Delivery Management Guidelines

Delivery Process 2 - Project Management
The IDMS

**DP1: Portfolio Management**

- **DP1-1 Infrastructure Planning**
  - Develop/review U-AMP (including prioritised MTEF works list)
  - U-AMP
  - G1(a)
  - PF1.1
  - PF1.2
  - PF1.3

- **DP1-2 Programme Management**
  - Develop/review C-AMP (inc portfolio level Work Plans)
  - C-AMP
  - G1(b)
  - PC
  - PF2.1
  - PF2.2
  - PF2.3

**DP2: Project Management**

- **DP2-1 Implementation Planning**
  - Prepare Packages
  - Define Packages
  - Develop/Review IPIPs (Prgr & Proj level)
  - PEP1
  - G3
  - G4
  - IPIP

- **DP2-2 Design**
  - Design devlpmt
  - Detailed design
  - Compile MFC Info
  - PEP3
  - G5
  - PC
  - PF3

- **DP2-3 Works**
  - Construct / Deliver works
  - Handover
  - Contracts Close Out
  - PEP4
  - G6(a)
  - G6(b)
  - PC
  - PF4

- **DP2-4 Close Out**
  - Contracts
  - Adminstv
  - Close Out
  - PEP5
  - G7
  - G8

**DP3: Operations & Maintenance**

- **DP3-1 Recognise & accept assets**
  - G8
  - PF1.1

- **DP3-2 Mobilisation for Facilities Mgt**
  - PF1.4

- **DP3-3 Operations**
  - PF2.1

- **DP3-4 Maintenance**
  - PF2.2
  - PF2.3

- **DP3-5 Demobilisation of Facilities Mgt**
  - PF3
  - PF4
Structure of the Infrastructure Delivery Management Toolkit (IDMT)

Management Companion

Delivery Management Guidelines

Delivery Processes

Overview

DP1: Portfolio Management

PG1: Prov Infr Strategy

PG2: Constr Proc Strat

PG3: Perform Mgt

Practice guides

Infrastrucutre Delivery Management System (IDMS)
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Table 1: Project Management Framework for Implementation of Infrastructure Projects in the South African Public Sector ........................................................................................................ 8
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1. The Purpose of this module

The purpose of this module is to assist users to:

- Understand key concepts of implementing infrastructure in programmes and projects
- Understand different types of project implementation methodologies
- Understand the project implementation stages of delivery infrastructure.

2. Where am I within the Delivery Management Guidelines

![Diagram: Project Management in relation to other delivery processes]

Figure 1: Project Management in relation to other delivery processes

3. Introduction

In this module Project Implementation is defined as “planning and executing the design and the associated works required for the physical creation of new or refurbished infrastructure or immovable assets.”
This module provides management guidelines for the implementation of infrastructure programmes through the implementation of its constituent projects. Infrastructure projects are implemented individually as “stand-alone” projects or as a “group” of projects “packaged” for increased management and economic efficiency.

The implementation of programmes and its constituent projects are preceded by a “Portfolio Management” process as described in module DP1. The portfolio planning process is aimed at the identification, definition, appraisal and evaluation of “Potential Projects” to be listed in a User Department’s U-AMP (Long Term Plan). Once evaluated and approved, the priority projects will be listed as “Proposed Projects” on the User Department’s Infrastructure Medium Term Expenditure Framework (MTEF) Works List (Medium Term Plan). The Infrastructure MTEF Works List forms part of the User Department’s Infrastructure Budget Proposal submitted for consideration in the Medium Term Expenditure Committee (MTEC) process. The Infrastructure MTEF Works List provides details of (1) “Active Projects”, i.e. current commitments to be continued/completed during the MTEF Period and (2) “Proposed Projects” to be “released” on approval of the User’s Immovable Asset Budget for implementation during the MTEF Period.

The implementation of infrastructure projects is executed in four stages:

1. Planning
2. Design
3. Works

This Module contains guidelines for the setting up and formulation of implementation plans and provides guidance on the work to be done in each of the implementation stages. It also provides methodologies for the implementation of different project types with a description of the required work processes and activities.

The phasing and control gates as described in this Module are aligned with the prescripts of the CIDB as contained in the CIDB Gateway System.

4. Implementation of Programmes and Projects

Programmes are implemented through the implementation of each of its constituent projects. Programme implementation management differs from project implementation management in a number of significant ways:

- The programme manager manages the total programme budget (the programme manager can use the savings on some projects to fund over-expenditure on other projects within the programme); the project manager manages and controls the project budget only
- The programme manager manages each project’s contribution to the programmes intended benefits, and the project manager manages the project scope of work only.

4.1 Programme Implementation

The goal of Programme Implementation is to initiate the component projects of the programme and to coordinate the delivery of the expected programme benefits.

4.1.1 Milestones in Programme Implementation

The starting milestone for Programme Implementation is the approval of the very first edition of the Infrastructure Programme Implementation Plan (IPIP) as developed during the Planning Stage (see 6.2).

The Programme Implementation Stage can be of unlimited duration because the scope of the programme will be reviewed, and possibly increased, regularly. The Programme Charter, the IPMPs and the IPIPs will go through several iterations - during the implementation stage - and changes to the contents of these plans will therefore have to be monitored continuously.
The Implementation of a programme ends when:

- The planned benefits of the programme have been achieved or
- A decision is made to terminate the programme.

It is therefore not always possible to identify a milestone ahead of time for the completion of a programme.

### 4.1.2 Overview of the work to be done in Programme Implementation

Each and every project in the programme shall be formally “released” for implementation by the implementing team. The Programme Management Office shall assist in reviewing the efforts of the constituent project teams, with specific reference to the following:

- Ensuring adherence to the prescribed project management methodologies
- Monitoring of the project deliverables against the programme objectives
- Identifying risks and ensuring that appropriate mitigation actions have been taken
- Identifying issues and ensuring that corrective actions are taken
- Reviewing variation orders and authorising additional work
- Communicating with the stakeholders and the programme governance board
- Identification of environmental changes which may impact on the programme management plan or anticipated benefits.

A detailed description of the recommended Project Delivery Methodologies is provided in Section 5.2.

### 4.2 Project Implementation

Infrastructure projects in the South African public sector are managed according to the “traditional” approach to project management, which requires division of the project’s life span into a number of distinct ‘stages’ (also called “phases”) based on the intrinsic “logic” of the project development process. Each stage has its own objectives, usually expressed in terms of the completion of one or more stage deliverables, which have to be approved by a governing body, before the project team may commence with the subsequent stage.

#### 4.2.1 Project Management Framework

The recommended Management Framework for the Implementation of Infrastructure Projects in the South African Public Sector is aligned with the CIDB Gateway System and detailed in Table 1.

<table>
<thead>
<tr>
<th>Stage No</th>
<th>Description</th>
<th>Goals</th>
<th>Stage Control Gate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Package Preparation</td>
<td>To develop a Strategic Brief (which includes a user requirement specification for each Package)</td>
<td>Approval by the Client of the Project Execution Plan (PEP) v1 (the Strategic Brief)</td>
</tr>
<tr>
<td>1.2</td>
<td>Package Definition</td>
<td>To develop a design concept that will enable the client to establish the feasibility of satisfying the package requirements.</td>
<td>Approval by the Client of Project Execution Plan (PEP) v2 (the Concept Report)</td>
</tr>
<tr>
<td>Stage</td>
<td>Goals</td>
<td>Stage Control Gate</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Works Planning</td>
<td>To develop IPIPs in response the User Departments MTEF Works List.</td>
<td>None</td>
</tr>
<tr>
<td>2.0</td>
<td>Design</td>
<td>To develop the accepted concept and to finalise the design and definition criteria.</td>
<td>Approval by the Client of Project Execution Plan (PEP) v3 (the Design Development Report)</td>
</tr>
<tr>
<td>2.1</td>
<td>Concept Development</td>
<td>To produce the Production Information, i.e. the final detailing, performance definition, specification, sizing and positioning of all systems and components.</td>
<td>Approval by the Client of Project Execution Plan (PEP) v4 (the Production Information)</td>
</tr>
<tr>
<td>2.2</td>
<td>Detail Design and Specification</td>
<td>To produce the Production Information, i.e. the final detailing, performance definition, specification, sizing and positioning of all systems and components.</td>
<td>Approval by the Client of Project Execution Plan (PEP) v4 (the Production Information)</td>
</tr>
<tr>
<td>2.3</td>
<td>Manufacture, Fabrication and Construction (MFC) Information (if required)</td>
<td>To produce the Manufacture, Fabrication and Construction (MFC) information based on the Production Information</td>
<td>Acceptance by the Client of the Manufacture, Fabrication and Construction Information</td>
</tr>
<tr>
<td>3.0</td>
<td>Works</td>
<td>To construct/deliver the works according to the working drawings and specifications.</td>
<td>Acceptance of the completed works for occupation by the Client; Issue of a Practical Completion Certificate; Approval of Project Execution Plan (PEPv5)</td>
</tr>
<tr>
<td>3.1</td>
<td>Construction/Delivery</td>
<td>To facilitate smooth transition of the completed works from the project team to the Operations and Maintenance personnel.</td>
<td>Acceptance by the Client of the completed works; Issue of a Works Completion Certificate; Approval of Project Execution Plan (PEPv6)</td>
</tr>
<tr>
<td>3.2</td>
<td>Handover</td>
<td>To formally verify that all contractors have completely and successfully fulfilled their obligations to the project; To update all paperwork and electronic files used for managing the contracts; To compile and archive Contract Files for future reference and for auditing purposes</td>
<td>Formal verification and acceptance by the Client of the completed products/facilities; Archived Contract Files</td>
</tr>
<tr>
<td>4.0</td>
<td>Close-out</td>
<td>To archive all record information and statutory certificates; To capture new asset data or update the existing data on the Immovable Asset Register; To conduct a Project Review Meeting; To prepare and submit a Project Close-out Report</td>
<td>Acceptance by the Client of record information and statutory certificates; Confirmation of capturing of new or updated asset data; Acceptance of Close-out Report. Acceptance of Project Execution Plan (PEPv7)</td>
</tr>
</tbody>
</table>

The Framework is based on the assumption that certain “pre-project” planning activities have already taken place. These activities are normally described as the conceptualisation and/or initiation of the project and include actions such as the identification of a need or requirement, the justification for addressing this need.
or requirement by means of a description of the benefits that the project will yield, the appraisal and
evaluation of the proposed project against pre-determined criteria, and finally the inclusion of, and budgeting
for a project in a User Department’s Infrastructure MTEF Works List. These activities are described in more
detail in the infrastructure planning stage.

Please note:

- Procurement is not included in the above framework, because the point of insertion of a
  procurement stage depends on the selected contracting strategy (see paragraph 5.1).
- The Framework contains four stages (and several sub stages) in order to cover the full spectrum of
  work and management activities encountered on most projects. There is no requirement for all
  projects to go through all four stages!

The affect is shown in the following two examples:

**Example 1:** Renovation and Repair (R&R) Projects

The package information as documented in the package definition stage - for packages involving
Renovation and Repair projects (preventative, corrective, scheduled or routine maintenance) - is usually
sufficient for project implementation. There is thus no need for these projects to go through any Design
Stage as indicated in Table 1. These projects will therefore only have 3 implementation stages, except if the
services of a contractor need to be procured for the execution of the renovation or rehabilitation project, in
which case the project phasing will be as follows:

- Planning
- Contractor Procurement
- Works
- Close-out.

**Example 2:** New Construction and Alteration (Upgrade) Projects

Packages involving the construction, refurbishment and alteration of infrastructure require design services to
further develop the concept. The package information accordingly needs to be refined and agreed to as the
design is further developed. Physical construction of elements, components and assemblies can only take
place after production information is produced and, if relevant, the manufacture, fabrication and construction
information has been accepted by the client. If manufacture, fabrication and construction information is not
required, then only two design sub-stages will be required.

The contracting strategy – as determined during the portfolio planning process – will determine the number
of procurement stages and their corresponding insertion points, e.g.

- **Project Stages for Design and Construct Contracting Strategy:**
  - Planning
  - Contractor Procurement
  - Design
  - Works
  - Close-out
- **Project Stages for Design by Employer Contracting Strategy:**
  - PSP Procurement
  - Design
  - Contractor Procurement
  - Works
  - Close-out.

The Project Management Framework is aligned with the CIDB Gateway System and requires strict
adherence to the principle of stage controls, i.e. the approval of certain stage deliverables as a prerequisite
for the commencement of the subsequent stage of the project. The key deliverables at the end of each
stage also need to be accepted by the client to ensure that scope creep and project risks are understood and agreed to before proceeding to the next stage of implementation. Where the cost estimate indicates that the available budget will be exceeded, either additional budget must be obtained or the package information adjusted such that the cost is within the available budget. This needs to be undertaken before proceeding to the next stage of implementation.

The end of each stage is regarded as a “control gate” which needs to be “opened” to allow access into the next stage of the project. These control gates play a very important role in the planning and control of a project, because each gate approval is seen as a “milestone” to be reached. Project progress is usually measured in terms of the actual date of achievement of the milestone versus the planned date for reaching that milestone.

5. Project Management Methodologies

In general terms a methodology is a description of what to do to achieve a specific outcome. A project management methodology therefore describes what to do in every stage of the project to ensure that the goals of that stage will be achieved. The project management methodology contains a work breakdown structure (WBS) consisting of stages, activities and tasks with clear description of the deliverables and responsibilities associated with each task.

Project management methodologies are important:

- To ensure that the management processes to achieve the desired outcomes are consistent and effective
- To promote project governance through the implementation of a consistent and auditable process.

The development, acceptance and strict adherence to the recommended methodology will lead to improved standardisation and uniformity in public sector infrastructure delivery.

5.1 Impact of Contracting Strategy on Project Management Methodologies

Infrastructure Project Management Methodologies are impacted by the following two factors (as briefly discussed in section 4.2.1):

- The need for the project to go through the design development stages as described in 4.2.1 above
- The need for the procurement of professional and/or contracting services.

The need for the procurement of services is usually considered during the portfolio planning process. The procurement planning process involves decisions about the following:

- Delivery Management Strategy
- Contracting arrangements
- Procurement arrangements

Decisions taken during the procurement planning process is documented in a construction procurement strategy. A construction procurement strategy is usually defined for a specific programme, but some procurement strategies may be applicable to the portfolio of projects in totality or, sometimes, to a single project only.

The contracting strategy as contained in the construction procurement strategy is of specific importance because:
• It determines the number of and the insertion point(s) for the procurement stages to be included in the project phasing
• It determines responsibility for the development of the design.

The responsibility for the development of the design has traditionally, in the South African public sector, been retained by the Client or Employer, hence the preference for the Design by Employer contracting strategy and the resulting procurement of consultants or professional service providers. International trends indicate a swing from the traditional Design by Employer strategy to other preferred strategies in which the responsibility for design is contractually assigned to the contractor.

5.1.1 Design by Professional Service Providers

If the Design by Employer contracting strategy is selected and if the Employer does not have sufficient in-house capacity, then a separate Professional Services Procurement Stage may be required to procure the services of a PSP to:

• Provide the necessary design, cost and programme inputs into the package information
• Review the outputs of each stage prepared by the contractor’s project team for general conformity with the scope of work associated with the contract
• Administer the contract in accordance with the provisions of the contract; and
• Provide monitoring services.

(See Sample Generic Scope of Work for the Professional Services in the following Supporting Documentation:

- DP2-S02-Project and Construction Management Services
- DP2-S03-Principal Agent Services
- DP2-S04-Architectural Services
- DP2-S05-Quantity Surveying Services
- DP2-S06-Engineering Services
- DP2-S07-Terms of Reference for a Programme Manager (Implementing Agent)
- DP2-S08-Terms of Reference for Project Management).

The implementation of Framework Agreements (see CIDB Practice Note 15: Framework Agreements) is recommended for the provision of professional services when using the Design by Employer contracting strategy, because it will prevent the time delays normally associated with a separate professional services procurement stage. Task orders to proceed with a particular service may be given to PSPs where framework agreements are in place.

The Employer or his agents, in the Design by Employer contracting strategy, must also ensure that PSPs who are contracted to develop the design are afforded the opportunity to monitor the implementation of their designs in order to satisfy statutory obligations.

In each of the other contracting strategies referred to in Figure 3, the responsibility for developing the design is contractually assigned to the contractor and a separate professional services procurement stage will therefore not be required.

5.1.2 Design by Contractor

The selected contracting strategy shall, where design services by the contractor are required, normally determine when the procurement of a contractor can be initiated (see Table 2):
Table 2: Insertion point for Contractor Procurement Stage

<table>
<thead>
<tr>
<th>Contracting Strategy</th>
<th>Prerequisite for initiation of Contractor Procurement Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Contract</td>
<td>Availability of the Strategic Brief at the end of the Package Preparation Stage</td>
</tr>
<tr>
<td>Design and Construct</td>
<td>Availability of the Concept Report at the end of the Package Definition Stage</td>
</tr>
<tr>
<td>Design by Employer</td>
<td>Availability of the Production Information at the end of the Detail Design and Specification Stage</td>
</tr>
</tbody>
</table>

Figure 1 (per the CIDB Gateway System) provides a graphical interpretation of the information contained in Table 2. It shows that the “traditional” Design by Employer strategy results in a delivery method where Contractor inputs in the delivery process are delayed till the very latest. It is generally accepted that upfront availability of contractor inputs into the design processes should lead to increased efficiency during implementation and improved overall productivity.

Figure 2: Procuring the services of contractors to perform construction works where design services are required

Where framework agreements (see CIDB Practice Note 15: Framework Agreements) have been entered into with one or more framework contractors, either a single contractor needs to be appointed in terms of the framework contract to perform the works associated with the package or competition between framework contractors needs to be re-opened. Package orders need to be issued in accordance with the procedures contained in CIDB Practice Note 22: Gateway System at the point in the package cycle where the package information that is available enables the contractor to proceed with the work associated with his contract in terms of his framework contract.

5.2 Public Sector Infrastructure Project Management Methodologies

This module contains five methodologies for the management of infrastructure implementation projects:

- A methodology for projects or “packages” that do not require any design inputs (Figure 3) and where the services of a contractor need to be procured for the execution of the works
- A methodology for the Management Contract strategy (Figure 4) where the services of a contractor need to be procured for planning and managing all post-contract activities and for the performance of the whole of the contract.

**A methodology for the Design and Construct contracting strategy** (Figure 5) where the services of a contractor need to be procured for the development of the design (based on a concept report) as well as the execution of the works.

**A methodology for the Develop and Construct contracting strategy** (Figure 6) where the services of a contractor need to be procured for the detail design (based on a Design Development Report supplied by the Employer) as well as the execution of the works.

**A methodology for the traditional Design by Employer contracting strategy** (Figure 7) where the services of a PSP need to be procured for the development of the design and the services of a contractor need to be procured for the execution of the works.

The *Design by Employer* currently is the contracting strategy most frequently used in the South African public sector. Given the lack of management and technical capacity in the public sector, more attention needs to be given to the other contracting strategies. These strategies can typically be used in the following circumstances:

- The Develop and Construct contracting strategy can typically be used where Standard Designs are being utilised.
- The Design and Construct is typically regarded as the preferred strategy for projects where the Client has a clearly defined user requirement specification.
- The Management Contract is applicable if both the Client and the User do not have the capacity or expertise to manage the project.

The Infrastructure Project Management Framework as detailed in Table 1 serves as the foundation for the Public Sector Infrastructure Project Management Methodologies contained in Figure 3 to Figure 7.
Figure 3: Public Sector Project Management Methodology for Packages with no Design Inputs

Deliverables:
- PEPv1 (Strategic Brief)
- PEPv2 (Concept Report)
- IPiP

Tasks and Activities:
- Package Preparation
  - Prepare Strategic Brief
- Package Definition
  - Investigate alternatives
  - Analyse options
  - Prepare Concept Report
- Works Planning
  - Prepare implementation plans
- Contractor Procurement
  - Prepare Procurement Documents
  - Invite Tenders / Quotations
  - Conduct Site Inspection & Tender Clarification Meeting (optional)
  - Close and evaluate tender submissions
  - Formally accept tender offer
  - Compile Contract Document
- Practical Completion Gate
  - Administer contract in accordance with the terms and provisions and ensure compliance with requirements:
    - Site Meetings
    - Quality assurance
    - Site Instructions
    - Progress monitoring
    - Scope control
    - Payment certification
- Handover Gate
  - Finalise and assemble record information
  - Handover the works and record information to the user
- Closing Gate
  - Correct all defects detected during the defects correction period
  - Finalise all outstanding contractual obligations, including finalisation and payment of amounts due
  - Record updated asset information on Asset Register
  - Conduct Project Meeting

Milestones:
- Initiation of projects by User Departments based on Portfolio Planning Processes:
  - (1) identification of needs in terms of “Condition Gaps”
  - (2) listing of Potential Refurbishment/Renovation Projects on MTEF Project List
  - (3) approval of Infrastructure MTEF Budget
Initiation of projects by User Departments based on Portfolio Planning Processes:
2. Listing of Potential New Build or Conversion Projects on MTEF Project List
3. Approval of Infrastructure MTEF Budget

Figure 4: Public Sector Project Management Methodology for Management Contract Strategy
Initiation of projects by User Departments based on Portfolio Planning Processes:
(2) listing of Potential New Build or Conversion Projects on MTEF Project List
(3) approval of Infrastructure MTEF Budget

Figure 5: Public Sector Project Management Methodology for Design and Construct (D&C) Packages

Delivery Management Guidelines: DP2 - Project Management
Initiation of projects by User Departments based on Portfolio Planning Processes:
2. Listing of Potential New Build or Conversion Projects on MTEF Project List
3. Approval of Infrastructure MTEF Budget

**Tasks and Activities**

- **Package Preparation**
  - Prepare Strategic Brief
- **Package Definition**
  - Investigate alternatives
  - Analyse options
  - Prepare Concept Report
- **Works Planning**
  - Prepare implementation plans

**Control Gates**

1. Planning Gate
   - Approval of PEPv2 (Concept Report)
2. Design Development Gate
   - Approval of PEPv3 and Concept Design
3. Dev&C Contractor Procurement Gate
   - Approval of Contractor Tender Award
4. Design Gate
   - Approval of PEPv4 and Production/MFC Information
5. Practical Completion Gate
   - Approval of PEPv5 and Practical Completion
6. Handover Gate
   - Approval of PEPv6 and Works Completion
7. Closing Gate
   - Approval of PEPv7 and Close-out Report

**Deliverables**

- **PEPv1** (Strategic Brief)
- **PEPv2** (Concept Report)
- **IPIP**
- **PEPv3** (Concept Report)
- **Tender Documentation**
- **Evaluation Reports**
- **Dev&C Contract**
- **PEPv4** (Production Information)
- **Documentation and certificates required in terms of the contract PEPv5**
- **PEPv6**
- **PEPv7**
- **Contract Report(s)**
- **Close-out Report**
- **PEPv7**

**Figure 6: Public Sector Project Management Methodology for Develop and Construct (Dev&C) Packages**

**Milestones**

- Stage 1: Planning
- Stage 2: Design Development
- Stage 3: Dev&C Contractor Procurement
- Stage 4: Detail Design
- Stage 5: Works
- Stage 6: Handover
- Stage 7: Close-out

**Project Management**

Delivered to O&M
Initiation of projects by User Departments based on Portfolio Planning Processes:
(2) listing of Potential New Build or Conversion Projects on MTEF Project List
(3) approval of Infrastructure

Control Gates

Tasks and Activities

Deliverable

Figure 7: Public Sector Project Management Methodology for Design by Employer Packages

Delivery Management Guidelines: DP2 - Project Management
6. Guidelines for the Work to be done in each of the Implementation Stages

The Figure 8 below provides a detailed process map showing the project management stages.
6.1 The Planning Stage

The goals of Implementation Planning are to prepare, and obtain approval, for the implementation of projects or packages (a group of projects to be executed under one contract), and to summarise the approved implementation plans in Infrastructure Programme Implementation Plans (IPIPs) (at programme level).

The appointed Programme Implementing Organisation/Agent is responsible for the preparation of the IPIPs (Refer to Template DP2-T29).

6.1.1 Gateway Control Points and Milestones in the Planning Stage

Approval of the Infrastructure Programme Management Plan (IPMP) (Part 3 of which indicate the projects to be commenced with during the MTEF period) is normally regarded as the milestone for the “start” of Implementation Planning.

In practice these documents – the IPMP and the IPIP – are “live” documents which are updated continuously or at regular periodic intervals, i.e. monthly or quarterly. The programme planning and implementation planning processes should therefore be seen as concurrent, although Government’s planning and budgeting cycles do require formal and sequential approval of these documents at prescribed dates in each financial year. Implementation Planning is a continuous process, never to be considered as concluded or “finish”, but subject to periodic reviews of updated implementation plans.

Gateway Control Points in the Planning Stage:

- Approval of a Project Execution Plan (PEP v1) for each project or package (also known as a Strategic Brief) is a Control Gate (see CIDB Gateway System) and prerequisite for continuing with the Package Definition Stage.

Approval of the PEP v2 (also known as the Concept Report) is a Control Gate (see CIDB Gateway System) and pre-requisite for initiating the design stage (if required) or works stage as described in the various project management methodologies

6.1.2 Overview of the work to be done in the Planning Stage

The primary focus is the detailed planning of the projects to be implemented during the MTEF period. The planning processes can be divided into two distinct types:

- Planning for the completion of Active Projects (started during previous MTEF Periods)
- Planning for the commencement of Proposed Projects (scheduled to start during the current MTEF period).

When planning for the completion of Active Projects, the focus shall primarily be on cash flow forecasts for current project activities.

Planning for Proposed Projects shall primarily focus on the “Packaging” of projects, i.e. the identification of a “package” of projects to be implemented in one single contract. The packaging of projects shall be done based on the Programme Management Plans and MTEF Works Lists submitted by all User Departments.

6.1.2.1 The Package Preparation Sub Stage

The goal of the Package Preparation Process is to develop a PEPv1 (Strategic Brief) for each Package or project. The PEPv1 (Strategic Brief) is a record of all the requirements to meet the strategic objectives of the package. It forms the user requirement specification for the package from which the PEPv2 (Concept Report) will be developed during the package definition stage.
Packaging of projects is normally done by the user department as part of the procurement planning process. Packages shall however not necessarily be restricted to projects in one single programme and a user department may include projects from different programmes in a package.

The location and type of project may also result in the Implementing Organisation packaging or grouping projects from different user departments for implementation purposes. A “package” may therefore include projects from more than one user department and from more than one user programme.

“Packaging” of projects may be done based on the following project characteristics:

- Portfolio or programme assignment (e.g. all projects in one specific programme or portfolio)
- Location (e.g. projects listed in different programmes, but located in same town)
- Similarity (e.g. project listed by different departments, but of same type)
- Technical requirements (e.g. projects that require similar, specific and/or special skills)
- Existence of current “Framework Agreements” applicable to the type of work to be done.

Procurement strategies - as determined during the portfolio and/or programme management planning processes – are usually taken into consideration during the “Package Preparation” process. Deviations from these portfolio and/or programme procurement strategies should receive special mention in the PEPv1 (Strategic Brief) and should also be subjected to special approval.

Gateway Control Points and Milestones in the Package Preparation Stage

Approval of the PEPv1 (Strategic Brief) is a Control Gate (see CIDB Gateway System) and prerequisite for continuing with the work as proposed in the Strategic Brief.

Overview of the work to be done in the Package Preparation Stage

Once identified, each Package should be “prepared” in detail. The following activities form part of the Package Preparation Process:

- Defining the business need and client requirements
- Defining the project objectives
- Where necessary, the conducting of preliminary investigations or desk top studies to obtain package information
- Establishing the project criteria in terms of function, mix of uses, scale, location, quality, value, time, safety, health, environment and sustainability
- Identifying key constraints, statutory permissions and strategies to take the project forward;
- Confirming the scope of the package
- Establishing the control budget;
- Confirming organizational structure, rules, responsibilities and procedures for project implementation,
- Developing a PEPv1 (Strategic Brief) which sets out the package information including the procurement strategy to implement the package. (The PEPv1 contains Conceptual Time and Cost Estimates based on a Conceptual Scope Statement, with corresponding Cash Flow Forecast).

On larger multi-disciplinary projects it may be necessary to procure the services of professional service providers to assist with the development of a proper Strategic Brief. The typical tasks to be attended to by the professional service providers are as follows:

Project lead

- Establish need for specialist advice and studies and obtain such advice and studies
- Obtain outline statement from the client setting out the client’s requirements and objectives in respect of the package including cost and programme
- Identify stakeholders and facilitate the necessary consultations
Facilitate the development and finalization of the Strategic Brief
Obtain approval for strategic brief.

Design lead (if required)
- Co-ordinate advice and input of discipline specific consultants.

Discipline specific design consultant*/Cost consultant
* A consultant (Professional Service Provider) can be either an in-house or in-sourced professional
- Provide discipline specific advice and input into liaison with stakeholders and strategic brief
- Carry out, where instructed by the project lead, discipline specific initial studies and information gathering to assist in establishing the strategic brief
- Collaborate and assist with the preparation of the Strategic Brief
- Review with project team and comment on draft Strategic Brief
- Discuss with team client comments on Strategic Brief.

6.1.2.2 The Package Definition Sub Stage

Gateway Control Points and Milestones in the Package Definition Stage

Approval of the PEPv1 (Strategic Brief) is a pre-requisite for commencing with the detail planning of the work as proposed in the “package”. The detail planning is aimed at the development of a “package solution”. The findings of the “Package Definition Process” should be documented in a PEPv2 (Concept Report). Approval of the PEPv2 (Concept Report) is a Control Gate (see CIDB Gateway System) and pre-requisite for initiating the design stage, if required, or works stage as described in the various project management methodologies.

Overview of the work to be done in the Package Definition Stage

The Package Definition Process represents an opportunity for the development of different design concepts to enable the client to establish the feasibility of satisfying the package requirements as developed during the preparation stage. It also presents, through the testing of alternative approaches, an opportunity for the client to select a particular conceptual approach.

The key activities in the package definition stage are:
- Establishing the detailed brief, scope, scale, form, and cost plan for the package, including, where necessary, the obtaining of site studies and construction and specialist advice
- Determining the initial design criteria, design options, cost plan, and the selection of the preferred design option
- The production of a site development plan or other suitable schematic layouts of the works; and
- Drafting of the PEPv2 Concept Report based on information obtained during the package definition stage. (The PEPv2 contains Preliminary Time and Cost Estimates based on a Detailed Scope Definition with assignment of selected resources and corresponding cash flow forecast).

6.1.2.3 The Develop/Review IPIP Sub Stage

The Works Planning Stage is a portfolio or programme level process, which requires regular review and updating of the Infrastructure Programme Implementation Plans (IPIP; see Template DP2-T29) as prescribed in the Division of Revenue Act (DORA).

Gateway Control Points and Milestones in the Works Planning Stage
Approval of the PEPv2 (Concept Report) for a project or package is:

- A Gateway Control Gate for commencing with the execution of that project or package
- A trigger for the updating of the IPIPs (i.e. inclusion of the project details as contained in the approved Concept Report).

User Department acceptance of the updated IPIPs **is not a pre-requisite** for commencing with the execution of a project or package (as described in the project or package PEPv2 (Concept Report)); acceptance of the PEPv2 (Concept Report) is the only such prerequisite. Acceptance of the PEPv2 (Concept Report) should however be seen as the User Department **permission to proceed with the implementation of the work** as described in the Concept Report, and therefore necessitates the inclusion of the project or package in the IPIPS.

It is recommended that the Work IPIPs be updated monthly or at least quarterly in order to reflect newly approved packages/projects and changes (increase/decreased cost estimate, delayed/accelerated cash flow, etc) to the implementation of the active packages/projects.

The Works Planning Stage therefore is an on-going stage with no due completion date. The monthly or quarterly update of the IPIPs is a recommended practice to entrench and institutionalise implementation planning as a continuous function, thus ensuring that the annual due date for the submitting of the IPIPs shall complied with as a matter of course. These monthly/quarterly/annual due dates should be seen as repetitive planning Milestones for this stage.

**Overview of the work to be done in the Works Planning Stage**

**Drafting of Infrastructure Programme Implementation Plan (IPIP)**

An IPIP must be developed (by the Programme Implementing Organisation) for each Programme as detailed in the IPMPs received from User Departments. The IPIP serves as both a programme planning report and a programme control report. Drafting and updating of the IPIP should be done as follows:

- The IPIP shall be based on the detail contained in the PEPv2 for each project or package
- The IPIP is a high level summary of the planning detail contained in the PEPv2 and shall reflect:
  - the milestone dates for implementation of each project
  - the assigned resources for each project
  - the cash flow forecast based on the project/package scope of work for each project
- A package or project shall only be included in the IPIP on acceptance (by the User Department) of the Package/Project Concept Report
- The IPIP shall be updated to reflect the changes to the PEPs as recorded at the end of each stage of the project, or as and when changes and variations to the project necessitates updating of the PEPs. These updates should be done monthly or at least quarterly in order to continuously reflect the status quo of all projects in the programme
- The IPIP Financial Report shall include listing of the projects completed during the 2 years preceding the current MTEF Period. The actual expenditure on these projects (only projects completed during the 2 years preceding the current MTEF Period) shall be reported as follows:
  - Actual Expenditure in Year “Current -1”
  - Actual Expenditure in Year “Current -2”
  - Actual Expenditure in the years “Before -2”, i.e. the total actual expenditure in the years preceding Year “Current -2” (only if project completed in either Year “Current -1” or Year “Current -2”)
- For the current year, the IPIP Financial report shall show:
  - A: Budget for the year
  - B: Actual expenditure to date
  - C: Remaining budget for the year (A-B)
  - D: Forecast expenditure for the remainder of the year
  - E: Forecast over/under expenditure for the year (C-D)
6.2 The Design Development Stage

The goal of the Design Development stage is to produce the Detail Design and Specifications (Production Information) which will enable the Contractor to construct the required infrastructure according to the needs and requirements of the client.

6.2.1 Gateway Control Points and Milestones in the Design Development Stage

Client acceptance of the PEPv2 (Concept Report) compiled during the Package Definition Stage is defined as the major milestone that indicates the ‘start’ of the project design (if required). The Design Development Stage is defined as being “finished” on Client acceptance of:

- The Production Information (the detail design and specifications), or, if required
- The Manufacturing, Fabrication, and Construction Information, and
- The PEPv3 (summary of scope, cost and time impact resulting from the Production Information)

6.2.2 Overview of the work to be done in the Design Development Stage

6.2.2.1 Design Development Sub Stage

The goal of the Design Development Stage is to produce the Production Information, i.e. the final detailing, performance definition, specification, sizing and positioning of all systems and components enabling either:

- Construction (where the contractor is able to build directly from the information prepared), or
- The production of the manufacturing, fabrication and manufacturing information for construction.

This is in order to obtain approval and/or acceptance of the:

- Production Information (Detail Design and Specifications) and the
- PEPv3 (highlighting scope changes - and its impact on time and cost – resulting from the Detail Design and Specification processes).

Gateway Control Points and Milestones for the Design Development Stage

- Client acceptance of the PEPv2 (Concept Report) compiled during the Package Definition Stage is defined as a major milestone that indicates the ‘start’ of the project Design Development Stage (if required).
- The Design Development Stage is defined as being “finished” on Client acceptance of the Production Information (Detail Design and specifications) and the approval of Project Execution Plan v3.

Overview of the work to be done in the Design Development Stage
The work to be done in the Design Development Stage should always start with an analysis of the User Department’s needs and requirements as documented in the Concept Report, note that the extent of the design work is largely dependent on the project type.

Public sector infrastructure projects are often based on Standard Designs and Specifications and therefore do not require any conceptual development of a design and also eliminates the need for detailed design work except for general arrangement, foundation design and supply of municipal services.

Some projects may however require the development of (1) a concept design - for which the approval of the user or client department will be required (see CIDB Gateway System) – and (2) a detail design and specification to enable the construction of the required infrastructure.

**The Design Development Stage**

The goal of the Design Development Stage is to obtain Client acceptance of the PEPv3 (Design Development Report) setting out the integrated design for the package. The PEPv3 contains a Detailed Scope Statement and corresponding Time and Cost Estimates.

Assignment of typical tasks associated with the Design Development Stage of a multi-disciplinary project is as follows:

**Project lead**

- **Direct**:
  - project team considerations and investigations of alternative design solutions that comply with the package information, receive reports and obtain instructions from client
  - risk management process, allocate to project team risk mitigation actions, assess impact on package information, report to client and obtain instructions
  - value management process, allocate to project team proposals for value management, assess impact on package information, receive developed proposals, report to client and obtain instructions

- **Monitor**
  - progress of consultations with utility providers
  - finalization of design criteria
  - provision of principal elements to assist in establishing cost plan

- **Refine, obtain agreement and direct implementation of management procedures and reporting procedures**
- **Receive inputs from project team, assess impact on package information and, as necessary, submit to client and obtain instructions or agreement**
- **Manage and monitor liaison and consultations with statutory authorities to agree submission requirements, report to client and arrange payment of fees**
- **Prepare and assemble design development report and submit to client for acceptance**
- **Obtain client comments on or amendments to design development report, discuss with project team, advise on impact of any amendments or additional requirements, agree changes and resubmit design development report to the client for acceptance.**

**Design lead**

- **Refine design approach so that the design achieves the required quality, is co-ordinated within the project team and is in conformity with package information**
- **Co-ordinate work of discipline specific design consultants and cost consultant**
- **Give design direction to consideration of design options**
- **Give design direction and co-ordinate**
- **Provision of briefing information to specialists, and suppliers**
- **Integration of the design and requirements of project team**
- **Integration of the design and requirements of specialists and suppliers**
• Lead and co-ordinate liaison and consultations with statutory authorities to agree submission requirements.

**Discipline specific design consultant**

• Advise on updating design programme
• As the design develops, review compliance with regulations and advise on implications
• Collaborate and assist in preparing design development report
• Receive and with project team discuss client comments on or amendments to design development report, advise on impact of any amendments or additional requirements and changes
• With project team, develop design approach and periodically review so that the design achieves required quality, is co-ordinated and is in conformity with package information
• Prepare design options for elements of works and with project team test options against package information and agree preferred design option
• Develop strategy for use, cleaning and maintenance and subsequent construction
• Advise where elements of works are most appropriately designed (wholly or in part) by specialists or suppliers, provide briefing information
• Receive and advise on outputs of specialist studies and surveys and incorporate into the design
• Liaise with utility providers as necessary and incorporate into the design their requirements
• Prepare calculations in sufficient detail to facilitate and verify design development
• Finalise design criteria for works
• Develop actions for risk mitigation and assess with project team impact on package information
• Contribute to value management process and assess impact on package information
• Establish critical construction details, tolerances, performance tolerances and anticipated movements, defining critical co-ordination clearances
• Advise on scope of performance and prescriptive specifications, and procurement implications
• Liaise with project team and contribute to consultations with statutory authorities to agree submission requirements
• Prepare design development drawings defining detailed form, function and character of works with the primary components being defined in terms of overall size and typical detail, including general arrangement plans, sections, elevations and details in sufficient detail to show design intent
• Prepare outline specifications for components of works defining performance and quality
• Assemble design development drawings, outline specifications and agreed visualizations for inclusion in design development report.

**Cost consultant**

• Advise on updating design programme
• As the design develops, review compliance with regulations and advise on implications
• Collaborate and assist in preparing design development report
• Receive and with project team discuss client comments on or amendments to design development report, advise on impact of any amendments or additional requirements and changes
• Provide cost advice for development of design approach so that the design achieves required quality, is co-ordinated within project team and in conformity with package information
• Contribute to periodic reviews of development of the design for conformity with project team, assess need for changes, advise on impact on package information and incorporate agreed changes
• Update cost plan and advise on project budget
• Prepare cash flow forecasts and monitor expenditure against cost plan and report
• Advise on effect of market conditions including forecast of construction cost
• Prepare cost studies to assist project team in testing options
• Consider cost aspect of strategy for use, cleaning and maintenance and subsequent construction
• Receive and advise on outputs of specialist studies and surveys and incorporate into the cost plan
• Provide cost information for liaison with utility providers
• Support development of actions for risk mitigation and assess impact on package information with project team
Contribute to value management process and assess impact on package information with the project team
Receive information on principal elements to establish approximate quantities
Receive details of design development and prepare cost details for inclusion in the design development report
Assemble cost plan and reports for inclusion in design development report.

The Detail Design and Specification Stage

This process shall commence on User or Client acceptance of the PEPv3 (Design Development Report) produced during the Design Development Stage.

The goal of the Detail Design Process is to produce the Production Information, i.e. the final detailing, performance definition, specification, sizing and positioning of all systems and components and to obtain acceptance of the Detail Design and Specifications and approval of the PEP v4.

Assignment of typical tasks associated with the Detail Design and Specification Stage of a multi-disciplinary project is as follows:

Project lead

- Refine / initiate, obtain agreement and direct implementation of refined management procedures and reporting procedures
- Receive:
  - project team advice on scope, content, assembly, packaging and sequencing of Detail Design and Specification, and updating of design programme and report to client and obtain instructions
  - results of periodic review of the development of the design for conformity with package information and advice on need for change, advise on impact, submit to client and obtain instructions
- Monitor and manage development of Detail Design and Specification in conformity with package information
- Direct work of project team, allocate actions, assess impact on package information, report to client and obtain instructions
- Contribute to strategy for use, cleaning and maintenance and subsequent construction, report to client and obtain agreement
- Manage and monitor project team liaison and submissions to statutory authorities and report to client
- Receive Detail Design and Specification drawings and schedules of work sufficient for construction and assemble works information and undertake programme review

Design lead

- Co-ordinate work of discipline specific design consultants and cost consultant
- Co-ordinate advice on scope, content, assembly, packaging and sequencing of Detail Design and Specification and implementation of clients instructions
- Give direction to development of Detail Design and Specification in conformity with package information
- Give design direction and co-ordinate integration of the design requirements of project team and specialist and suppliers into package information
- Lead and co-ordinate project team liaison and making of submissions to statutory authority.

Discipline specific design consultant

- Advise on scope, content, assembly, packaging and sequencing of Detail Design and Specification and implement instructions
- Advise on updating design programme
- Develop Detail Design and Specification in conformity with package information
- Periodically review development of the design for conformity with package information, assess with project team need for changes and advise on impact on package information
- Incorporate non-material changes to the design
- Confirm strategy for use, cleaning and maintenance and subsequent construction
- Develop actions for risk mitigation and assess with project team impact on package information
- Contribute to value management process, develop proposals for value management and assess with project team impact on package information
- Integrate the design and requirements of project team into package information
- Integrate the design and requirements of specialists and suppliers into package information
- Prepare drawings and integrate information from specialists and suppliers
- Liaise with project team and contribute to submissions to statutory authorities
- Prepare Detail Design and Specification drawings and schedules of works sufficient for construction or preparation of manufacturing and installation drawings and production information by other project team members
- Receive confirmation of setting out information and dimension drawings
- Prepare detailed specifications for components of works for inclusion in scope of work, defining performance, quality, operating and maintenance requirements.

Cost consultant
- Advise on scope, content, assembly, packaging and sequencing of Detail Design and Specification and implement instructions
- Advise on updating design programme
- Support development of Detail Design and Specification in conformity with the package information
- Contribute to the periodic review of the development of the design for conformity with package information, advise on conformity with the package information, assess with project team need for changes and advise on impact on package information
- Contribute to confirmation of strategy for use, cleaning and maintenance and subsequent construction
- Advise on effect of market conditions including forecast of construction cost
- Support development of proposals for risk mitigation and assess with project team impact on package information
- Contribute to value management process, support development of proposals for value management and assess with project team impact on package information
- Review integration of the design and requirements of specialists and suppliers into package information for conformity with cost plan
- Receive Detail Design and Specification drawings and schedules of work sufficient for construction or preparation of manufacturing and installation drawings and undertake cost check exercise, monitor cost and update cash flow projections.

6.2.2.2 The Manufacture, Fabrication and Construction Information Sub Stage

The goals of the Manufacture, Fabrication and Construction Information Stage are for the Contractor to produce the manufacture, fabrication and construction information based on the Detail Design and Specification and to obtain the Client approval thereof.

Gateway Control Points and Milestones for the Manufacture, Fabrication and Construction Information Stage

Client acceptance of the PEPv4 and the Production Information (the Detail design and Specifications) are pre-requisites for the Contractor to start with the Manufacture, Fabrication and Construction Information Stage. The stage will be concluded with the Client’s acceptance of the manufacture, fabrication and construction information as prepared and submitted by the Contractor.
Overview of the work to be done in the Manufacture, Fabrication and Construction Information Stage

Assignment of typical tasks associated with the Manufacture, Fabrication and Construction Stage of a multi-disciplinary project is as follows:

**Design lead appointed by client (review service)**

- Coordinate work of discipline specific design consultants:

**Discipline specific design consultant appointed by client (review service)**

- Advise on need for instructions relating to MF&C information
- Review programme for submission of MF&C information to meet needs of procurement pre-installation testing, and construction programme
- Provide information required to clarify Detail Design and Specification drawings and specifications
- Receive and review MF&C information for general conformity with scope of work and consider need for amendments and resubmissions for further review and issue comments
- Advise on need to amend production information or design included in scope of work and assess impact on changes on package information with project team
- Advise on contractor’s proposals relating to elements of the works to be designed by contractor
- Receive and review samples of materials, components and assemblies for general conformity with scope of work and consider the need for amendments and resubmission for further review and issue comments
- Comment on contractor’s method statements in so far as they reflect on design intent of the works
- Monitor progress with completion of MF&C information
- Review operation and maintenance manuals for components and systems, record drawings and schedules of design criteria of works as constructed, for general conformity with scope of work information and completeness
- Update Detail Design and Specification, general arrangement drawings and schedules, incorporating changes instructed during construction.

**Design lead appointed by the contractor**

- Coordinate work of discipline specific design consultants.

**Discipline specific design consultant appointed by the contractor**

- Consider Detail Design and Specification and advise on issues requiring supplementary information or clarification
- Advise on design programme that meets needs of procurement, pre-installation testing, construction works contract and construction programme
- Regularly review design programme for receipt and issue of information, submissions for approval, and testing and commissioning during construction. Issue schedule of drawings and other information to be provided
- Develop actions for risk mitigation and assess impact with construction contract team / project team
- Contribute to value management process. Develop proposals for value management. With Construction Contract team / project team assess impact on construction works contract
- Request and obtain information required to clarify Detail Design and Specification drawings and specifications
- Prepare co-ordinated manufacture and installation drawings of elements and / or components and relevant testing and commissioning information, based on Detail Design and Specification. Integrate with construction, manufacture and installation drawings
6.3 The Works Stage

The goal of the Works Stage is to construct/deliver the works and to handover the completed works to the client.

6.3.1 Gateway Control Points and Milestones in the Works Stage

The “start” and the “finish” milestones for this stage is usually contractually defined, and therefore subject to the Form of Contract prescribed in the Tender Documentation.

There are three basic milestones commonly associated with constructions works, namely:

- The provision of access to the site by the client so that the works may commence
- The completion of the works so that the client can occupy or use the works
- The correction of all defects before the end of the defects liability period.

6.3.2 Overview of the work to be done in the Works Stage

6.3.2.1 The Construction/Delivery of the Works Sub Stage

The goal of the Construction/Delivery Stage is to create, alter (convert), renovate, refurbish or repair the infrastructure according to the specifications as described in the procurement documentation.

Gateway Control Points and Milestones in the Construction/Delivery Stage.

The “start” and the “finish” milestones for this stage is usually contractually defined, and therefore subject to the Form of Contract prescribed in the Tender Documentation.

**Example:** The JBCC Contract defines the signing of the contract between the Employer and the Contractor as being the “start” of the Construction Stage; the General Conditions of Contract (GCC) define the “start” as being the earliest of (i) the date of Site Handover or (ii) 14 days after the date of the award of the Tender. The construction is usually regarded as “completed” on the issuing of a Practical Completion Certificate. Both the Custodian and the User Department’s permission to issue such a Practical Completion Certificate is defined as the “finish” of the Works Stage of the project. The issuing of a Practical Completion certificate should be accompanied by an update of the project information in the PEPv5.

Overview of the work to be done in the Construction/Delivery Stage
The management processes and work to be done during this stage flow out of the contract between the employer and contractor. There are two component documents within contracts compiled in accordance with the CIDB prescripts:

- Contract data
- Scope of work

These two component documents are defined in SANS 10403 (Formatting and compilation of procurement documents) as follows:

- Contract data: document that states the applicable conditions of contract and associated contract-specific data that collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the contract
- Scope of work: the specification and description of the supplies, services, or engineering and construction works which are to be provided and any other requirements and constraints relating to the manner in which the contract work is to be performed
- Accordingly, the actions associated with this activity are to:
  - Perform the works in accordance with the requirements of the contract i.e. provide and manage the works in accordance with stated requirements and act in terms of the agreed administrative procedures
  - Bring the works to a state of readiness for occupation of the whole of the works, although some minor work may be outstanding.

The two parties to the contract are the contractor and the employer. Some forms of contract make provision for an employer’s representative to perform some of the administrative functions allocated to the employer. Others allocate most of the employer’s obligations to the employer irrespective of the specific details. The contractor is responsible for completing the works as defined in the contract in accordance with the drawings and specifications. Professional Service Providers are usually appointed to act as the employer’s representative or agent with the defined administrative duties. In addition, PSPs may, as part of the employer’s risk management process, provide an independent verification, to the level required by the employer, that the works are being completed in accordance with the requirements of the contract, that the designs are being correctly interpreted and that appropriate construction techniques are being utilised.

General Assignment of Duties

The contractor is typically responsible for activities such as:

- Provide construction camps, offices, storage facilities and workshops facilities for the due and proper fulfilment of the contract and those facilities for use by the employer and his agents
- Provide temporary and permanent works
- Provide plant, equipment, labour and materials
- Protection of existing services
- Testing and correction of defects
- Quality control
- Implement quality assurance programmes
- Prepare interim progress reports and payment claims (see template DP2-T02 and DP2-T18)
- Employ, where applicable, community labour in terms of the community resource plan approved by the project steering committee (see Template DP2-T27)
- Maintain daily records
- Health and safety measures.

PSPs, acting for the employer, are typically responsible for activities such as:

- Hand over site to the contractor (see Template DP2-T15)
- Approve contractor’s work programme, procedures and methods
Oversee liaison with controlling authorities
Evaluate variations to the contract (see Template DP2-T24)
Issue written instructions to change the scope of the contract (see Template DP2-T24)
Obtain approval for changes in time and cost
Administer interim payment claims, including the certification thereof (see Template DP2-T18)
Implement controls to confirm compliance with requirements
Monitor progress through site meetings, site visits and interim reports and payment claims (see Template DP2-T16) prepared by contractor
Ensure that design intent is achieved during construction
Monitoring that specific goals relating to preferences are monitored or requirements in poverty relief programmes for the employment of labour (see Templates DP2-T17 and 27)
Undertake completion inspection
Issue certificate of practical completion, works completion and final completion (see Templates DP2-T19, 20 and 21).

Contract Administration:

Site Meetings

Site Meetings must be held regularly and should be conducted based on a ‘standard’ agenda (Refer to Template DP2-T16). The main purpose of the meeting is to verify progress on site, to inspect the works in progress and to record issues that may result in possible delayed completion of the project.

All meetings should be minuted as a record of proceedings. Copies of the minutes should be distributed to all stakeholders.

Variations to the Contract

Variations to the contract which can impact on time for completion and the final cost of the contract include:
- Changing requirements by the employer
- Design changes made by the professional team
- Unforeseen events that impact on the project
- Unforeseen conditions that affect the works or the method of executing the works.

Variations should be recorded in detail with full assessment of the time and cost impact. Special effort should be spent on the determination of a possible “knock-on” effect, i.e. time and cost impact on other activities not clearly linked to the items as described in the variation order (VO) (Refer to Template DP2-T24). Variation Orders must be approved by the User Department before payment may be claimed on the work done as described in the Variation Order.

Monitoring of Progress

The Contractor is obliged to produce a work schedule (programme) as indication of the forecast progress of the works to completion. The Project Lead shall have to monitor the actual work against the planned progress in order to detect variation from the planned progress and to make conclusions about the project progress and the ability of the contractor to complete the works within the contractually stipulated time.

Completion of the works

The Contractor shall be entitled to receive a Certificate of Practical Completion (Refer to Template DP2-T19) when the Works have reached a stage which allows its use for its intended purpose without danger or undue inconvenience. If requested in writing by the Contractor when the Works are about to reach the said stage, the Engineer shall, within 14 days after the request, issue to the Contractor a written list setting out the work to be completed to justify the issue of such Certificate of Practical Completion.
As soon as the work referred to in the list has been duly completed, the Engineer shall issue to the Contractor and to the Employer a Certificate of Practical Completion. Upon the issue of the Certificate of Practical Completion:

- The Works shall be deemed to have been completed for the purposes of **Clause 43.1** (The Contractor must achieve Practical Completion by not later than the Due Completion Date, otherwise he will be liable, in terms of Clause 43.1, to pay penalties to the Employer)
- The Employer shall be entitled to take occupation of the Works (provided that the Contractor is given reasonable access to complete the Works in terms of the Contract)

Although the Employer may occupy and use the Works, the Contractor still has possession of the Works. This means that the Contractor is still responsible for loss or damage to the Works, unless the loss or damage is caused by the Employer.

The Certificate of Practical Completion must be accompanied by a further written list (commonly known as the “snag” list) setting out the work to be completed to justify the issue of a Certificate of Completion.

### 6.3.2.2 The Handover of Works Sub Stage

The goals of the Handover Stage include the preparation of the Operation and Maintenance guidelines (if applicable), capacitatiing of and handover to the department responsible for the ongoing Operations & Maintenance.

**Gateway Control Points and Milestones in the Handover Stage**

The Handover Stage commences with the issuing of a Practical Completion Certificate and its accompanying Works Completion List and is concluded (after completion and inspection of the works listed on the Works Completion List) with the issuing of a Works Completion Certificate (see Template DP2-T20) to the Contractor and an update of the project information in the PEPv6.

**Overview of the work to be done in the Handover Stage**

Commissioning is an essential and yet very often neglected part of the Handover Stage.

**Commissioning**

Commissioning is only relevant on projects where the works entail mechanical, electrical or processes to be a part of the final built asset. Examples, of where commissioning will form part of the project team’s responsibilities, are pipelines, reservoirs, process plants, assembly lines, etc. On completion of a section of the works, the contractor often prepares for the immediate occupation and use by the employer. This will entail the completion of the works to a state that will allow the employer to make use of a part or all of the works. Where the Employer will not gain advantage from the use of the works until all is complete, the contractor may commission the works in parts, or wait for the entire project to be completed before starting the commissioning process.

Commissioning entails the testing of the works under the normal (and sometimes above normal) working load that it will have to deal with under normal operations. The commissioning process ensures that there are no problems with the functioning of the works under normal or above normal loads.

Commissioning is frequently the only aspect of a project which does not receive the degree of attention commensurate with its importance. Commissioning is a site administration function, which if neglected or overlooked can result in major delays to the completion of projects. The establishment of a commissioning procedure is not complicated. A systematic approach is, however, fundamental to successful commissioning.
Commissioning is often regulated by statutory requirements, e.g. the commissioning of boilers. The quality of workmanship can be controlled relatively easily whilst the unit is being manufactured in a factory. However, when the unit arrives on site, the maintenance of high standards becomes more difficult and can only be ensured by strict adherence to properly planned procedures. In view of the exhaustive and time consuming procedures required before certificates of acceptance can be issued, it is in the employer’s interest to retain skilled operatives to ensure that installation is properly carried out.

Sophisticated electronic systems are often the cause of delayed commissioning. Because their testing requires all other systems to be either fully functional or simulated, they are invariably the last item to be completed, tested and commissioned. In order to minimise the risk of the overall commissioning being delayed by the commissioning of an electronic control system, the contractor and the employer should ensure that testing of electronic installations is commenced as soon as is feasible, even if much of this work is carried out off-site.

Off-site testing of software is often frequently undertaken using manually operated simulators. This enables the supplier of the software to test the system in a controlled dust-free environment. The control system is then installed on site towards the end of the commissioning process, when the installation of all other items has been fully tested and should merely require interfacing with the computers to complete the process. Integrated commissioning along the following lines is recommended:

**Pre-commissioning checklist**

- Identify all commissionable systems
- Establish the commissioning hierarchy, i.e. the priorities and the inter-relationships between systems
- Compile commissioning documentation, making reference to statutory requirements where applicable
- Plan the commissioning and ensure adequate time allocation.

**Commissioning checklist**

- Ensure that construction is complete and that identified defects have been dealt with
- Ensure that all commissionable systems are operational, e.g., that pipelines have been cleaned and infrastructure services connected
- Operate the works that are to be commissioned at the identified loading and simulate all eventualities to ensure proper operation.

**Handover**

A structured approach to the handover of the completed product to the Custodian and User Department is recommended. The Handover proceedings should be planned and recorded as a Site Meeting. The attendance of both the Custodian and the User Department’s Operation and Maintenance personnel is seen as crucial to the effectiveness of the Handover process.

**Completion of the Works**

As soon as the work referred to in the ‘snag’ list has been duly completed, the Engineer shall issue to the Contractor and the Employer a Certificate of Works Completion) (Refer to Template DP2-T20). Upon the issue of a Certificate of Works Completion:

- The Defects Liability Period start
- The Guarantee is returned to the Bank or Insurance Company which issued it
- Half the Retention Money which was deducted is paid to the Contractor
- Possession of the site is given back to the Employer
- Insurance of the works stops.

Please note that the Engineer shall be empowered to issue such Certificate of Works Completion leaving any work or the remedying of defects, as specified therein, to be completed by a date stated in the Certificate,
and the Contractor shall be obliged to complete the work specified by that date. Should the Contractor fail to complete the work by the specified date, the Defects Liability Period (if any) shall be extended in respect of that work by the amount of the additional time taken by the Contractor to complete the work specified.

6.4 The Close-out Stage

The objective of the Close-out Stage is to finalise the project after the handover of the completed product/service to the end user.

6.4.1 Gateway Control Points and Milestones in the Close-out Stage

The Close-out Stage and the Defects Liability Period commences with the issuing of the Works Completion Certificate and the accompanying List (if applicable). The end of the Defects Liability Period as defined in the Contract Data is normally regarded as the finishing milestone for the Close-out Stage, but finalisation of the Final Payment Certificate, professional fee payments and the compilation of the Close-out Report (Refer to Template DP2-T22) often delays the completion of this stage. The Custodian and User Department’s approval of the Close-out Report (which includes the final version of the Project Execution Plan) is therefore regarded as the completion milestone for both the stage and the project.

6.4.2 Overview of the work to be done in the Close-out Stage

This is an extremely important process of the project delivery cycle, since all record information is finalised, collated and carefully archived for future reference. From the contractor’s perspective, the finalisation and agreement of the final accounts is crucial to bringing about closure on the contract.

6.4.2.1 The Making Good of Defects

The "Defects Liability Period" commences on the issuing of the Certificate of Works Completion, or on the extended date as described above. During the Defects Liability Period the contractor has an obligation to make good defects in the materials and workmanship covered by the Contract.

The Works shall not be considered as completed in all respects until a Final Completion Certificate (Refer to Template DP2-T20). Shall have been delivered by the Engineer to the Employer and the Contractor stating the date on which the Works have been completed and all defects have been corrected in accordance with the Contract. Such Final Completion Certificate shall be delivered by the Engineer as soon as practicable after the completion of the whole of the Works or of the expiration of the Defects Liability Period. Upon the issue of the Final Completion Certificate:

- It shall be deemed that the Contractor has finished all his duties under the Contract
- Payment will be made of all outstanding monies, including the remaining portion of the Retention Money

The Contractor’s liability for any latent defects shall continue beyond the date of the Final Completion Certificate but the Employer shall have no claim against the Contractor arising out of any latent defect which first manifests itself later than 10 years after the issue of the Final Completion Certificate.

6.4.2.2 Contract(s) Close-out

The purpose of this Stage is to (1) formally verify that all contractors have completely and successfully fulfilled their obligations to the project, and (2) to update all paperwork and electronic files used for managing the contracts, in order to compile and archive a Contract File for each contract as future reference and for auditing purposes.

Verification of completed products/facilities
The purpose of this step is to obtain, from each person or organisation responsible for the administration of a contract, formal written notice of completion of that contract, in order to comply to the requirements of the contract. The Close-out of contracts should also be communicated to all stakeholders and Final Completion Certificates (see Template DP2-T21) shall be issued to the Contractors.

**Updating and archiving of Contract Files**

The purpose of this step is to compile Contract Files for future reference and specifically for auditing of the procurement processes. The Contract Files should be updated based on a prescribed index and should be archived in accordance with SCM requirements.

6.4.2.3 Administrative Close-out

**Archiving of As-built (Record) Information**

The purpose of this step is to ensure that As-built details, showing any amendments from the original designs and operational procedures, are prepared, submitted, approved and filed for future reference. The Drawing Registers and checklists should be used to ensure that all information is properly recorded and archived.

**Updating of Asset Register**

The purpose of this step is to capture all asset related data (financial and non-financial) on the Asset Register to serve as inputs in future infrastructure planning processes. Standard documentation should be developed for the recording of the updated asset data by the Project Team and, once captured a copy of the updated Asset Register should be submitted to the Project Leader to enable verification of the captured information.

**Close-out Review Meeting**

The purpose of this step is to conduct a Project Review Meeting in order to discuss and record the Lessons Learned during the implementation of the project. It is recommended that similar Review Meetings be conducted at the end of every phase of the project in order to ensure that inputs be obtained from all role players during every phase of the project. The success of this meeting is subject to proper presentation by all role players and stakeholders and acceptance by all that the ultimate goal should always be focused on continuous improvement of the delivery processes and not on personal or inter-departmental vendettas.

**The Close-out Report (Refer to Template DP2-T22)**

The Close Out Report is most often the only record of the events (both positive and negative) that occurred during the project. This document provides essential information to the employer when evaluating new projects and identifying the most appropriate methods to follow. It should as a minimum:

- Contain details of the final accounts and how they relate to the budget
- Outline any disputes that are unresolved
- Outline all events of significance during the project
- Indicate project and contract goals that were achieved goals
- Contain suggestions for improvements to projects of a similar nature
- Contain Final List of Drawings. i.e. the as-builds or record drawings.
- Final summary of project information in the PEPv7.

6.4.2.4 Post Project Evaluation

It should be noted that the proposed Capital Investment System for South Africa proposes that, for significantly big projects, the project cycle should be expanded to include monitoring through the construction and operational stage of the project, and once the project has reached its design life, a full evaluation must be carried out to assess whether the project has achieved its objectives and address the problems identified.

The size of the project will generally determine the extent of the evaluation to be done, the bigger the project, the more rigorous the evaluation will be.
6.5 The Procurement Stages

Depending on the selected delivery and contracting strategy, one or two procurement stages may have to be included in a project life span.

The objective of the PSP and/or Contractor Procurement Stages is to conclude a contract with a PSP and/or Contractor (the successful tenderer) for the planning and/or design and/or construction and/or implementation of the scope of work as described in the tender documentation.

6.5.1 Gateway Control Points and Milestones in the Construction Procurement Stages

A procurement stage shall commence with the advertisement of a Request for Tenders and shall be concluded with the User Department’s approval of (1) the Tender Award Recommendation and (2) the revised Project Execution Plan which shall contain revised Cost and Time Estimates based on the tendered prices received from the recommended Tenderers.

6.5.2 Overview of the work to be done in the Construction Procurement Stages

The work and management processes involved in the procurement of PSPs and/or CIDB-graded Contractors are described in the CIDB’s Construction Procurement Toolbox (see www.cidb.org.za). Strict adherence to the CIDB prescripts is the key to successful construction procurement.

The procurement process should result in the conclusion of contracts with PSPs or contractors who have both the capability and capacity to perform the contract.

The CIDB Standard Conditions of Tender - F3.13 - in this regard, states that “a contract shall not be awarded to a tenderer who cannot demonstrate that he possesses the necessary professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, and the personnel, to perform the contract.”

7. Programme Closing

The goal of the Programme Closing is to ensure a controlled closedown of the programme through the compilation and approval of a Programme Closing Report.

7.1 Gateway Control Points and Milestones in Programme Closing

The Closing Stage commences on verification by the Programme Management Board of the completion of all the projects in the programme, or, verification that the programme’s intended benefits have been achieved. The stage and the programme are regarded as “closed” on approval of the Programme Closing Report.

7.2 Overview of the work to be done in Programme Closing

The work to be done in this stage leads to the shutdown of the programme organisation and the termination of the programme budget allocation. The Programme Closing Report requires a report on the following matters:

- Demonstration that all programme benefits have been delivered
- Demonstrate that all contractual commitments have been fulfilled
- Demonstrate that all payments have been made to all service providers
- Demonstrate that all required documentation has been archived
- To transition ongoing activities such as product support to an operational support function
- Capture lessons learned.

8. Project Performance Management

A project, by definition is unique and time-bound and therefore although in our performance model, work gets done at both through projects and through operations, project level performance indicators differ radically from operational level indicators. For example, because of its uniqueness, project scope is often under pressure and scope change must be tightly controlled – we might therefore require an indicator to measure whether this happens.

From a project management perspective the project manager is interested in the performance of the project and here the project management best practice standards provides the project manager with extensive guidance on what indicators are available and how these can be used.

It is however important not to confuse the Departmental Project Manager’s performance measures and metrics with that of the Site Construction Manager. Whereas the latter will be interested in production and productivity metrics such as tons of reinforcing steel delivered to site and fixed, or perhaps in cubic metres of concrete placed, the former must only concern themselves with the key performance indicators. These would typically be restricted to understanding performance in terms of Scope; Cost and Budget; Time and Schedule; Quality and Safety; Risks and Issues.

The performance management process followed by a project manager is presented in the performance management practice guide. However in many cases where the project forms part of and is being controlled through a formal Programme the PMO will perform some of the performance management steps on behalf of all projects in the programme.

Before we present a few examples of project level input, activity and output indicators, it is necessary to explore a few project specific performance concepts.

8.1 Earned value management (EVM)

Earned value management is a commonly used method of project performance measurement. For more detail please refer to any good project management manual or to the PMBOK guide published by the PMI in the US. The key concepts of EVM are summarised below.

- EVM integrates scope, cost and schedule measures to help the project management team assess and measure project performance and progress. This technique requires the formation of an integrated baseline using three key dimensions or parameters, namely Planned Value (PV), Earned Value (EV) and Actual Costs (AC). The total PV for the project is also known as the Budget at Completion (BAC)
- Two variances are defined and measured, namely Schedule Variances (SV= EV-PV) and Cost Variances (CV=EV-AC).
- Two efficiency indicators are used, namely Schedule Performance Index (SPI= EV/PV) and Cost Performance Index (CPI=EV/AC)
Figure 9: Earned Value concepts illustrated

The Earned Value data in the s-curve graph shown in Figure 9, is for a project that is performing over budget (CV = -30; CPI = 0.5) and behind the work plan (SV=-15; SPI=0.67). If this trend continues, then the estimated cost at completion (EAC) could be double the current budget (EAC=BAC/CPI = 81/0.5=162).

8.2 Cost versus budget

A project budget is a controlled document defining the approved estimated project cost and once approved can only be changed through a formal budget change process.

Actual costs can vary from the approved estimates contained in the budgets. A cost performance index CPI (refer to the PMBOK standard for detail) is a measure of the value of work completed compared to the actual cost and measures the cost efficiency of work performed.

The Estimated Cost at Completion (EAC) is an estimated cost with forecasts updated throughout the execution of the project using new cost information reflecting current risks, potential claims, cost of scope and time overruns and so forth. It is a key indicator to determine whether the budget is sufficient.

8.3 Typical Project level Input, Activity and Output Indicators

8.3.1 Input indicators

- Cost Variance and Cost Performance Index indicators are examples of very useful input indicators. (refer preceding discussion on earned value)
- Indicators measuring human resource level variances are input indicators.

8.3.2 Activity indicators

- Schedule Variance and Schedule Performance Indices are activity indicators
• Production indicators are activity indicators not output indicators. Again, note that the Departmental Project Manager would only be interested in a very small number of Key production indicators such as meters of pipe laid on a pipeline project or tons of premix on a road project. Also note that the indicator must measure variance from planned.
• Productivity indicators are activity indicators. Again it is the variance one would be interested in, e.g. 1200 m trenching per day achieved versus 1000m/day planned tells the full story.
• Comparing cumulative with periodic indicators is valuable to confirm a contractor’s claim of acceleration for example
• Quality performance indicators are very useful activity indicators and measuring for example the number of Non-Compliance Reports issued by the Site Engineer or Architect is a good indication of how much trouble lies ahead
• Indicators measuring metadata from the issues log provides useful early warning, especially the ratio of closed versus open issues.

8.3.3 Output indicators

• Progress towards completion of major project deliverables is a useful output indicator, for example length of road completed in km or as a percentage of totals
• In addition to the obvious scope outputs, such as class rooms complete, it is necessary to measure project management outputs as well such as close-out reports, as-built drawings, final certificates etc.

8.4 Performance of the individual

The fourth performance roadmap step, namely “Review & Appraise Performance of Individuals responsible” for the performance of deploying the inputs, performing the activities and measuring the outputs is a vital imperative for the success of the performance management system. The performance processes and indicators discussed above will be meaningless if they are not mapped in a structured organised manner to the specific individuals responsible, AND if instances of poor or under-performance is not regularly followed by appropriate management action to address these. This process cannot only be performed once per annum through the formal appraisal process, but must be performed on a continuous day-to-day basis in interaction up and down the organisational chain of command based on the contents of the performance reports.