we actually proceeded with the process. There is only one way forward, create a project team and workshop it. No-one can assist you (you need a facilitator in this regard); you need to do it yourself and get your hands dirty.

At a previous conference, one person mentioned the process is like a pregnant woman, the period is 9 months, you can add another pregnant woman, but the period is still 9 months. If you want to rush the process you are going to make mistakes and the mistakes are going to cost money. Municipalities have diverse functions, the core asset management process can only follow one standard. The big danger is when each Utility wants to develop its own framework. There needs to be one set of processes for all, but tailor-made to fit each business.

What we want to achieve:

- Framework in place which makes reporting in any format/information requested possible.
- Put a process in place to make sure the confidence levels of data/capturing of data, reflects what happens at ground level.
- Framework in place that supports other modules in the system which we use.
- Makes reporting possible at all levels.

8.3 Electricity - Key Activities for System Restructuring

Step no.	Go-live requirement (R)equired (O)ptional	Business Data Requirement	Purpose
1	R	Asset hierarchy	To structure technical assets for the purpose of grouping and reporting. Core master data for Asset Management serves as container or placeholder for many other types of master data.
2	R	Technical asset classes	To add another dimension to reporting and to provide a starting point for capturing more industry specific data.
3	O	Nameplate data (e.g. KVA rating, Input voltage etc)	Detailed technical specification for the purpose of making informed decisions with regards to planning for equipment upgrade/modification as well as other functions such as searching for replacement equipment.
4	R	Ex-Maintenance department responsibilities	Departments or people responsible for a technical object (functional location). For example a Scada responsibility may need to be notified before work order completion to restore Scada links are restore after Circuit breaker was replaced by maintenance. During planning of new capital equipment non-maintenance departments need to approve work requests or be notified on completion in order to update complimentary systems like GIS, for example.
5	O	Document links to technical objects / notification	The following type of document need to be linked to the asset hierarchy: Tenders, Operating Manual, Safety plan/risks. In addition to master data, equipment breakdowns may require pictures of the technical object(s) to be stored in the notification.
6	O	Floc-to-floc links	To indicate the network aspect of technical objects, i.e. A breaker panel in a protected substation may link to a incomer panel in a unprotected sub via a feeder cable (3 technical objects are linked in such an example)
7	R	MV Fault report codes	Problem/Damage codes Cause Codes Object parts Activity codes
8	R	Condition Assessment criteria and voltage measuring points	Master data required to perform condition assessments and enter measuring documents for technical objects.
9	O	Spares list per technical object	To ensure that proper spares management can be done. Without PM/MM integration on master data level, re-order point planning and integrated transaction processing benefits cannot be realized.
10	R	Artisans	Technical skills can be grouped by work centres and individual personnel numbers can be assigned to a work centre. Capacity planning/monitoring cannot be done without accurate work centre definitions
11	R	Maintenance planner/ planning office	Maintenance planners are responsible for detailed planning of capital and maintenance projects as well as the week-to-week schedules and prioritization of work orders in general. This type of person requires a high level of system knowledge or a willingness and aptitude to learn if such knowledge is lacking.
12	R	Task List	Task lists are used to define preventive maintenance / inspections and other repetitive maintenance tasks. The operations defined should be defined to prevent failures or alert maintenance personnel of an impending failure

			(condition monitoring)
13	R	Maintenance plans	Maintenance plans and items relate maintenance tasks to technical objects and allow the planner to schedule task list operations as part of a maintenance plan.
14	R	Reports	Several standard reports are available to PM. Some sight changes may be required to realize the full benefit of the afore-mentioned steps.
15	R	BPM	Business process management would require a review of existing business processes with a view of streamlining and improving the integration aspects of such processes. Improved quality of master data will only result in streamlined transactions if the transactions are configured to take advantage of the cleansed master data.
16	R	Role definition/mapping	A BPM review may results in a better focus in some areas (maintenance planning) whilst reducing non-value add activities in other areas (manual or double capturing of time confirmation data). These individual steps in a process chain will need to be mapped to business users whilst ensuring that said users have to capacity and capability to perform such tasks. Role definition is also the core input required to setup authorization for users.

8.4 Asset Hierarchy Structure

Due to the magnitude of the project, different methodology, it is important to put a framework on top of the existing structures to make sure that you have only one reference number. Without a asset hierarchy it is not possible to advance the system or create a proper reporting structure or link your assets to other modules e.g. GIS, insurance, bar-coding or financial asset management structure, and most important of them all – if you want to go the route of automisation of the system, it is not possible, your asset hierarchy must first be in place. Codification of assets and establishing family tree structure. Capable of reporting on maintenance matrix which includes costs, breakdown and meantime to repair.

Attached is the asset hierarchy (Attachment A) for the MV Distribution network in City of Cape Town. You'll find from the framework that it is developed around the framework provided in the DRC Valuation Handbook compiled by PB Power for the REDs. To report on the different assets installed. The template (Attachment B) for protected subs indicates the different assets and on what data can be reported.

The important part is to develop the structure in such a way that it is possible to report or draw statistics on all the different assets installed.

The compiling and data collection of assets is time consuming and all efforts need to be made to ensure that data is correctly captured.

8.5 Classes

Due to the different reporting requirements, it is essential that the structure must be built to allow for different requirements. The attachment (Attachment C) indicates the different classes. One unique item from our structure is the diversity of the different reporting formats, most important being horizontal reporting.

8.6 Classification

In most instances, the capturing of classification data was neglected, or the processes implemented are such that the data is not constantly updated. Without classifications (name-plate data) it is impossible to do life-cycle costing, implement a replacement policy, perform condition assessments, scrapping or dictate where problem equipment is installed to do batch replacement. Attached is sample data which we captured for primary plant and also for horizontal reporting.

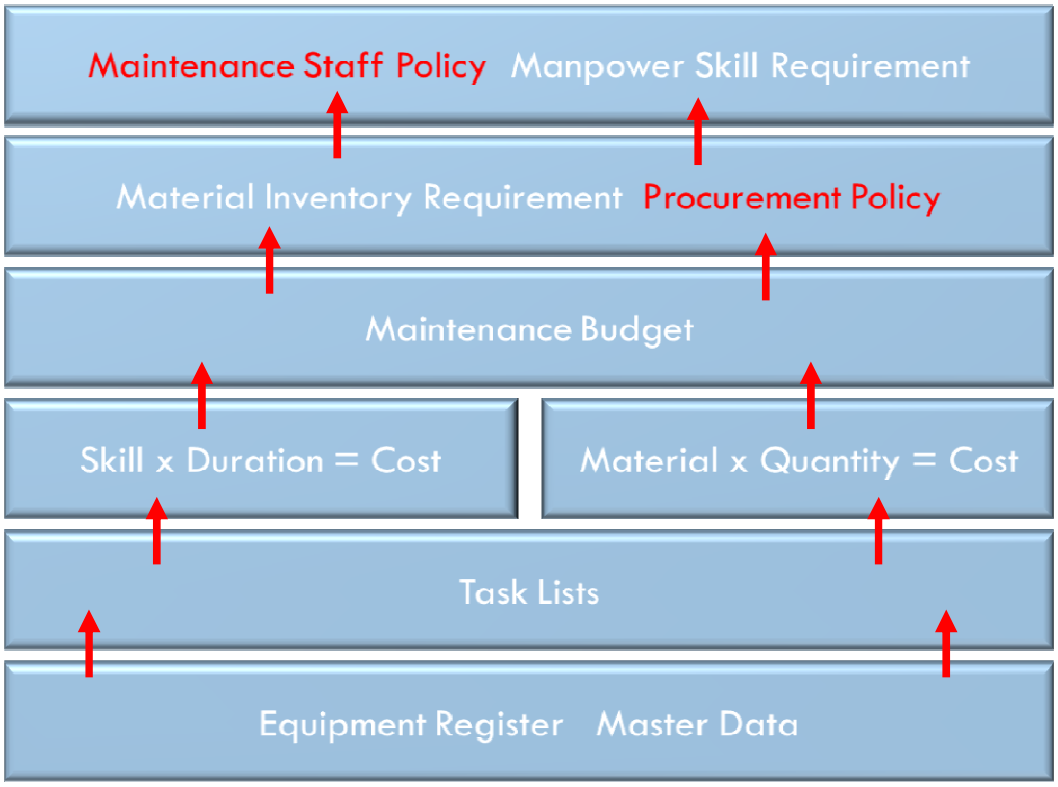
Your classification data is the key for a capital replacement programme and obviously reflecting to determine tariffs and the implementation of them. The classification structure is also important for condition reporting.

8.7 Catalogues and Measuring Points

If you want to measure the performance of your assets or network, it is clear that your system must be set up and correct templates need to be provided for data to be captured. Without data, you cannot measure and without data, you cannot take corrective steps. Attached spreadsheet/template (Attachment D) is what we use to capture reactive maintenance. The aim is that maintenance staff must only work with one of two spreadsheets; the proactive or reactive schedule. For measuring purposes, the key is that all data has been captured. This is one discipline that must still be drilled into staff and this is why performance data is not regularly available. It is especially bad when it comes to the history of data, by having measuring points operating and performance data can be provided.

8.8 Task List and Maintenance Plans (one of the key building blocks of the system)

The main aim is to put a framework together in order to start using the NRS specifications which relate to maintenance, as the basis for performing proactive maintenance. One word of advice – changes to data or maintenance plans must be done centrally and access to the data must be limited – only key personnel to have access!



8.9 Business process management and role definition

Do not implement any system or re-engineer if your business processes are not sorted out. Each staff member related to the process needs to know exactly what they must do.

Do not commit your data to the system unless all asset life cycle processes and policies are firmly in place.

One of the biggest mistakes that constantly occur is that your business processes do not link up with the system you use and the result is that you are constantly rebuilding your data over and over. It is a must that the processes you implement are fool-proof, that you have evidence of acknowledgement by all and that data has been captured.

8.10 Master Data

It is important that your system data reflects the as-build configuration of the network, otherwise your data integrity will suffer and you will have to build your master data after each couple of years.

The focus in the organisation must be around master data and the processes must be built around master data. Any organisation which succeeds in this philosophy will gain the benefit of the system and will succeed in their outputs. If you implement the correct framework, there is no need to operate your business in silos.

The correct framework will lead to:

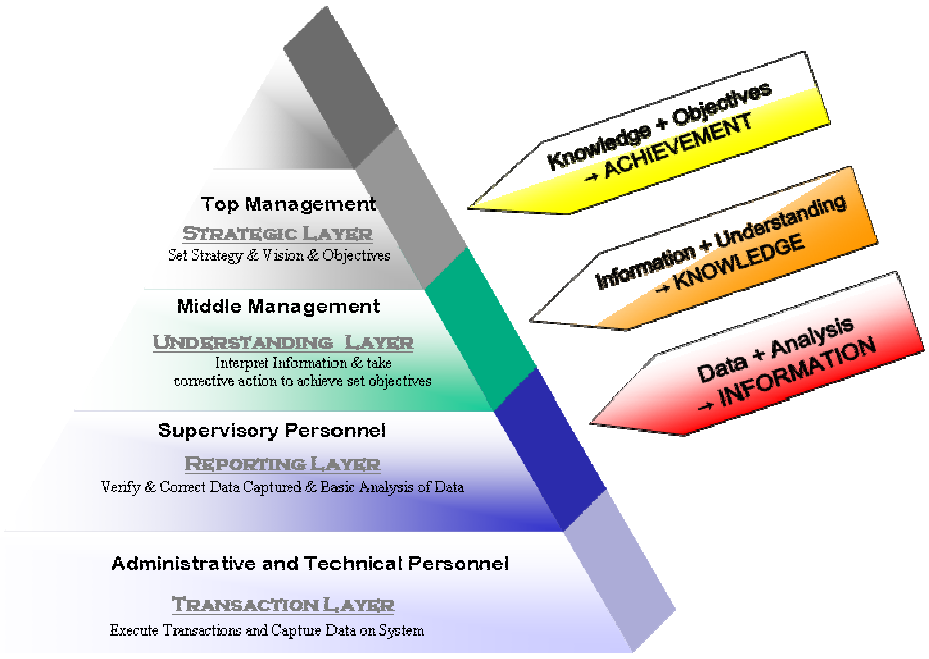
- increased productivity
- better decision-making
- correct staffing level requirements
- accurate reports
- improved budgeting
- reduced operating costs
- improved maintenance of equipment

8.10.1 Master data collection, purification and verification

Do not underestimate the value of verification of the data entered into your system. Due to the large volumes of data and constant changing of data on the system it is essential that any data you enter into the system for master data is correct. Also, from the management and reporting side you want to know about the changes.

8.10.2 Master data quality/responsibility (once codification is completed)

- Master data should reflect maintenance organogram for maintenance responsibility for installed assets
- Should indicate critical assets
- Structure must be flexible to changes in maintenance organisation
- Master data installed should support business processes



9. Conclusion

- Want to work towards visibility of budget requirements (0 budgeting)
- Ability to optimise maintenance tactics (condition monitoring, reduce maintenance costs and increase uptime of network)
- Need stability on the core system to start continuous business improvements
- To establish a foundation which has been change managed across the enterprise in order to reduce future change management efforts
- Finally, to our ERP PM Team, Martin Aldrich, Hannes van Zyl and Chris Pluddemann for their support, patience, dedication and assistance in starting the building process.

ANNEXURE A

MV Asset Hierarchy Naming Convention: Substations

Utility Level	**E**	E = **Electricity**	Levels 1 to 5 are organisational levels
Top Level	***ED***	***D* = Distribution**	In this level D indicates the whole Distribution Network. This level will reflect costs and KPI's for the complete Distribution Network
			Maintenance Plant and Business area will be populated at this level to be copied to all levels below
Second Level	ED***M***	***M*** = Distribution MV	**This is the Second organisational level**
	EDL	***L*** = Distribution LV	This level indicates a split between the MV Network the LV Network and the Depots grounds and buildings
	EDD	***D*** = Distribution Depots	This ensures that only MV or LV costs and KPI's are rolled up to this level
Third Level	EDM***CE***	Alpha Character for City Area or Town(Red1): • ***CE***=East •***CN***=North •***CS***=South	**This is the Third organisational level**
			This level indicates a split between the current 3 distribution area's in the City, provision has also been made to accommodate future inclusion of other Towns & area's in the future RED's
			Costs and KPI's per area will roll up to this level
Fourth Level	EDMCE***1***	Numeric Character for District:	**This is the Fourth organisational level**
		•***1***=Bloemhof; 1=Atlantis 1 = Gugulethu	The District is indicated at this level
		•**2**=Helderberg 2=City 2= Mitchells Plain	Costs and KPI's per District will roll up to this level
		•**3**=Oostenberg 3=Mowbray 3=Muizenberg	Cost Centre, Planner Groups and work Centres will be populated at this level to be copied to all levels below
		•**4**=Parow 4=Vanguard 4=Wynberg	
Fifth Level	EDMCE1***01***	Numeric Character for Operational Area :	**This is the Fifth and last organisational level**
		• ***01***=Durbanville	Each District is broken into operational area's this will correspond with a GIS layer
		• ***02***=Bellville	This will ensure a grouping of equipment by geographical area
		• ***03***=.....)	The reason for grouping equipment geographical at this level and not by operational diagrams is the supply point can move in time but the position of the equipment will stay fixed
Sixth Level	EDMCE101***/P***	Forward slash followed by an Alpha Character for Asset Group :	**The following levels are functional levels indicating the functional relationship of the equipment**
		•***/P*** =Protected Subs	At this level we have a split between Protected Subs, Unprotected subs and Mini subs
		• ***/U*** =Unprotected Subs	This will ensure all Protected subs are grouped together for an area to enhance navigation of the structure and avoid the previous long flat list in the current system.

		• ***/M*** =Mini Subs	The rule is any loose standing MV transformer or Switchgear will be regarded as an Unprotected Sub, if these occur within the boundaries of a Protected sub it will be regarded as part of the Protected sub the same would apply to a Mini sub in the boundary of a Protected Sub
Seventh Level	**EDMCE101/P *001***	**Three Numeric Characters numbering the Asset in the Asset group for an area starting with:**	**This is the Second Functional level**
		• ***001*** **= First of an Asset Group**	This level indicates the numeric number of an Asset group to be found per Operational area.
		(i.e. Protected sub 1) for Operating Area(i.e. Bloemhof)	
		• ***002*** **= Second of an Asset Group**	The assets will be numbered in the area from West to East starting from the most Northerly to South.
		(i.e. Protected sub 2) for Operating Area(i.e. Bloemhof)	
		• ***003*** **=cont.**	
Eighth Level	EDMCE101/P 001***=TEL***	•***=TEL*** = Telecoms Equipment	**This is the Third Functional level**
		•***=SEC*** = Security Systems	This level indicate the various equipment groups to be found in a Protected Sub, Unprotected Sub and Mini sub
		•***=MET*** = Metering Equipment	
		•***=PCB*** = Pilot cable box	
		•***=LCL*** = Load control Equipment	Secondary equipment groups like Protection equipment and Grounds.
		•***=SCA*** = S.C.A.D.A Equipment not on panels	
		Note: *Un-Protected Subs & Mini Subs will consist of the same Asset group types as in the above list excluding non related types.*	
Eighth Level (Cont)	EDMCE101/P 001***=GRN***	= "Equals to" Sign & Three Alpha Characters indicating Asset Group Type per Asset Group :	Loose standing RMU's in Protected & Un-protected subs will be covered as Un-protected switchgear
		•***=GRN*** =Grounds	
		•=***FPE*** = Fire protection	Fire protection systems/equipment
		•***=GEN*** = Generator	Permanent Back up Generator inside substations
		•***=PMP*** ***=*** Submersible pumps	Permanent Substation submersible pumps
		•***=BAT*** =DC Supply (Battery & Charger)	
		•***=PSW*** =Protected Switchgear Panel	
		•***=USW*** =Un-Protected Switchgear Panel (Also covering RMU)	
		•***=LSW*** =LV Switchgear Panel when part of a Sub.	
		•***=TRF*** =Transformer when part of a Sub.	
		•***=MSB*** =Mini Sub when part of a Protected Sub.	
Ninth Level	EDMCE101/P 001=PSW***01***	Two Numeric or Alpha or Alpha Numeric Characters numbering the Asset Group Type:	**This is the Fourth Functional level**
	EDMCE101/P 001=BAT***BK***	***01*** = First of an Asset Group Type(i.e. Protected Switchgear 01)	At this level Primary equipment will be assigned a numeric number to indicate how many of these are in the Substation

	EDMCE101/P 001=GRN***BL***	Or	
		• ***BK*** = Battery Bank	
		• ***CH*** = Battery Charger	Secondary equipment will be assigned a code to indicate the equipment type
		• ***BL*** = Buildings	
		• ***FC*** = Fences & Enclosures	
		• ***EN = Enclosers***	Where encloser can be replaced separate to the equipment inside
		• **SI** = Site	
	EDMCE101/P 001=MSB***RM***	•***RM*** = RMU	
	EDMCE101/P 001=MET***P1***	• ***P1*** = Metering Panel (multiple)	
	EDMCE101/P 001=MET***U1***	•**U1** = Metering unit (multiple)	
	EDMCE101/P 001=TEL***PX***	•***PX*** = Pax (single)	
	EDMCE101/P 001=SCA***RT***	•***OF*** = Optic fibre network (single)	
		•***RT*** = Remote terminal unit	
		•***MD*** = Main distribution frame (single)	
Tenth Level	EDMCE101/P 001=PSW01-***CB***	- "Hyphen" Two Alpha Characters indicating Asset Group Type Sub Type:	**This is the Fifth Functional level**
		• **-*CB*** = Circuit Breaker	This level are only for Primary equipment to indicate sub equipment installed on the Primary equipment
		• **-SC** = S.C.A.D.A	
		• **-QS** = Quality of supply	
		• **-PR** = Protection	Note: All other Master Data will be populated from the Reference Functional Locations.
		• **-VT** = Voltage Transformer	
		•**-MT** = Metering	

MV Asset Hierarchy Naming: Convention Lines

Organisational levels are as per Substations

Sixth Level	**DMCE101/*L***	**Forward Slash followed by an Alpha Character for Asset Group :** **•*/L* =Lines**	**The following levels are functional levels indicating the functional relationship of the equipment**
			Note: For Lines a different structure indicator is used
Seventh Level	DMCE101/L***0 1***	•***01 =*** The first Line for the Operational area	**This is the second Functional level**
			Two numeric digits is used to identify the number of the Line for an operational area
Eighth Level	DMCE101/L0 1***N01***	•***N01*** = Maintenance Node One(Area on line where maintenance significant equipment is installed	**This is the third Functional level** Lines are broken up into Maintenance Nodes and Sections
			A maintenance Node on a Line indicates a position on the line where equipment that requires regular maintenance is installed. Each node will be distinguished by a unique number (two numeric's) per area.
	DMCE101/L0 1***C01***	•***C01*** = Line Section One (Section of line including poles between Isolating Points)	Line Sections: The section of feeder line between Isolating points (Air breaks), if there is no isolating points it will be the complete main feeder or sub feeder line. Line section consists of the poles and the conductor. **Note**: A maintenance node is not always an isolating point

Ninth Level	DMCE101/L01N01=***PRT***	= "Equals to" Sign & Three Alpha Characters indicating Asset Group Type per Asset Group :	**This is the fourth functional level**
			This level indicates the type of equipment found at Maintenance Node or the poles in the section of line
		•=***MTP*** = Metering Panel	
		•=***MTU*** = Metering Unit	
		•=***PRT*** = Protection Equipment	This equipment that will operate automatically under fault conditions: Drop-out Fuses, Surge Arrestor, Auto recloser, Circuit Breaker (This must be indicated under your classification)
		•=***ISO*** = Isolator	This is equipment that will not operate automatically but must be operated manually : Air break switch, Links, Isolator (This must be indicated under your classification)
			Note in certain cases the same equipment is used as either <u>Protection equipment</u> or as <u>Isolating equipment</u> you have to indicate the current configuration when selecting the grouping
		•=***PLE*** = Pole	
		•=***TRF*** = Transformer	
		•=***CON*** = Conductor	
		•=***LMP*** = LV Metering Panel	The class EDL_MP must be used for these equipments
Tenth Level	DMCE101/L01N01=***PRT01***	•***01*** = The number of the Asset at the Node.	**This is the fifth Functional level**
	DMCE101/L01S01=***PLE01***	•***01*** = The number of the Pole in the Section.	The number of the Assets at the Node or the pole in the Line section.
			Pole numbers will be a combination of the Line number, the section or Node number and the Pole number.

MV Asset Hierarchy Naming Convection: Cables

Organisational levels are as per Substations

Sixth Level	**DMCE101*/C***	**Forward Slash followed by an Alpha Character for Asset Group :**	The following levels are functional levels indicating the functional relationship of the equipment
		•***/C*** **=Cables**	Note: For Cables a different structure indicator is used
Seventh Level	DMCE101/C***P***	•***P*** = Primary Cables	An Alpha character is used to identify the cable type
	DMCE101/C***S***	•***S*** = Secondary Cables	
	DMCE101/C***O***	•***O*** = Fibre Optic Cables	
	DMCE101/C***U***	•***U*** = Unit protection (Pilot cables)	
	DMCE101/C***T***	•***T*** = Telephone cables (Pax)	
Eight Level	DMCE101/CP***001***	•***001*** = Primary Cable No. 1	A number will be used to differentiate between cables of a similar type to give each cable a unique code.
	DMCE101/CS***001***	•***002*** = Primary Cable No. 2	
		•***001*** = Secondary Cable No. 1	
		•***002*** = Secondary Cable No. 2	

ANNEXURE B

Protected sub (/P) name:_____				
Template to capture data for Protected Substations from the field for Maintenance Planning				
Protected subs defined as those substations in Distribution with the following key elements: indoor switchgear panels, protection relays and dc supply.				
Description	Asset hierarchy	Classes	Name of equipment/ feeder (Label name)	Indicate Yes/No
Grounds	**=GRN**			
Grounds: building	=GRNBL	EDG_GRB		
Grounds: fencing	=GRNFC	EDG_GRF		
Grounds: Site	=GRNSI	EDG_GRS		
Local Minisubs	**=MSB**			
Local Minisubs nr 1	=MSB01	EDM_MSN (without RMU)		
		EDM_MSR (with RMU)		
Local Minisubs nr 1, RMU	=MSB01-RM	EDM_SGS1 (SF6)		
		EDM_SGS2 (OIL)		
		EDM_SGS3 (VACUUM)		
Transformers	**=TRF**			
Local TX nr 1	=TRF01	EDM_TX		
Metering units	**=MTU**			
Metering unit nr 1	=MTU01	EDS_METUN		
Metering panels	**=MTP**			
Metering panel nr 1	=MTP01	EDS_METPM		
Unprotected switchgear	**=USW**			
Fuse/Line/Dual Switch or RMU	=USW01	EDM_SGS1 (SF6)		
		EDM_SGS2 (OIL)		
		EDM_SGS3 (VACUUM)		
With enclosure	=USW01-EN	EDM_SGSE		
Load Control	**=LCL**	EDS_LCL		
Generator	**=GEN**	EDG_GEN		
Security systems	**=SEC**	EDG_SEC		
Fire protection equipment	**=FPE**			
Fire protection equipment nr 1	=FPE01	EDG_FPE (Extinguishers)		
		EDG_FPC (CO_2 System)		
Pumps/ pump system	**=PMP**			
Submersible pump nr 1	=PMP01	EDG_PMP		
DC Supply	**=BAT**			
DC Supply nr 1	=BAT01			
Battery bank	=BAT01-BK	EDS_BTB		
Battery charger	=BAT01-CH	EDS_BTC		
Pilot cable box	**=PCB**	EDS_PCB		
Telecomms	**=TEL**			
Telecomms - Opt. fibre Network	=TELOF	EDS_TELOF		
Telecomms - Pax	=TELPX	EDS_TELPX		
Scada	**=SCA**			
Scada: Main distribution frame	=SCAMD	EDS_SCAMD		
Scada: Remote terminal unit	=SCART	EDS_SCART		
Scada: Data concentrator	=SCADC	EDS_SCADC		
Protected Switchgear	**=PSW**			
Panel 1	=PSW01	EDM_PLM		
Panel 1 - circuit breaker	=PSW01-CB	EDM_BR1 (SF6)		
		EDM_BR2 (OIL)		
		EDM_BR3 (VACUUM)		
Panel 1 - metering	=PSW01-MT	EDS_NM		
Panel 1 - Protection	=PSW01-PR	EDS_NM		
Panel 1 - quality of supply	=PSW01-QS	EDS_NM		
Panel 1 - SCADA	=PSW01-SC	EDS_SCAPN		
Panel 1 - voltage transformer	=PSW01-VT	EDS_VT		
LV Panel	**=LSW**			
LV panel nr 1	=LSW01	EDM_PLL		

ANNEXURE C

CLASSES: DISTRIBUTION

ED	EDG	GROUNDS AND BUILDINGS: DISTRIBUTION				
ED	EDG	**EDG_GR**	**GROUNDS**			
			EDG_GRB	Grounds - Building		Substation Buildings
			EDG_GRF	Grounds - Fencing		Substation Fencing
			EDG_GRS	Grounds - Site		Substation Site surrounding buildings inside perimeter fence
		EDG_FP	**FIRE PROTECTION**			
			EDG_FPC	Co2 Systems		Fixed installations
			EDG_FPE	Extinguishers		Portable extinguishers
			GENERAL			
			EDG_GEN	Generator		Fixed Standby Generators
			EDG_SEC	Security system		Security Equipment
			EDG_PMP	Submersible pumps		
ED	EDM	PRIMARY PLANT MV: DISTRIBUTION				
ED	EDM	**EDM_BR**	**CIRCUIT BREAKERS - MV**			
			EDM_BR1	Circuit Breakers - SF6		SF6 MV Circuit Breakers
			EDM_BR2	Circuit Breakers - Oil		Oil MV Circuit Breakers
			EDM_BR3	Circuit Breakers - Vacuum		Vacuum MV Circuit Breakers
ED	EDM	**EDM_SG**	**SWITCHGEAR - MV**			
			EDM_SGS	Switchgear - MV, Substations	(Unprotected Switchgear)	
				EDM_SGS1	Switchgear - MV, SF6	SF6 MV Substation Switchgear
				EDM_SGS2	Switchgear - MV, Oil	Oil MV Substation Switchgear
				EDM_SGS3	Switchgear - MV, Vacuum	Vacuum MV Substation Switchgear
				EDM_SGSE		Switchgear - Enclosure
			EDM_SGO	Switchgear - MV, O/H Line		
				EDM_SGO1	O/H Fuses	O/H Protection Equipment
				EDM_SGO5	O/H Auto Recloser	"

				EDM_SGO6	O/H Surge Arrestors	"
				EDM_SGO7	O/H Circuit Breaker	"
				EDM_SGO2	O/H Links	O/H Isolator
				EDM_SGO3	O/H Air break Switch	"
				EDM_SGO4	O/H Isolator	"
ED	EDM	**EDM_L**	**CABLES & LINES**			
			EDM_LCON	MV Line Conductors		Line conductors
			EDM_LPLE	MV Poles		MV Poles
			EDM_LCBL	MV Feeder Cables		
				EDM_LCBL1	MV Cables	Primary Cables
				EDM_LCBL3	MV Cables	Secondary Cables
ED	EDM	**EDM_PL**	**PANELS**			
			EDM_PLL	Panels - LV		Panels
			EDM_PLM	Panels - MV		LV Oil Circuit Breakers
ED	EDM	**EDM_T/MS**	**TRANSFORMER & MINISUBS**			
			EDM_MS	Minisubs		
				EDM_MSN	Minisub w/o RMU	Mini Sub without a RMU
				EDM_MSR	Minisub with RMU	Mini Sub with a RMU
			EDM_TX	Transformer - MV		All Transformers
ED	EDS	SECONDARY PLANT MV: DISTRIBUTION				
ED	EDS	**EDS_BT**	**BATTERIES & CHARGERS**			
			EDM_BTB	Battery bank		Battery banks in Substations
			EDM_BTC	Battery charger		Battery Chargers in Substations
ED	EDS	**EDS_L**	**CABLES & LINES**			
			EDM_LCBL	Communication cables		
				EDM_LCBL2		MV Optical Fibre Network
				EDM_LCBL4		MV Pilot Cables
				EDM_LCBL5		MV Telephone cables
ED	EDS	**EDS_LCL**	**INSTR. & CONTROL - LOAD CONTROL**			Load control equipment
ED	EDS	**EDS_MET**	**INSTR. & CONTROL - METERING**			Metering equipment
			EDS_METPM	Instr. & Control - Metering panel		
			EDS_METUN	Instr. & Control - Metering unit		

ED	EDS	**EDS_NM**	**NETWORK MANANAGEMENT (QoS) EQUIPMENT**			
ED	EDS	**EDS_PCB**	**INSTR. & CONTROL - PILOT CABLE BOX**			Pilot cable boxes
ED	EDS	**EDS_SCA**	**INSTR. & CONTROL - SCADA**			
			EDS_SCADC	Instr. & Control - Data concentrator		Data concentrators for SCADA
			EDS_SCAMD	Instr. & Control - Main distr. frame		Main distribution frame for SCADA
			EDS_SCART	Instr. & Control - Remote terminal unit		Remote terminals for SCADA
ED	EDS	**EDS_TEL**	**INSTR. & CONTROL - TELECOMS**			
			EDS_TELOF	Instr. & Control - Optical fibre network		Optical fibre network
			EDS_TELPX	Instr. & Control - PAX		PAX network
ED	EDS	**EDS_VT**	**INSTR. & CONTROL - VOLT TRANSFORMER**			VT
ED	EDL	**LV EQUIPMENT**	PLANT LV: DISTRIBUTION			
ED	EDL	**EDL_C**	**CUSTOMER EQUIPMENT**			
			EDL_CRR	Ripple Relays		
			EDL_CSG	Standby Generators		
ED	EDL	**EDL_K**	**KIOSK**			
			EDL_KKD	Kiosk Distribution		
			EDL_KKL	Kiosk Public Lighting		
			EDL_KKM	Kiosk Metering		
			EDL_KKP	Kiosk Pole		
ED	EDL	**EDL_L**	**LV CABLES & LINES**			
			EDL_LCBL	LV Cable Conductor		
			EDL_LCON	LV Line Conductor		
			EDL_LPLE	LV Poles		LV Poles
ED	EDL	**EDL_M**	**METERING**			
			EDL_MP	Metering Panels		
			EDL_MR	Metering Room		

CITY OF CAPE TOWN : ELECTRICITY SERVICES : MV FAULT REPORT

ANNEXURE D

A. KNOWN INFORMATION

Notification No.: _____ Work Order No.: _____

Fault Detail: _____ Operational Area: _____

Substation Name: _____ Start Time: _____ Feeder Name: _____

Functional Location: _____ Finish Time: _____

Equipment nr: _____ Date: _____

Staff Attend:	Staff No.:	Activity No.:	Vehicle Reg No.:	KMs Travelled:	Vehicle Activity Type:

B. EQUIPMENT FAULTED

☐ Substation Protected	☐ Panel MV	☐ Breaker Oil	☐ Switch Line	☐ Transformer Distribution	☐ Feeder Cable
☐ Substation Unprotected	☐ Panel Protection	☐ Breaker SF6	☐ Switch Fuse	☐ Transformer Current	☐ Feeder OH Line
☐ Mini-Substation	☐ Panel Scada	☐ Breaker Vacuum	☐ Switch Ringmain Unit	☐ Transformer Voltage	
	☐ Battery Charger	☐ Auto Recloser	☐ Switch Air Break	☐ Metering Unit	

C. TECHNICAL HISTORY

COMPONENT/PART			SCENARIO/DAMAGE	CAUSES		ACTIVITIES
☐ Aerial	☐ Conductor	☐ Oil Insulating	☐ Blown	☐ Adverse Weather Condition	☐ New Equipment / Project	☐ Adjusted
☐ Alarm	☐ Connector / Clamp	☐ Operating Linkages	☐ Broken	☐ Cooling Loss / Reduction	☐ No cause observed	☐ Assisted
☐ Arcing Horn	☐ Damper	☐ Pole	☐ Burnt	☐ Consumer Fault	☐ No maintenance	☐ Cleaned
☐ Band Joint	☐ Danger Signs / Notices	☐ Relay	☐ Contaminated/Water/Ingress	☐ Contamination	☐ Overload	☐ Filtered / Re-Gassed
☐ Battery	☐ Earthing	☐ Seal / Gasket	☐ Dirty	☐ Contractor Damaged	☐ Safe Switching	☐ Fluid added
☐ Blade	☐ Fence / Gate	☐ SF6 System	☐ Knocked	☐ Deterioration due to Age	☐ Sealant / Gasket Failure	☐ Inspected
☐ Breaker	☐ Filter	☐ Structure	☐ No Damage	☐ Excavation	☐ Settings Incorrect	☐ Installed
☐ Breather	☐ Fire Extinguisher	☐ Switch	☐ Punctured	☐ External Object	☐ Short Circuit	☐ Issue Permit
☐ Building	☐ Fuse	☐ Tank	☐ Ripped	☐ Fauna / Flora	☐ Temperature Abnormal	☐ Lubricated
☐ Busbar	☐ Fuse Carriage	☐ Termination	☐ Ruptured	☐ Fire	☐ Theft	☐ Operational Conditions MOD
☐ Bushing	☐ Hardware (Bolt / Nut)	☐ Wiring	☐ Rusted	☐ Inferior Workmanship	☐ Tracking	☐ Painted
☐ Cabinet/Housing/Enclosure	☐ Insulator	☐ Transformer Current	☐ Seized	☐ Insulation Failure	☐ Vandalism	☐ Problem referred to Other
☐ Cable	☐ Joint	☐ Transformer Voltage	☐ Tripped	☐ Lightning	☐ Voltage Incorrect	☐ Removed
☐ Cable Box	☐ Locking Device	☐ Yard / Grounds	☐ Wear and Tear	☐ Loose Connection	☐ Wear and Tear	☐ Repaired
☐ Circuit Board	☐ Meters (Volt / Amp)					☐ Replaced
☐ Coil (Trip / Close)	☐ Monoblock					☐ Reset
						☐ Rewired
						☐ Routine Maintenance Perf.
						☐ Sample for Analysis
						☐ Spray Weedkiller
						☐ Switching / Operating
						☐ Testing Performed
						☐ Unable to Correct Problem
						☐ Unable to Detect Problem

D. REMARKS

Refer to: ☐ HV Department ☐ Engineering Support ☐ LV Department ☐ Protection ☐ SCADA ☐ Electricity Support ☐ Engineering

Date Referred: _____ Time Referred: _____

Materials used: _____

Remarks:

E. EQUIPMENT CONDITION ASSESSMENT

☐ 1. Very Poor ☐ 2. Poor ☐ 3. Fair ☐ 4. Good ☐ 5. Very Good ☐ 6. New

Record feeder loading: _____ (A) and Voltage: _____ (V) (If applicable)

If applicable: Voltage: R_____ W_____ B_____

SIGNATURE: Loading: R_____ W_____ B_____