MALAWI INFRASTRUCTURE DELIVERY MANAGEMENT STANDARDS

Operation and Maintenance System

Subsystem No. 5

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Definitions / Glossary

Stage - a point, period, or step in a process or development

Senior Management - individuals at the highest level of management of an organization who have the day-to-day tasks of managing that organization

Corporate Board -

Client - as in registration regulations

Construction Industry Players – means clients, contractors, consultants, and material suppliers

Abbreviations or Acronyms

O & MS	-	Operation and Maintenance System
IDMS	-	Infrastructure Delivery Management Standards
ICT	-	Information Communication and Technology

INTRODUCTION

The Malawi Infrastructure Management System (IDMS) guidelines have been authored and written as a guide to all Construction Industry players in implementation of quality infrastructure. The guidelines have been developed to respond to poor project planning and management which often results in poor quality infrastructure in the Construction Industry. The Council regulates the Construction Industry to ensure quality infrastructure in the country, however, there has been a gap between the Industry players and the Client organizations. Based on observations by the Council, a good number of client organizations do not fully understand the processes of Construction Project Management lifecycle. The IDMS addresses the gap that exists in the Construction Industry and provides the user with rich knowledge on how infrastructure projects are supposed to be conceived, planned, designed, procured, implemented and maintained.

The guidelines have seven subsystems namely; Infrastructure planning system, infrastructure gateway system, infrastructure procurement system, project management system, operation and maintenance system, supply chain management and infrastructure technical audit system. These subsystems are very useful in quality infrastructure delivery in the country.

The IDMS is an informative resource because it outlines simplified steps which can be followed for the management of life cycle of infrastructure. The guidelines have been written in a simplified manner for easy understanding and use by every player in the Construction Industry. The IDMS will contribute greatly to delivery of quality infrastructure in the country when put to the right use.

The guidelines have seven subsystems namely; 1-Infrastructure planning system, 2-infrastructure gateway system, 3-infrastructure procurement system, 4-project management system, 5-operation and maintenance system, 6-supply chain management, 7-infrastructure technical audit system.

Article I.

BACKGROUND

Section 1.01 General

1.1 Asset Management: Operations and Maintenance (O&M) consists of all operational work from the moment assets have been recognised into the infrastructure asset register and handed over to Operations from Projects until the disposal of an asset. It considers the strategic and decision-making work that takes place during the asset strategy determination, asset portfolio planning and physical project implementation processes. The O&M process is linked to the overall service delivery plan of any institution. This stage will guide users in fulfilling their obligations by following the following processes:

a) Recognize and accept assets
b) Mobilisation for Facilities Management
c) Operations
d) Maintenance
e) Demobilise Facilities Management

Article II.

PROCESS MAP

Section 2.01 General

1.1 Figure 1 below depicts the processes for the Asset O&M and indicates the most important inputs and outputs from and to other asset management processes.

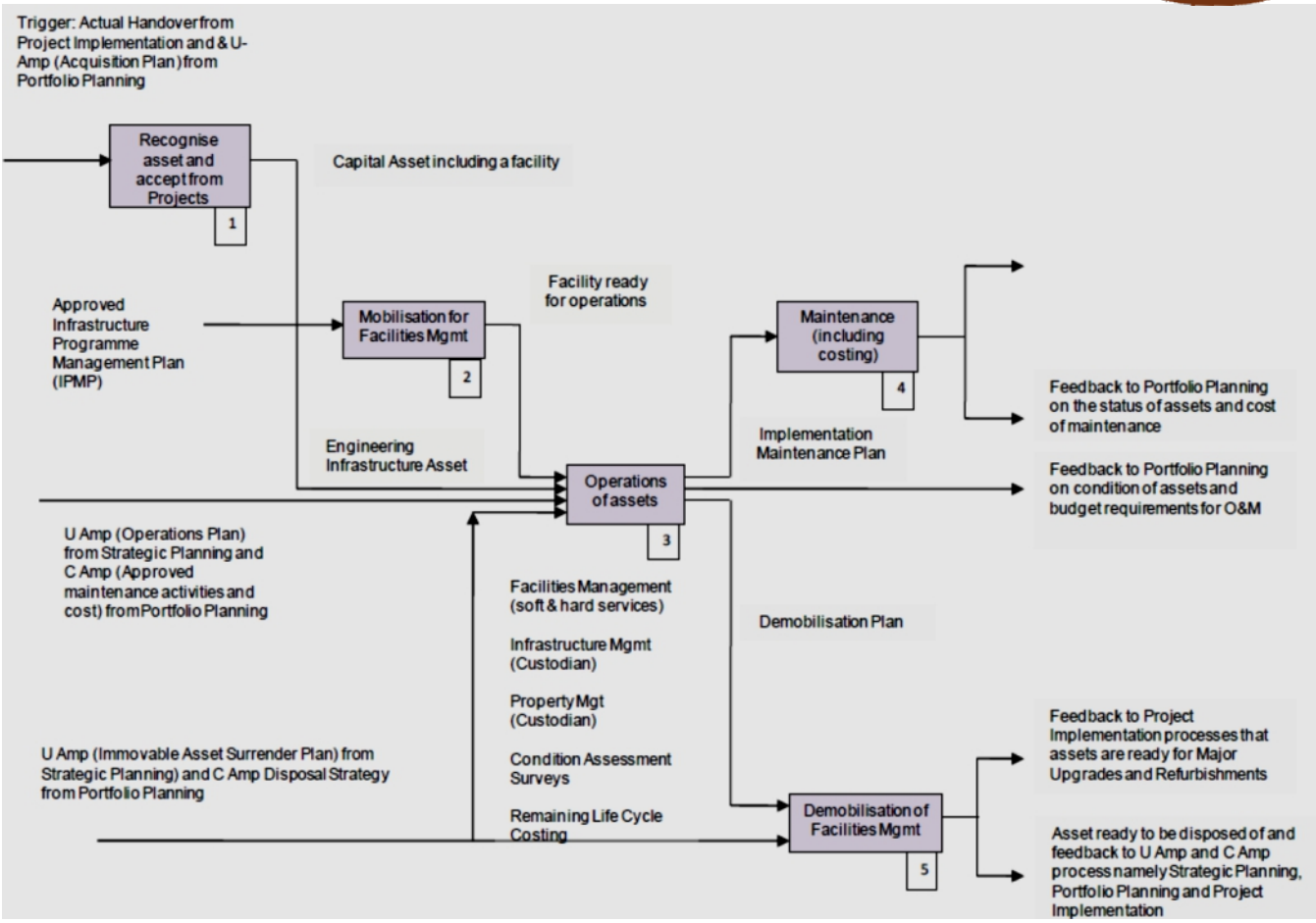

Figure 1: Process map

Article III.

ASSET OPERATIONS AND MAINTENANCE PROCESSES

Section 3.01 General

1.1 O&M is the process of receiving assets into the Infrastructure Asset register (IAR), managing and maintaining it over the life cycle and eventually demobilising the asset when required to be terminated.

1.2 Asset O&M includes the day-to-day management of assets such as Facilities Management, Property Management and Engineering Infrastructure Management, all of

which will require maintenance, costing and budgeting, and maintaining an asset register.

1.3 Excluded from Asset O&M are the strategy determination, portfolio planning, acquisition planning and acquisition implementation processes.

1.4 Although Asset Disposal is seen as one of the life-cycle phases of an asset it does not form part of O&M. The physical disposal of an asset will be planned and executed by Projects whereas the demobilisation of facilities will be planned and managed by O&M.

1.5 Demobilisation of facilities that are earmarked for upgrades, renovation or refurbishment will also be planned and managed by O&M and then handed over to Projects for the physical execution.

1.6 The generic process of Asset O&M is covered by the following sub-processes:

1. Asset recognition
2. Mobilisation for Facilities Management
3. Operations of assets
4. Maintenance
5. Demobilisation of Facilities Management

Article IV.

RECOGNISE ASSET AND ACCEPT FROM PROJECT

Section 4.01 General

1.1 The purpose of this process is to recognise the asset into the infrastructure asset register and accounting system. Figure 2 below shows the breakdown of the sub-process “Asset Recognition”.

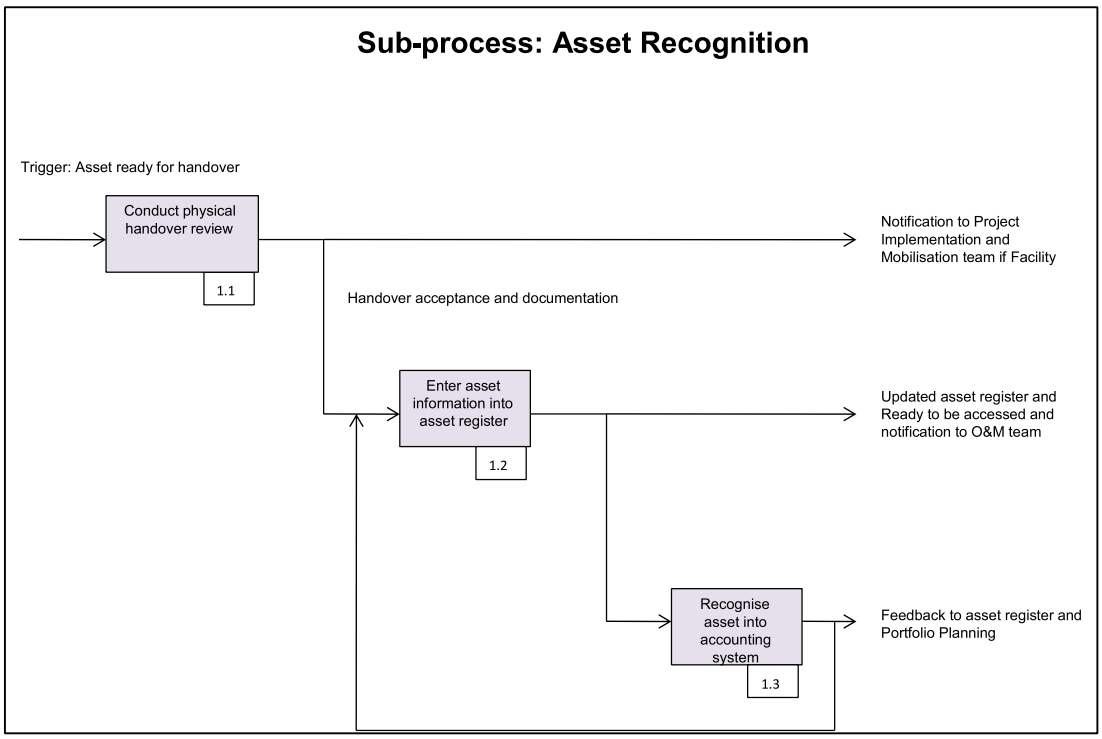

Figure 2: Asset recognition process

Article V.

SUB-PROCESS - ACCEPT THE PHYSICAL ASSET AT HANDOVER

Section 5.01 General

1.1 The purpose of this sub-process is to ensure acceptance of the asset by O&M prior to the handover of the asset by the Contractor to Client.

1.2 This sub-process is subsequent to the Gate Approval to handover the project from the Contractor to Client, which also requires the input and acceptance by O&M staff and includes the following steps:

i. Get prior notification of handover date from the contractor to Client

ii. Walk through and assess the asset deliverables including serviceable systems

iii. Identify non-performance against asset operational requirements

iv. Establish snagging lists/defects

v. Verify all required spares according to specifications

vi. Verify all required documentation such as O&M manuals and as-built drawings

vii. Verify vendor items and vendor information

viii. Give Client the go-ahead to continue with the handover from the contractor.

1.3 It is important that O&M takes part in the asset handover process and to ensure that all elements of the asset are exactly as what was specified and in a serviceable condition and that the complete set of documents are handed over.

1.4 This sub-process ends with the issuance of a "go-ahead" notice from O&M staff to Clients to complete the handover process from the Contractor.

Article VI.

SUB-PROCESS - ENSURE THAT RELEVANT INFORMATION IS CAPTURED INTO THE INFRASTRUCTURE ASSET REGISTER

Section 6.01 General

1.1 The purpose of this sub-process is to ensure that the required initial information on the new asset is captured into the infrastructure asset register. Infrastructure Asset Register is a detailed list of all immovable assets which are owned by an organization.

Section 6.02 Asset register

2.1 The infrastructure asset register should have as a minimum, three parts of information, namely:

i. Generic information e.g., asset identification, location

ii. User information e.g., functionality related (entered/controlled by user)

iii. Custodian information e.g., technical condition related (entered/controlled by custodian).

2.2 Typical information to be captured in an infrastructure asset register is (but not limited to):

i. Date of capitalisation and total acquisition cost (at cost price)
ii. Ownership of land, registration, location
iii. Asset identification, tagging number
iv. Asset condition (functional and technical)
v. Asset value (replacement, economic value, etc)
vi. Insurance if applicable
vii. Dates and costs of upgrades, replacement, disposal etc as well as costs Leasing information.

2.3 The basic steps for this sub-process are:

i. Obtain the required information of the new asset for the infrastructure asset register[1]
ii. Validate information
iii. Enter the information into the infrastructure asset register.

2.4 The sub-process starts when Projects have submitted the final asset information to O&M and ends when the information is captured in the infrastructure asset register.

2.5 It is important validated information that needs to be captured for accounting purposes is the final acquisition cost of the asset and the date of practical completion.

[1] i.e., as built drawings, O&M manuals, full design report, project report and any other information the client may deem necessary

Article VII.

RECOGNISE THE ASSET INTO THE ACCOUNTING SYSTEM

Section 7.01 General

1.1 This sub-process starts when the general asset information is captured in the infrastructure asset register and that the department responsible for finances is notified as such. The basic steps are:

i. Obtain asset value

ii. Obtain Asset identification information

iii. Verify and validate information

iv. Enter information into the accounting system.

1.2 The sub-process ends when a confirmation notification is sent out from the -department responsible for finances that the asset is entered into the accounting system.

Article VIII.

MOBILISATION FOR FACILITIES MANAGEMENT

Section 8.01 General

1.1 The purpose of the process is to prepare a new asset for occupation and to ensure that all internal and Facilities Management (FM) service providers are ready and trained to manage the asset. Figure 3 below shows the breakdown of sub-process Mobilisation.

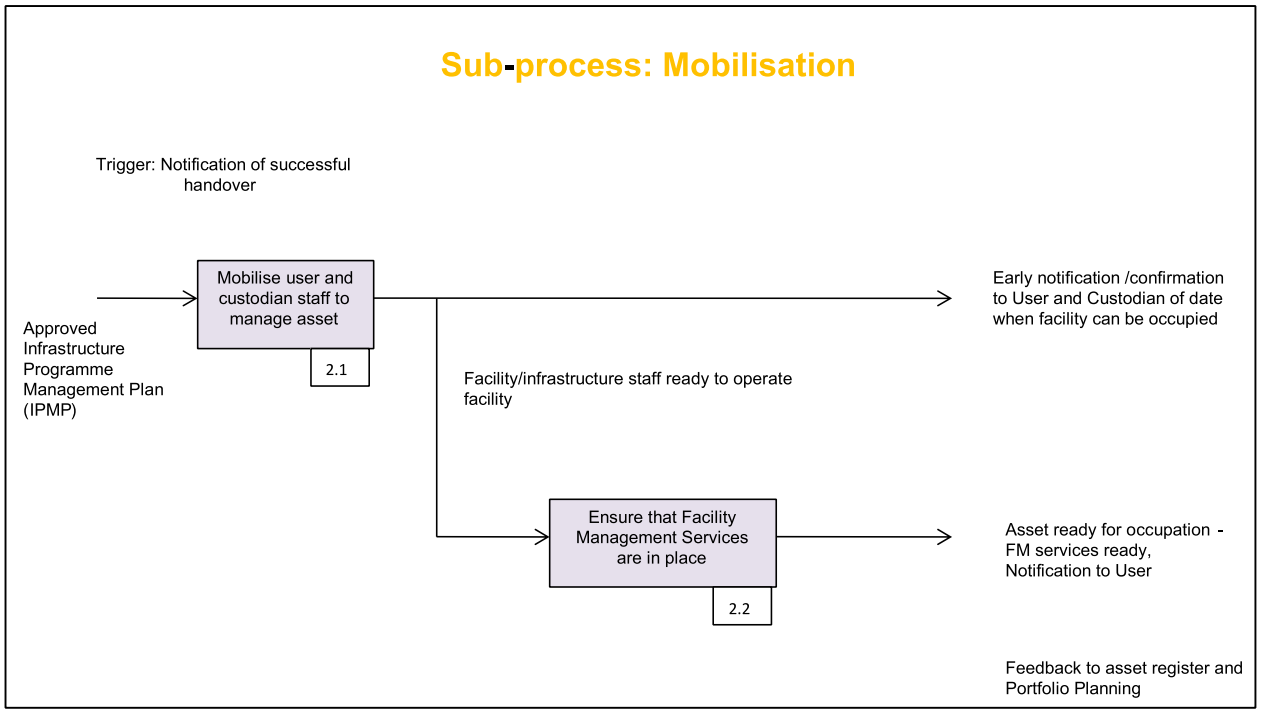

Figure 3: Mobilization process

Article IX.

MOBILISE USER AND CUSTODIAN STAFF TO MANAGE ASSETS

Section 9.01 General

1.1 This sub-process should start in advance to ensure that the asset is ready at least two weeks before occupation. It includes the following steps:

i. Identify user and custodian staff well ahead of the start-up of operations

ii. Place and train staff, ready to mobilise facilities management contracts and services.

1.2 The sub-process is triggered by the following documents:

i. Final notification when handover of asset will be completed and when access will be given to O&M

ii. The final approved Infrastructure Programme Management Programme (IPMP).

1.3 It is important that O&M continuously follows up with Client on the expected date for practical completion and handover so that the planning and implementation of the mobilisation process can be completed in time for occupation. The sub-process ends with the notification of readiness of user and custodian staff to continue with mobilisation process.

Article X.

SUB-PROCESS: ENSURE THAT FACILITIES MANAGEMENT SERVICES ARE IN PLACE AND OPERATIONAL

Section 10.01 General

1.1 The purpose of this sub-process is that the trained user and custodian staff now ensure that all FM contracts are in place and that the FM service providers have mobilised to conduct facilities management tasks and also to ensure that they have the skills and know-how how to manage and operate the asset and other engineering systems and structures.

1.2 Basic activities in this sub-process are:

i. Obtain the projected practical handover and user occupation dates of facilities well in advance
ii. Conduct a facilities management services requirement
iii. Establish a Statement of Work and prepare tender documentation for facilities management services
iv. Follow the procurement process to appoint facilities management service providers
v. Appoint service providers after the tenders have been adjudicated and contracts have been awarded

vi. Conclude contracts (including signing thereof)

vii. Provide access to the assets to the facilities management service providers

viii. Ensure via the contract the readiness of all soft and hard services at least two weeks prior to occupation by the user

ix. Notify user of readiness of facilities management services.

Article XI.

OPERATIONS OF ASSETS

Section 11.01 General

1.1 This phase involves the operational management of all assets and includes facilities management, engineering infrastructure management, property management, technical condition assessment surveys, maintenance of assets and remaining life cycle costing. Figure 4 below shows the breakdown of sub-process Operations of Assets.

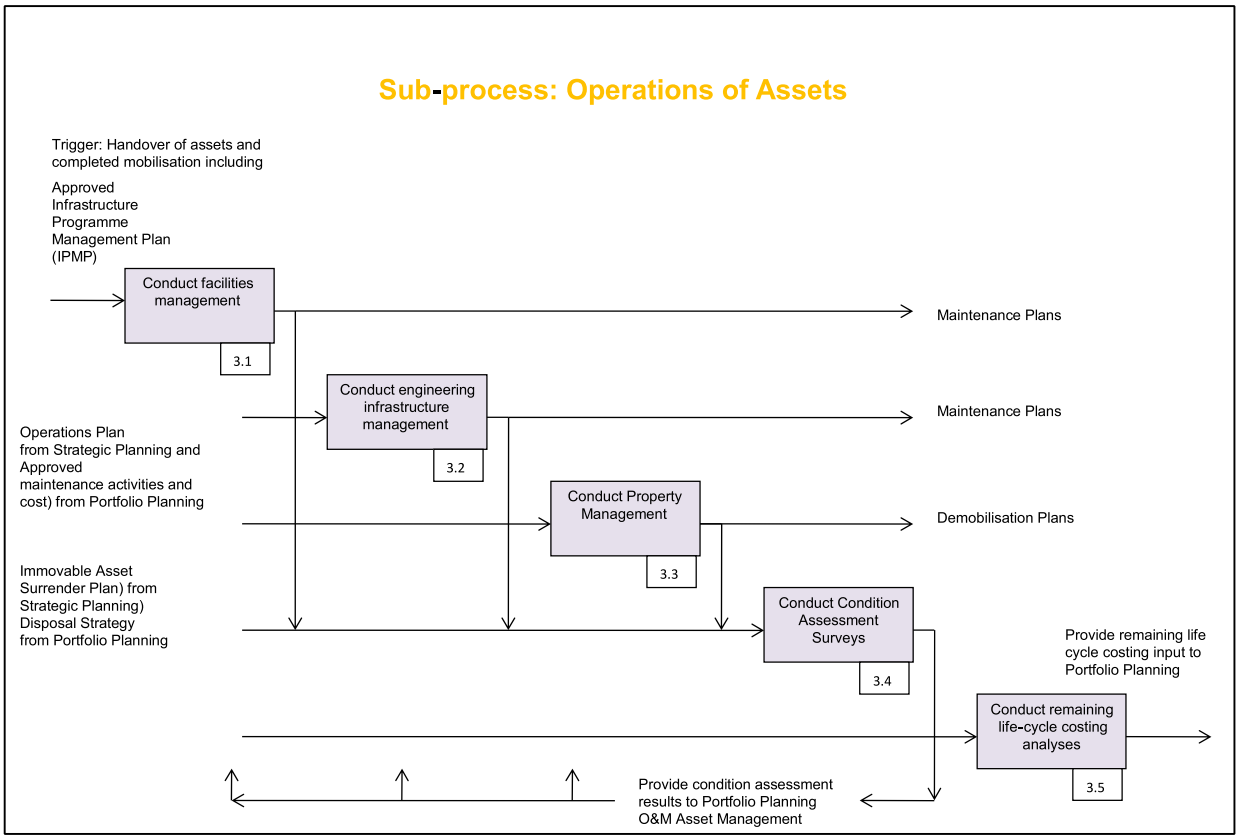

Figure 4: Operation of asset process

Article XII.

CONDUCT FACILITIES MANAGEMENT

Section 12.01

1.1 The purpose of this step is to carry out the management of the facilities including planning and budgeting and includes the following activities:

i. Identify and establish inspection and maintenance plans as per the operating and maintenance manuals and check, test or replace asset systems, subsystems, assemblies or components

ii. Ensure that preventative (scheduled, routine) maintenance plans are in place.

iii. Ensure that all breakdowns are being addressed immediately

iv. Ensure that facility/asset Condition Assessment Surveys (CAS) are being planned and conducted as per requirements.

v. Ensure that the required funds are allocated and that facilities management contracts are being placed to ensure continuation of services.

1.2 Outputs from this process are:

i. Implementation of preventative maintenance plan
ii. Facilities demobilisation plans
iii. Inspection plans
iv. Facilities management operations plans
v. Facilities management budget.

Article XIII.

CONDUCT CONDITION ASSESSMENT SURVEYS

Section 13.01 General

1.1 The purpose of this sub-process is to ensure that CASs are scheduled to take place at regular intervals and that assets that do not meet the minimum operational requirement are immediately addressed to improve the asset functionality and to bring it back to the original asset value

1.2 This process includes the following activities:

i. Ensure that the user conducts a perception technical condition assessment of all immovable assets occupied and that results are being reported

ii. Establish a technical condition assessment plan to conduct the surveys on all assets within a period of 5 years

iii. Determine manpower requirements (professional, trained, skilled) to conduct the technical condition surveys as per the plan

iv. Budget and get funds approval to implement the technical condition assessment plan

1.3 The sub-process ends with the issuance of Condition Assessment Reports on all assets.

Article XIV.

CONDUCT REMAINING LIFE-CYCLE COSTING

Section 14.01 General

1.1 The purpose of this step is, during the Planning and Budgeting process (in the Portfolio Planning Module), to conduct a complete life-cycle costing (LCC) from project initiation until the asset disposal stage including upgrades, refurbishment or renovations.

1.2 This sub-process only addresses the costing of the remaining life of the asset and includes the following activities:

i. Determine the cost elements of the remaining asset life

ii. Split cost elements into recurring and non-recurring capital investment costs and into operating sustaining costs

iii. Decide on the operating method and technology required to run technical systems for the remaining life.

iv. Determine cash flows for each costing element per annum and for the decided operating method. Cash flows should be presented in a specific time-value, namely either constant (real) money terms or current (nominal) money terms

v. Conduct an optimisation analysis (best operating approach and technology for the least cost) and select the best remaining life solution per cost element

vi. For the remaining life selected operating solution and corresponding cash flows, determine the total annual cumulated cash flows

vii. Compare with original life cycle estimates and submit reports.

Article XV.

MAINTENANCE OF ASSETS

Section 15.01 General

1.1 The purpose of this sub-process is to attend to the execution of maintenance plans, primarily preventive maintenance, and also the repair of breakdowns. Figure 5 below shows the breakdown of sub-process Maintenance of Assets.

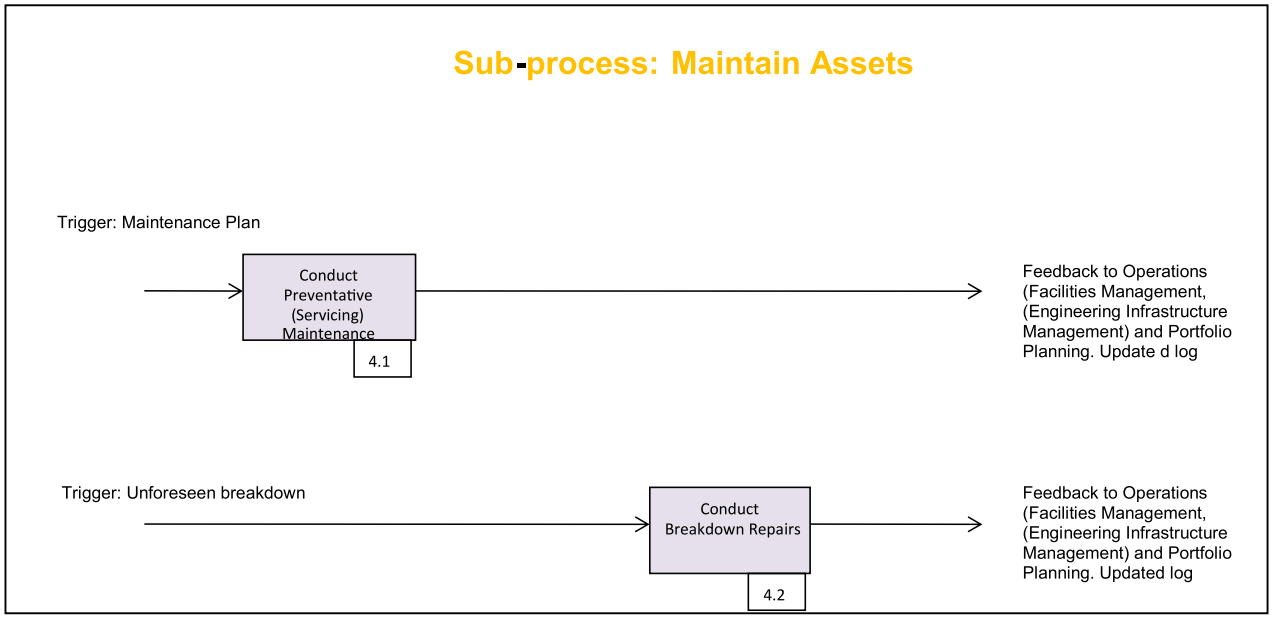

Figure 5: Maintain asset process

Article XVI.

CONDUCT PREVENTATIVE (SERVICING) MAINTENANCE

Section 16.01 General

1.1 The purpose of this step is to attend to the implementation of the preventative maintenance plans.

i. Instruct the maintenance service provider to implement the preventative maintenance plan

ii. Ensure records and warranty documentation for all maintenance completed

iii. Monitor performance of the service provider as per contract

iv. Consolidate monthly maintenance activities, analyse and submit a monthly preventative maintenance report.

1.2 The sub-process ends with the issuance of preventative maintenance reports.

Article XVII.

CONDUCT BREAKDOWN REPAIRS

Section 17.01 General

1.1 The purpose of this sub-process is to attend to the work to be undertaken when a sudden breakdown of a system or damage to an asset has been reported. It includes the following activities:

i. Accumulate reports on breakdowns and establish a monthly prioritised repair schedule

ii. Instruct the repair service provider to repair breakdowns as per the schedule

iii. Ensure records and warranty documentation of all repairs completed

iv. Monitor performance of the service provider as per contract

v. Consolidate monthly repair activities, analyse and submit a monthly breakdown repair report.

Article XVIII.

DEMOBILISATION OF FACILITIES MANAGEMENT

Section 18.01 General

1.1 Demobilisation of Facilities Management is required for assets that will be disposed of as well as assets earmarked for upgrades, refurbishments or renovations. This process refers to the demobilisation of facilities/engineering plants. Figure 6 below shows the breakdown of sub-process Demobilisation.

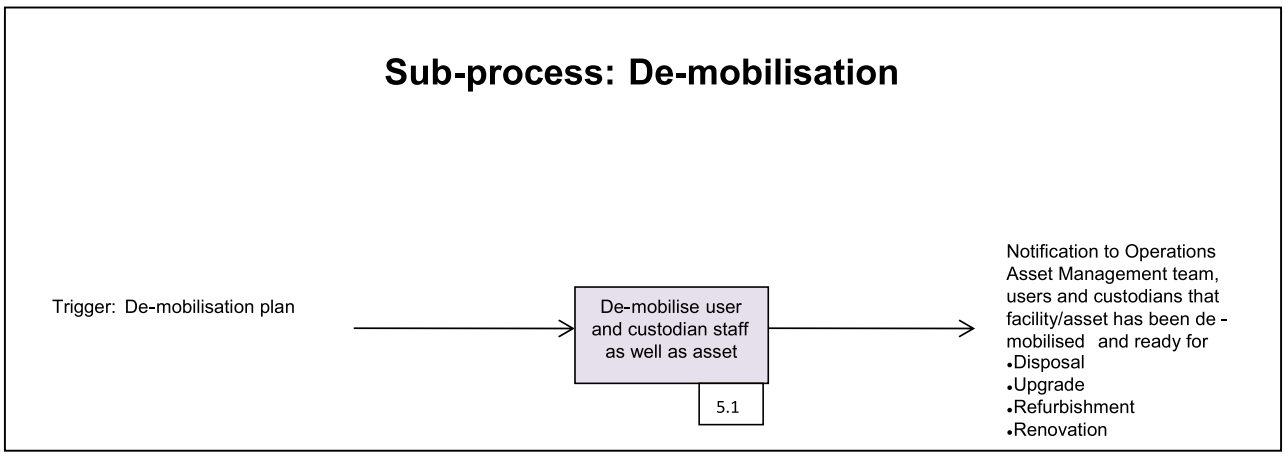

Figure 6: Demobilization of asset process

Article XIX.

DEMOBILISE FACILITIES MANAGEMENT

Section 19.01 General

1.1 The purpose of this step is to ensure the removal of staff and shut down of selected systems prior to the start of the disposal process or upgrades or refurbishments of an asset and includes the following activities:

i. Establish a demobilisation plan after receipt of notification of an asset to be disposed of or to be upgraded/refurbished

ii. Implement demobilisation plan and if required removal and storage of re-usable items and systems

iii. Notification of readiness to hand over asset to Client

iv. Handover of asset to Client with a stock/inventory/equipment list and condition thereof

v. Acceptance by Client of asset from handover by O&M.

1.2 This process ends with the notification that a facility is demobilised and that it is ready to be handed over to Client from Operations.

Article XX.

DISPOSAL OF ASSETS

Section 20.01 General

1.1 The decision to dispose of an asset is taken at strategic and portfolio level but based on input given by the asset management team. The asset management team will be responsible to plan for the demobilisation of services but the Project team will be responsible for the specification and contracting for the final demolishing of the asset and reinstating the land (if required) to environmental minimum standards.

1.2 Although a final stage/phase in the product (asset) life cycle, an asset manager needs to take the following into consideration when planning for the disposal of an asset and providing advice to other functions:

i. Plan the disposal process of assets identified in the disposal plan.

ii. Cause minimum disposal value to be determined and approved in accordance with relevant laws

iii. Develop the disposal brief (all disposals) and the specification for bid process, except in the case of inter-governmental transfer.

iv. Ensure accurate update of the infrastructure asset register.

Article XXI.

ASSET HIERARCHY

Section 21.01 General

1.1 It is important to categorise assets into an asset hierarchy according to which information can be captured in an infrastructure asset register and also according to which records could be kept on operations and maintenance aspects.

Article XXII.

RISKS

Section 22.01 General

1.1 This chapter identifies the risks associated with Operations and Maintenance for the Reader to assess and to mitigate.

1.2 The following is a list of major risks (but not limited to) that need to me mitigated:

i. The proposed O&M processes could lead to unsatisfactory service delivery if not properly established and followed within the user and custodian departments.

ii. The late start and finish of all-important activities could lead to the non-readiness of facilities for user occupation or custodian re-occupation in order to proceed with major upgrade/refurbishment projects, e.g., the timely placing of contracts for facilities management and maintenance

iii. The lack of record keeping with regards to facilities could lead to repetitive or similar mistakes in the future

iv. The lack of knowing and managing the complete hierarchy of assets insofar as preventative maintenance is concerned

v. The under-estimating or over-estimating the remaining life-cycle cost that could have a negative impact on the budget

vi. The employment of not suitably qualified people to manage the asset management process

vii. If the asset register is not maintained properly, wrong or outdated information might be used in crucial decision-making exercises.

Article XXIII.

O&M PERFORMANCE MANAGEMENT

Section 23.01 General

1.1 Performance management of operations and maintenance differs from that of projects in that it is mostly an ongoing function. Whilst some of the inputs, activities and outputs may differ, the concepts however remain the same. Some of the key differences will be found in the concept of the customer

1.2 . In a project environment the project often has a single customer represented by the project sponsor, whereas in the maintain asset processes, for example, it is necessary to deal with multiple customers across the organisation, internally and externally. This will result in performance metrics such as indicators to measure service levels, response times etc per customer, sometimes with indirect indicators.

1.3 Conversely, performance indicators for the bulk of the work required to plan and manage the O&M function will not differ from the indicators required by managers in programme management functions to manage their functions.

Article XXIV.

INPUT INDICATORS

Section 24.01 General

1.1 O&M inputs are financial, human and technology resources and the input performance indicators will therefore measure:

i. % of staff available as a percentage of planned staff (input indicator)

ii. Cost Performance Indicator of PSP appointed to provide support at this level (input indicator)

iii. Cost variance through a form of cost performance index of for example material used in maintenance. Remember that these indicators explore value for money and should be designed as such.

iv. Vacancy and other resource production indicators (actual hours worked versus total hours available) measuring the availability of O&M staff versus planned is required.

Article XXV.

ACTIVITY INDICATORS

Section 25.01 General

1.1 The following are activity indicators:

i. % of issues elevated for Management Action closed (activity indicator)

ii. Budget performance indicator of the Programme unit's own budget (activity indicator) Budget variance indicators explore the performance in terms of spending the budget.

iii. Variance from service level requirements, for example time to respond to a call.

iv. Productivity measures – number of calls responded to, especially if these are coupled to a long-distance trip.

v. Quality performance indicators are essential activity indicators and measuring for example the number of inspection failures, or customer come-backs will provide these.

vi. Indicators measuring metadata from the customer call log provides useful early warning of failures.

Article XXVI.

OUTPUT INDICATORS

Section 26.01 General

1.1 Outputs need to be measured across the O&M value chain and will include measuring on-time submission of business plans, budgets, periodic reports etc.

1.2 Management action is an important output and indicators to track these can be obtained from measuring the number of calls closed after having been elevated to management, for example.

1.3 Output indicators at an O&M level could also be measured for example by tracking the trends per facility to determine whether the planned maintenance activities have reduced the number of callouts. This type of indicator might however best reside at the O&M programme level.

1.4 Each roadmap process and sub-process will require indicators designed around the specific process step applicable to this process step.

1.5 Conduct Property Management, would typically address the performance of formulating, updating and submitting documents required by that process, namely:

i. Land acquisition plans - % plans updated for example.
ii. Analysis reports on utility bills and consumption trends
iii. Leasing records and reports
iv. Asset registers reports
v. Asset registers non-compliance reports.

1.6 In instances where the outputs are defined in plans, the indicators will naturally be developed as part of the planning process.

1.7 Conduct preventative maintenance is defined in the approved budget.

1.8 Performance of these activities can therefore be measured in terms of one or more dimensions of delivery, namely:

i. Comprehensiveness of the deliverables

ii. Quality of the deliverables

iii. Timeliness of the deliverables

Article XXVII.

PERFORMANCE OF THE INDIVIDUAL

Section 27.01 General

1.1 There has to be review of performance of the Officer responsible for implementing O&M based on the agreed Key Performance Indicators (KPIs). This is the fourth performance roadmap step and it is important for the successful management system.

1.2 Organizations should develop clear KPIs that are tailor made to the specific individual responsible for O&M and can easily be measured to ensure that the inputs and outputs are reflective of the desired outcome. In addition to the performance appraisal done once per annum, it is important that the performance of the officer is continuously monitored.